Courses

The University Catalog lists all courses that pertain to the West Lafayette campus. In order to view courses that are available at a given time, and the details of such courses, please visit the myPurdue Schedule of Classes.

To search for a group of courses within a number range, enter an asterisk to note the unspecified value in the course code or number field. For example, to search for all AAE courses at the 50000 level, enter 5* in the "Code or Number" box.

Aeronautical and Astronautical Engineering

AAE 19000 - Introduction To Aerospace Engineering

Credit Hours: 2.00. Emphasis on the nature of engineering and the engineering method, with special attention to aeronautical and astronautical problems; introduction to design. Typically offered Fall.

AAE 20000 - Undergraduate Sophomore Seminar

Credit Hours: 0.00. The courses are intended to provide a forum for guest speakers, organizational and informational meetings with undergraduates, and to provide a venue for discussion of professional development. Typically offered Fall Spring.

AAE 20300 - Aeromechanics I

Credit Hours: 3.00. Fundamental concepts and principles of bodies in motion, with applications to aeronautical and astronautical problems. Subjects covered include rectilinear motion, curvilinear motion, rotation, and plane motion. The static equilibrium and quasistatic equilibrium situations are treated as a part of motion in which the acceleration is zero. Problems involving impact, separation, work, and energy are considered. Typically offered Fall Spring.

AAE 20400 - Aeromechanics II

Credit Hours: 3.00. Loads on aircraft. Strain, stress, and equations of equilibrium. Description of aircraft structures and materials. Torsion of shafts. Fuselage and wing structures. Symmetrical bending and stiffness analysis of solid and stringer-panel box beams. Structural failures. Typically offered Fall Spring.

AAE 20401 - Aeromechanics II Laboratory

Credit Hours: 1.00. Introduction to strain gauges, dial gauges, and photoelasticity. Tensile test. Torsion of solid and hollow propeller shafts. Stress concentration around skin cut-outs. Bending of symmetrical box wing beams. Combined axial and flexural test of aircraft stringers. Buckling of slender stringers. Typically offered Fall Spring.

AAE 25100 - Introduction To Aerospace Design

Credit Hours: 3.00. The role of design in aerospace engineering. Introduction to aerodynamics, performance, propulsion, structures, stability and control, and weights. Layout and general arrangement of aerospace vehicles. Design concept generation and selection. Computational methods for design. Trade studies and graphical optimization. Conceptual design exercise involving aircraft, spacecraft, or both. Technical presentations and communication for aerospace engineering. Typically offered Fall Spring.

AAE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional experience in aeronautics and astronautics. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. Professional experience in aeronautics and astronautics. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 30000 - Undergraduate Junior Seminar

Credit Hours: 0.00. The courses are intended to provide a forum for guest speakers, organizational and informational meetings with undergraduates, and to provide a venue for discussion of professional development. Typically offered Fall Spring.

AAE 30100 - Signal Analysis For Aerospace Engineering

Credit Hours: 3.00. Signal processing and spectral analysis for aerospace engineering. Fourier and fast Fourier transforms. Vibration analysis; estimation of natural frequencies, wing vibrations. Introduction to linear circuits, operational amplifiers and filtering. Noise suppression. Typically offered Fall.

AAE 33300 - Fluid Mechanics

Credit Hours: 3.00. Kinematics of fluids and conservation equations for mass, momentum, and energy. Viscous and inviscid incompressible flow. Lift and drag in subsonic flow. Introduction to compressibility and boundary layers. Potential flow. Typically offered Fall Spring.

AAE 33301 - Fluid Mechanics Laboratory

Credit Hours: 1.00. A laboratory course designed to illustrate various aerodynamic phenomena. Experiments in incompressible viscous flow; flow measurement and visualization; laminar and turbulent boundary layers; wakes. Typically offered Fall Spring.

AAE 33400 - Aerodynamics

Credit Hours: 3.00. Incompressible airfoil and lifting line theory. Steady and unsteady, one-dimensional, linear and nonlinear flows. Normal shock waves. Steady, supersonic, two-dimensional linear and nonlinear flows. Oblique shock waves. Perturbation theory for wings and bodies. Design applications. Typically offered Fall Spring.

AAE 33401 - Aerodynamics Laboratory

Credit Hours: 1.00. A laboratory course designed to illustrate various aerodynamic phenomena. Airfoil pressure distribution. Finite wing lift, drag, and moment. Supersonic flow around bodies. Shock waves. Typically offered Fall Spring.

AAE 33800 - Thermal Sciences

Credit Hours: 3.00. A fundamental course covering a range of topics selected from the disciplines of engineering thermodynamics, fluid mechanics, heat transfer and combustion, with an emphasis on their application to propulsion. This is an entry level course to prepare students for advanced analysis of propulsion and energy systems. Upon completion of this course, students are expected to be able to apply fundamental principles to perform thermodynamic analysis for thermophysical problems involving fluid flow, heat transfer and combustion. Typically offered Fall Spring.

AAE 33900 - Aerospace Propulsion

Credit Hours: 3.00. Survey of air-breathing and rocket propulsion systems for AAE students not in the propulsion option. Thermodynamic cycles, analysis of air-breathing systems and components. Rocket Equation, rocket cycles, liquid and solid propellants, chemical equilibrium. Typically offered Spring.

AAE 34000 - Dynamics And Vibrations

Credit Hours: 3.00. Kinematics and kinetics of particles and rigid bodies. Topics include a particle in orbit, systems of particles, vibrations, Euler's equations of motion, Eulerian angles, and aerospace vehicle dynamics. Typically offered Fall Spring.

AAE 35103 - Aerospace Systems Design

Credit Hours: 3.00. Aerospace system lifecycle and design process. Stakeholder needs elicitation and requirements generation. Quality function deployment and hierarchical objective trees. Concept generation and creativity techniques. Introduction to safety, risk, cost and value analysis. Critical evaluation of the applicability of systems engineering techniques in specific contexts. Application of these techniques to a team semester design project. Typically offered Spring.

AAE 35200 - Structural Analysis I

Credit Hours: 3.00. Properties of wing and fuselage sections. Beam-column moments. Torsion of thin-walled and skin-stringer multiple-cell sections. Nonsymmetrical bending of skin-stringer wing sections. Flexural shear in open and closed thin-walled and skin-stringer sections. Loads and stresses in the rib system. Cutouts and shear lag. Modified beam theory for wing and fuselage design. Deflection by energy method. Introduction to composite structures. Typically offered Fall Spring.

AAE 35201 - Structural Analysis I Laboratory

Credit Hours: 1.00. Location of shear center. Torsion of thin-walled open and closed sections. Torsion of multiple-cell, thin-walled section. Nonsymmetrical bending of skin-stringer cross section. Shear lag effect. Bending of composite beam. Typically offered Fall Spring.

AAE 36100 - Introduction To Random Variables In Engineering

Credit Hours: 3.00. Events, sample space, probability, conditional probability, independence, random variables. Probability mass functions, density functions, and cumulative distribution functions. Derived probability density functions. Bernoulli, Poisson, and normal processes. Applications to engineering problems. Some fundamental limit theorems. Typically offered Fall Spring.

AAE 36400 - Control System Analysis

Credit Hours: 3.00. Modeling and analysis of dynamical systems with aerospace applications. Laplace transforms, transfer functions, block diagrams. Transient and steady-state response of dynamical systems. Root Locus, Bode, Nyquist methods for control systems analysis. Introduction to controller design. Typically offered Fall Spring.

AAE 36401 - Control Systems Laboratory

Credit Hours: 1.00. Enhance student awareness of control systems by providing hands-on experience using dynamic systems representative of air and space vehicles. Design of a control system from start to finish by mapping requirements into control solutions through the process of modeling, identification, and controller design (PID and Lead-Lag). Typically offered Fall Spring.

AAE 37200 - Jet Propulsion Power Plants

Credit Hours: 3.00. Basic operating principles and analysis of performance characteristics of jet propulsion systems (air breathing and rocket). Ramjet, turbojet, and turbofan cycle analysis. Analysis of flow through inlets, combustors, nozzles, compressors, turbines. Component matching. Liquid and solid propellant rockets. Not open to students with credit in ME 43800. Typically offered Spring.

AAE 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 39000 - Professional Internship

Credit Hours: 0.00. Professional experience in aerospace engineering. Program coordinated by the school with cooperation of participating employers. Students submit a summary report. Course may be taken more than once. Permission of department required. Typically offered Fall Spring Summer.

AAE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional experience in aeronautics and astronautics. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional experience in aeronautics and astronautics. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 39500 - Undergraduate Seminar

Credit Hours: 0.00. The course is intended to provide a forum for guest speakers, organizational and informational meetings with undergraduates and to provide a venue for assessment. Typically offered Fall Spring.

AAE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional experience in aeronautics and astronautics. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

AAE 39699 - Professional Practice Internship

Credit Hours: 0.00. Professional experience in aeronautics and astronautics. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

AAE 40000 - Undergraduate Senior Seminar

Credit Hours: 1.00. A lecture-demonstration series emphasizing evaluation of career options, identification and development of professional skills. Example of career-related topics include choosing a job, and post graduate education in engineering or other disciplines. Examples of professional skills topics covered include interviewing, writing, and ethics. Assessment of student achievement of AAE program learning outcomes. Typically offered Fall Spring.

AAE 41200 - Introduction To Computational Fluid Dynamics

Credit Hours: 3.00. Introductory course in the formulation and application of finite difference methods for solving fluid flow problems. Classification of partial differential equations and formulation of well-posed problems. Discrete approximation of partial differential equations: stability, consistency, and convergence. Finite-volume formulations. Survey of methods for solving hyperbolic, elliptic, and parabolic problems. Formulation of discrete boundary conditions. Application of methods to one- and two-dimensional flow problems. Typically offered Fall.

AAE 41600 - Viscous Flows

Credit Hours: 3.00. Navier-Stokes equations, boundary layer theory, frictional drag and heating, separation and transition. Turbulent flows. Computational methods for laminar and turbulent flows. Typically offered Fall.

AAE 41800 - Zero-Gravity Flight Experiment

Credit Hours: 3.00. Team-based design-build-test engineering experience to maximize the benefits of student participation in the NASA Reduced Gravity Student Flight Opportunity Program (or similar). Gravity, orbits, and weightlessness. Low-gravity capillary fluid physics, scaling laws, and components. Experiment design for multiple short zero gravity test times. Technical proposal writing, design for manufacturability, experiment fabrication, planning, testing, and execution. Typically offered Fall.

AAE 42100 - Flight Dynamics And Control

Credit Hours: 3.00. Flight vehicle rigid-body equations of motion; linearization via small perturbation techniques. Trim analysis, static and dynamic stability, aerodynamic stability derivatives and control effectiveness. Vehicle transfer functions, stability augmentation, aircraft handling qualities. Introduction to flexible vehicle effects. Typically offered Fall.

AAE 43900 - Rocket Propulsion

Credit Hours: 3.00. Flight mechanics and the propulsion system requirements for terrestrial and interplanetary flight. Basic principles and performance of solid and liquid chemical rocket propulsion systems. Elements of nuclear rockets, nuclear-electrical power systems, and electrical propulsion systems. Typically offered Fall.

AAE 44000 - Spacecraft Attitude Dynamics

Credit Hours: 3.00. Description of orientation, angular velocity, and angular acceleration in terms of direction cosines, Euler parameters, and angles. Forces and moments acting on space vehicles. Attitude stability of various types of satellites in circular and elliptic orbits. Spin stabilization and gravity gradient torques. Gyroscopic devices and energy dissipation. Introduction to attitude control. Typically offered Spring.

AAE 44300 - Industrial Practices Seminar

Credit Hours: 1.00. Students give oral presentations describing their employers and employment during their last coop/intern work session. Outside speakers from industry will also be solicited. Intended primarily for intern and cooperative students enrolled in A&AE. Permission of instructor required. Typically offered Fall Spring Summer.

AAE 45000 - Spacecraft Design

Credit Hours: 3.00. Senior students perform a team-based spacecraft design, requiring application of the education and skills developed in the aerospace curriculum. Components include analysis methods for preliminary design, development of an initial vehicle concept, and development of a complete numerical model of the mission, culminating in oral and written reports by the teams. Typically offered Fall Spring.

AAE 45100 - Aircraft Design

Credit Hours: 3.00. Senior students perform a team-based aircraft design, requiring application of the education and skills developed in the aerospace curriculum. Aircraft mission requirements include engine cycle selection and airframe/engine integration, performance, stability and control, structures, human factors, avionics, sensors, and manufacturing processes. The teams present oral and written reports on their designs. Typically offered Fall Spring.

AAE 45300 - Matrix Methods In Aerospace Structures

Credit Hours: 3.00. Matrix algebra and its programming. Energy principles and finite element formulation method. Coordinate transformation and assemblage. Stiffness, mass, and incremental stiffness matrices for aircraft elements - bar, beam, and shear panel. Analysis and design of wing box and fuselage structures using simple computer programs (static and dynamic). Typically offered Summer Fall Spring.

AAE 45400 - Design Of Aerospace Structures

Credit Hours: 3.00. Design/failure criteria for aerospace structures, materials selection, introduction to manufacturing methods, structural assemblies, component details, concurrent engineering, and interdisciplinary design teams. Typically offered Fall.

AAE 49000 - Special Problems In Aeronautical Engineering

Arrange Hours and Credit. Hours and credit to be arranged. Permission of instructor required. Typically offered Fall Spring Summer.

AAE 50700 - Principles Of Dynamics

Credit Hours: 3.00. Kinematics, fundamental laws of mechanics, constraints, and generalized coordinates. Lagrange's equations, virtual work. Application to particle dynamics, rigid body motion, and spacecraft dynamics. Knowledge of differential equations required. Typically offered Fall.

AAE 50800 - Optimization In Aerospace Engineering

Credit Hours: 3.00. Formulation of optimization problems encountered in aerospace engineering. Minima of functions and functionals, necessary conditions, calculus of variations, control formulation, two-point boundary-value problems. Applications to typical problems in aerospace engineering, such as optimal launch, minimum time to climb, maximum range, and optimal space trajectories. Typically offered Spring.

AAE 51100 - Introduction To Fluid Mechanics

Credit Hours: 3.00. The basic conservation equations are derived for a compressible viscous fluid, and then are specialized for applications in potential flow, viscous flow, and gas dynamics. Typically offered Fall.

AAE 51200 - Computational Aerodynamics

Credit Hours: 3.00. Finite difference methods for solving fluid flow problems. Review of classification of partial differential equations, well-posed problems, and discrete approximation of partial differential equations. Matrix and von Neumann stability analysis. Consistency and convergence. Grid generation: elliptic, hyperbolic, and transfinite mesh generation methods. Methods for solving the unsteady Euler equations: finite-volume formulations, flux-split and flux-difference formulations, shock-capturing, formulation of boundary conditions, artificial viscosity models, and multi-grid acceleration. Typically offered Spring.

AAE 51400 - Intermediate Aerodynamics

Credit Hours: 3.00. Thin airfoil theory and panel methods. Three-dimensional elementary solutions, lifting-line and lifting-surface models. Slender wing and slender body theory. Normal/oblique shock waves. One- and multi-dimensional flows and conical flows. Method of characteristics. Introduction to transonic flow, hypersonic flow, and airfoil design. Typically offered Spring.

AAE 51500 - Rotorcraft Aerodynamics

Credit Hours: 3.00. Introduction to Vertical Take-Off and Landing (VTOL) concepts and configurations. Rotor kinematics. Momentum and blade element theory. Rotor wakes and noise. Airfoil design for rotorcraft. Introduction to Computational Fluid Dynamics (CFD) techniques, rotorcraft performance, and design. Typically offered Fall.

AAE 51700 - Unsteady Aerodynamics

Credit Hours: 3.00. Review of inviscid fluid dynamics. Linearized flow theory; indicial and harmonic responses; panel methods for unsteady airfoils and wings. Simple applications to dynamic simulation and aeroelastic stability. Nonlinear theory for transonic flow; introduction to time dependent finite difference methods. FORTRAN programming used extensively. Typically offered Fall.

AAE 51800 - Low-Gravity Fluid Dynamics

Credit Hours: 3.00. Theory and design for control of liquid propellants in weightlessness. Gravity and orbits review. Satellite and space-probe acceleration environments. Capillary-dominated fluid dynamics: contact angle, surface tension, curvatures, and solution methods. Industry practice and current topics. Typically offered Fall.

AAE 51900 - Hypersonic Aerothermodynamics

Credit Hours: 3.00. Aerodynamics of satellites and planetary re-entry. Continuum hypersonic flow. Inviscid and viscous effects, boundary layers, and heat transfer. Shock and boundary-layer interactions. Equilibrium flow of high-temperature reacting gases. Nonequilibrium effects. Kinetic theory and rarefied flows. Direct simulation Monte Carlo techniques. Typically offered Fall.

AAE 52000 - Experimental Aerodynamics

Credit Hours: 3.00. Theory and application of experimental techniques and instrumentation for aerodynamics and fluid

mechanics. Computer data acquisition, wind tunnels, force balances, flow visualization, pressure probes, hot wire anemometry, laser Doppler velocimetry and turbulence measurements. Typically offered Spring.

AAE 53200 - Orbit Mechanics

Credit Hours: 3.00. Orbit determination of near-earth satellites and various perturbations; libration and attitude control; orbit transfer and interception; lunar theory and interplanetary orbits; ascending mechanics and re-entry. Typically offered Fall.

AAE 53500 - Propulsion Design, Build, Test

Credit Hours: 3.00. Intensive one-semester treatment of the aerospace propulsion component development process. Derivation of design requirements from mission objective to detailed components; the design process. Standard methods for thermostructural, life, performance, and combustion stability design analysis; combustor design. Experimental procedures; fabrication; test. Special topics according to student interest. Typically offered Spring.

AAE 53700 - Hypersonic Propulsion

Credit Hours: 3.00. Analysis of advanced high speed air breathing propulsion concepts for hypersonic flight. Missions and trajectories. Engine/airframe integration. Aerothermodynamic analysis of ramjets, scramjets, and oblique detonation wave engines. On- and off-design of compression inlets and minimum length nozzles. Cryogenic fuels and skin cooling. Ram accelerator ballistic launch concepts. Typically offered Spring.

AAE 53800 - Air Breathing Propulsion

Credit Hours: 3.00. (ME 53800) Analysis of operating characteristics of turbojet, turbofan, turboshaft, afterburning, and ramjet propulsion systems. Analysis and design of inlet, diffuser, combustor, compressor, turbine, nozzle. Component matching and off-design performance. Inlet distortion, nozzle-afterbody, and installation losses. Mission analysis. Typically offered Fall.

AAE 53900 - Advanced Rocket Propulsion

Credit Hours: 3.00. Generalized internal compressible and incompressible flows. Thermochemistry and heat transfer in rocket applications. Advanced topics in solid rocket motor performance and internal ballistics. Liquid rocket engine cycle analysis and turbopump design. Combustion of liquid and solid propellants. Hybrid rockets and thermal-nuclear engines. Typically offered Spring.

AAE 54600 - Aerospace Structural Dynamics And Stability

Credit Hours: 3.00. Dynamics of continuous systems: rod, beam, frame, and plate structures. General structural principles: virtual work, Hamilton's principle, Lagrange's equation, and Ritz method for discrete approximations. Modal analysis: eigenanalysis, mode shapes, mode superposition, and complex modes. Nonlinear vibrations: phase plane, Poincare, bifurcation plots, and chaos. Stability of the motion: classification of problems, follower loads, aerodynamic loads, divergence, flutter, pulsating compression, and gyroscopic systems. Typically offered Fall.

AAE 54700 - Experimental Stress Analysis

Credit Hours: 3.00. Theory and application of photoelastic, electric strain gage, and brittle lacquer methods of experimental solution of 2- and 3-D structures problems for static and dynamic loadings. Introductions to holography, moire, and photoviscoelasticity. Typically offered Spring.

AAE 55000 - Multidisciplinary Design Optimization

Credit Hours: 3.00. Basics of numerical optimization: problem formulation, conditions of optimality, search direction, and step length. Calculus-based techniques for univariate and multivariate optimization. Constrained and unconstrained optimization methods. Global optimization methods. Multi-objective optimization: Pareto optimality and approaches. Recent multidisciplinary design optimization techniques: approximations, response surface methodology, and collaborative optimization. Applications of various methods and techniques to representative engineering problems, culminating in a final project. Ability to solve mathematical problems with MATLAB and IMSL and similar software helpful. Typically offered Fall.

AAE 55100 - Design Theory And Methods For Aerospace Systems

Credit Hours: 3.00. Introduction to design theory, aerospace design process, design specification and requirements, concept generation and selection, design decomposition, improving designs, process design, and concurrent engineering. Design for assembly/manufacture. Projects allow for application and critical analysis of design methods. Typically offered Fall.

AAE 55200 - Nondestructive Evaluation Of Structures And Materials

Credit Hours: 3.00. Overview of methods employed for nondestructive evaluation of structures and materials taught in the context of damage tolerant structural analysis. Major inspection topics include: radiography, ultrasonics, eddy current, penetrant, magnetic, and visual/optical techniques. Other new emerging inspection techniques also are discussed. Offered in alternate years. Typically offered Spring.

AAE 55300 - Elasticity In Aerospace Engineering

Credit Hours: 3.00. A basic course in the theory of elasticity with emphasis on understanding the fundamental principles and solution techniques used in the stress analysis of structures. Cartesian tensors. Governing equations for linear elasticity. Rigorous derivation of beam and plate equations from the three-dimensional elasticity equations. Torsion. Thermoelasticity. The stress functions and complex functions approaches to two-dimensional problems. Energy methods and approximate solutions. Three-dimensional problems. Knowledge of differential equations assumed. Typically offered Fall.

AAE 55400 - Fatigue Of Structures And Materials

Credit Hours: 3.00. Development and application of methods for predicting the fatigue life of structural components. Characterization and response of materials to cyclic loading. Fatigue resistant design of aerospace structures. Both fatigue crack initiation and crack propagation concepts are discussed. Typically offered Fall.

AAE 55500 - Mechanics Of Composite Materials

Credit Hours: 3.00. Current and potential applications of composite materials. Review of elasticity of anisotropic solids. Methods for determining mechanical properties of heterogeneous materials. Static and dynamic analyses of laminated composites. Fracture and fatigue of laminates. Reliability, testing, and design of composites. Typically offered Spring.

AAE 55600 - Aeroelasticity

Credit Hours: 3.00. The study of the effect of aerodynamic forces of flexible aircraft. Static aeroelastic problems; control effectiveness; lift effectiveness; divergence. Dynamic aeroelasticity; classical flutter; an introduction to stability augmentation with controls. A review of standard and modern numerical solution techniques; the k-method, the British or p-k method. Typically offered Spring.

AAE 55800 - Finite Element Methods In Aerospace Structures

Credit Hours: 3.00. Introduction to the use of advanced finite element methods in the calculuation of deformation, strain, and stress in aerospace structures. Topics include: 1-D, 2-D, 3-D, and axisymmetric elements, isoparametric element formulation, convergence, treatment of boundary conditions and constraints. Special topics include stability, dynamic analysis, and nonlinear material behavior. Emphasis is on the theoretical knowledge of the finite element method. Applied experience is gained by solution of aerospace structural analysis problems through use of professional software. Typically offered Fall.

AAE 55900 - The Mechanics Of Friction And Wear

Credit Hours: 3.00. Introduction to tribology. Review of elasticity and Hertzian contact. Analytical and numerical methods for

non-Hertzian contact, including frictional and elastic-plastic contact. Surface roughness. Friction laws and frictional heating. Wear models and wear testing. Lubrication. Typically offered Spring.

AAE 56000 - System-Of-Systems Modeling And Analysis

Credit Hours: 3.00. Introduction to features of system-of-systems problems; problem definition tools; role of complexity; network topology analysis and agent-based simulation models; architecture analysis; metrics for multi-stakeholder problems; semester team projects allow students to exercise and critique such methods for analyzing system-of-systems problems. Some background in probability and statistics (e.g. random variables, probability density and distributions, sampling methods) is expected. Typically offered Spring.

AAE 56400 - Systems Analysis And Synthesis

Credit Hours: 3.00. State space methods of analysis and design of continuous and discrete-time linear systems. Coordinate transformations, Jordan canonical forms, digital control, controllability and observability of continuous and discrete systems. Liapunov stability analysis. The linear regulator problem of optimal control via Hamilton Jacobi theory. Pole assignment, stabilizability, detectability. State estimation for deterministic models. Minimal order observers. MA 51100 recommended concurrently. Typically offered Fall.

AAE 56500 - Guidance And Control Of Aerospace Vehicles

Credit Hours: 3.00. Optimal control theory and application to trajectory optimization; flight control synthesis and guidance law development; handling qualities; stability augmentation; auto-pilots. Launch vehicle and ballistic missile attitude control. AAE 56400 recommended. Typically offered Spring.

AAE 56700 - Introduction To Applied Stochastic Processes

Credit Hours: 3.00. An introductory course in the concept of a discrete and continuous stochastic process based upon physical phenomena that originally gave rise to the specific stochastic models that are studies. Spectral analysis, response of time invariant systems to noise inputs. Estimation theory, Kalman and Winer filtering. Typically offered Fall.

AAE 56800 - Applied Optimal Control And Estimation

Credit Hours: 3.00. This course introduces students to analysis and synthesis methods of optimal controllers and estimators for (stochastic) dynamical systems. The topics in this course include a review of probability and stochastic processes, classical estimation techniques, Pontryagin's maximum principle, dynamic programming. Linear Quadratic Regulator problems (LQR),

Kalman filter, duality of LQR with Kalman filter, Linear Quadratic Gaussian (LQG), and a range of engineering applications. Typically offered Spring.

AAE 57500 - Introduction To Satellite Navigation And Positioning

Credit Hours: 3.00. Introduction to radio-navigation techniques, using the Global Navigation Satellite System (GNSS); GNSS signal structures; satellite search and acquisition; satellite tracking; coordinate systems and time; observations; atmospheric effects; and position-velocity-time (PVT) solutions. Typically offered Fall.

AAE 59000 - Projects In Aeronautical Engineering

Credit Hours: 1.00 to 6.00. Topics vary - projects in Aeronautical Engineering. Permission of instructor required. Typically offered Fall Spring.

AAE 59500 - Aerospace Seminar

Credit Hours: 0.00. An interdisciplinary seminar that provides a forum for invited speakers and staff to discuss new developments in practice and current research in aerospace engineering. Typically offered Summer Fall Spring.

AAE 60700 - Variational Principles Of Mechanics

Credit Hours: 3.00. Basic concepts of analytical mechanics, calculus of variations, Hamilton's equations, Hamilton-Jacobi theory, canonical transformations. Offered in alternate years. Prerequisite: AAE 50700. Typically offered Spring.

AAE 61300 - Viscous Flow Theory

Credit Hours: 3.00. Compressible, laminar boundary layer theory; Buseman and Crocco integrals; skin friction and heat transfer. Introduction to turbulent boundary layers and transition phenomena. Advanced boundary layer theory; the method of inner and outer expansions. Boundary layers with chemical reaction; applications to hypersonic flow and combustion. Prerequisite: AAE 51100. Typically offered Spring.

AAE 61500 - Aeroacoustics

Credit Hours: 3.00. (ME 61500) Quantitative measures of sound (Decibel) scales, spectra, energetics of acoustic motions, and

measurement techniques). The wave theory of sound (basic equations and properties, sound propagation in homogeneous and inhomogeneous media, one-, two-, and three-dimensional sound fields, and distributed sources). Effects of source movement. Aerodynamic noise generation-acoustic analogy (Lighthill's equation and Ffowcs Williams-Hawkins equation). Introduction to Computational Aeroacoustics (CAA). Noise from turbulent shear flows (jet noise, cavity noise, and noise from flow over objects). Noise from turbomachinery, propellers, and rotors. Prerequisite: AAE 51100 or ME 50900 or ME 51300. Typically offered Fall.

AAE 62400 - Laminar-Turbulent Transition

Credit Hours: 3.00. Instability mechanisms, such as Kelvin-Helmholtz, Tollmien-Schlichting, Gortler, and crossflow. Secondary instabilities. Nonlinear and nonparallel effects; the Parabolized Stability Equations; receptivity; transition prediction. Effects of compressibility, heating, roughness, turbulence, noise, curvature, etc. Turbulent spots and the extent of transitional flow. Prerequisite: AAE 51100. Typically offered Fall.

AAE 62600 - Turbulence And Turbulence Modeling

Credit Hours: 3.00. Physical description of turbulence. Reynolds averaged equations. Scaling of basic turbulent flows. Homogeneous turbulence, spectra and two-point correlations. Hierarchy of turbulence models, including zero-, one-, and two-equation models, Reynolds stress models, large eddy simulations, and direct numerical simulations. Additional topics, such as compressibility effects on turbulence and probability density function methods, as time allows. Prerequisite: AAE 51100. Typically offered Spring.

AAE 63200 - Advanced Orbital Dynamics

Credit Hours: 3.00. Discussion of more advanced concepts in astrodynamics. Includes fundamental theories from celestial mechanics, as well as trajectory determination and perturbation analysis with application to the motion of Earth-orbiting and interplanetary spacecraft. Assumes experience with the two-body problem. Offered in alternate years. Prerequisite: AAE 50700, AAE 53200. Typically offered Fall.

AAE 64200 - Graduate Professional Practice

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. Approval by the student's adviser or major professor and by the Graduate professional practice administrator. Prerequisite: Approval by the student's adviser or major professor and by the Graduate professional practice administrator. Typically offered Spring Summer Fall.

AAE 64600 - Elastic Wave Propagation

Credit Hours: 3.00. Elastic wave propagation in rods, beams, and plates. Wave motion in semi-infinite bodies; Rayleigh, Lamb and Love waves. Pochhammer-Chree theory for rods. General properties of dispersive waves and approximation techniques. Impact. Wave front and ray methods. Introduction to wave propagation in anelastic and nonhomogenous media, and to large amplitude and shock waves. Prerequisite: AAE 55300 or ME 56300. Typically offered Fall.

AAE 65400 - Fracture Mechanics

Credit Hours: 3.00. Methods of stress analysis in elastic media containing cracks. Fracture criteria. The strain energy release rate and J-integral. Crack tip plasticity. Interface cracks. Cracks in anisotropic solids. Bending of cracked plates. Dynamic crack propagation. Prerequisite: AAE 55300. Typically offered Spring.

AAE 66600 - Nonlinear Dynamics, Systems, And Control

Credit Hours: 3.00. Fundamental concepts and tools that are useful in the analysis of nonlinear systems and in the design of controllers and estimators for such systems. Results are illustrated by, and applied to, aerospace/mechanical systems. Prerequisite: AAE 56400. Typically offered Spring.

AAE 66800 - Hybrid Systems: Theory And Analysis

Credit Hours: 3.00. Hybrid systems are dynamical systems with both continuous and discrete dynamics and they are finding increasing applications in a variety of engineering fields, even in scientific fields such as biological systems. This course will present the recent advances in modeling, analysis, control, and verification of hybrid systems. Topics covered in this course include the following aspects of hybrid systems: continuous-time and discrete-event models; reachability analysis; safety specifications and model checking; optimal control and estimation of hybrid systems; stability analysis and verification tools; stochastic hybrid systems; numerical simulations; and a range of engineering applications. Prerequisites: AAE 56400. Typically offered Fall.

AAE 69000 - Advanced Aeronautical Engineering Projects

Credit Hours: 1.00 to 6.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

AAE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

AAE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Aerospace Studies

AFT 11000 - Foundations Of Air Force I

Credit Hours: 1.00. A survey of officership, professionalism, communications skills, the organization of the Air Force, and the missions of the various Air Force major commands. Emphasis is placed on helping students understand what they would experience as an Air Force officer. Typically offered Fall.

AFT 11100 - Air Force ROTC Leadership Laboratory I

Credit Hours: 1.00. Introduction to military training. Introduction to drill and ceremonies, study and experience in Air Force standards, customs and courtesies. Typically offered Fall.

AFT 12000 - Foundations Of Air Force II

Credit Hours: 1.00. A survey of Air Force installations design and location, Air Force professions, principles of flight, geopolitics, defense policy and strategy, terrorism, and the Air Force's partner services in the Department of Defense. Emphasis is placed on helping students understand what they would experience as an Air Force officer. Typically offered Spring.

AFT 12100 - Air Force ROTC Leadership Laboratory II

Credit Hours: 1.00. Reinforces Air Force military training, drill and ceremonies, study and experience in Air Force standards, customs and courtesies. Typically offered Spring.

AFT 23000 - The Evolution Of USAF Air And Space Power I

Credit Hours: 1.00. Examines the development of air power from the beginning of manned flight through World War II. It traces the development of various concepts of employment of air power in this era and focuses upon factors that have prompted research and technological change. The impact of leadership on the development of Air Force doctrine is explored. Typically offered Fall.

AFT 23100 - Air Force ROTC Leadership Laboratory III

Credit Hours: 1.00. Cadets experiment with and develop leadership/management skills. Study of Air Force customs and courtesies, drill and ceremonies, and giving military commands; instructing, correcting, and evaluating the preceding skills, and study the Air Force officer environment. Typically offered Fall.

AFT 24000 - The Evolution Of USAF Air And Space Power II

Credit Hours: 1.00. Examines the development of air power from the end of World War II to the present. A variety of events and elements in the history of air power are stressed, especially where these provide significant examples of the impact of air power on strategic thought. The use of air power as an instrument of national power in dealing with a number of world crises is explored. Typically offered Spring.

AFT 24100 - Air Force ROTC Leadership Laboratory IV

Credit Hours: 1.00. Cadets continue with emphasis on field training preparation, developing leadership/management skills. Study of Air Force customs and courtesies, drill and ceremonies, and giving military commands; instructing, correcting, and evaluating the preceding skills, and study the Air Force officer environment. Typically offered Spring.

AFT 35100 - Air Force Leadership Studies I

Credit Hours: 3.00. Focuses on a study of leadership and management fundamentals, leadership ethics, and communicative skills required of Air Force lieutenants. Case studies are used to examine Air Force leadership and management situations to demonstrate and exercise practical application of concepts being studied. Typically offered Fall.

AFT 35200 - Air Force ROTC Leadership Laboratory V

Credit Hours: 1.00. Intermediate level leadership experience for military training cadets. Cadets lead the planning, coordinating, and directing of military activities for the cadet corps; provide formal training and guidance to increase the understanding, motivation, and performance of other cadets. Typically offered Fall.

AFT 36100 - Air Force Leadership Studies II

Credit Hours: 3.00. Continuation of AFT 35100, with emphasis on the management functions of planning, organizing, and controlling. Communication skills are developed through oral briefings and writing assignments. Air Force officer professional knowledge requirements are introduced. Air Force case analyses simulate real-life situations. Typically offered Spring.

AFT 36200 - Air Force ROTC Leadership Laboratory VI

Credit Hours: 1.00. Advanced leadership experience for field training preparation cadets. Cadets lead the planning, coordinating, and directing of military activities for the cadet corps; provide formal training and guidance to increase the understanding, motivation, and performance of other cadets. Typically offered Spring.

AFT 47100 - National Security Affairs I

Credit Hours: 3.00. This course examines the factors that play a part in the formulation of American defense policy, with particular emphasis on current issues. This policy uniquely combines aspects of American government, public administration, international relations, management, and economics. Typically offered Fall.

AFT 47200 - Air Force ROTC Leadership Laboratory VII

Credit Hours: 1.00. Advanced leadership experience for introductory military training cadets. Cadets lead the planning, coordinating, and directing of military activities for the cadet corps; provide formal training and guidance to increase the understanding, motivation, and performance of other cadets. Prepare for active duty. Typically offered Fall.

AFT 48100 - National Security Affairs II

Credit Hours: 3.00. Continuation of AFT 47100, with special emphasis on the role of the Air Force officer in the formulation and implementation of defense policy. Preparation for active duty and a review of the military justice system is also covered this semester. Typically offered Spring.

AFT 48200 - Air Force ROTC Leadership Laboratory VIII

Credit Hours: 1.00. Advanced leadership experience for field training preparation cadets. Cadets lead the planning, coordinating, and directing of military activities for the cadet corps; provide formal training and guidance to increase the understanding, motivation, and performance of other cadets. Prepare for active duty. Typically offered Spring.

African American Studies

AAS 27100 - Introduction To African American Studies

Credit Hours: 3.00. Introduction to the philosophical and methodological principles underlying Afro-American studies. Dimensions of the black experience, including history, education, politics, psychology, economics, religion, social organization, and art, will be covered, and the requisite academic tools and sources will be examined. Typically offered Fall Spring Summer.

AAS 27700 - African American Popular Culture

Credit Hours: 3.00. This course focuses on the production of popular culture through African-based and non African-based traditions among African Americans in the United States. Pop culture forms covered include film, theatre, visual arts, literature, dance, sports, music and religious traditions. Typically offered Summer Fall Spring.

AAS 35900 - Black Women Writers

Credit Hours: 3.00. (ENGL 35900) This course introduces students to the rich and varied literary texts produced by black women writers. Literary analysis, along with a consideration of historical, cultural, gender, and racial contexts will be emphasized. Typically offered Summer Fall Spring.

AAS 37000 - Black Women Rising

Credit Hours: 3.00. This course examines the rise of black women and their impact on economic, social, and cultural issues. Typically offered Fall Spring.

AAS 37100 - The African American Experience

Credit Hours: 3.00. Focus on specific topics of the personal experiences of blacks, in Africa and the diaspora, including black identity, black culture, and the relationships between blacks and society. Typically offered Fall.

AAS 37300 - Issues In African American Studies

Credit Hours: 3.00. Focuses on a specific topic that relates to selected issues in the life, history, and culture of peoples of African ancestry. Typically offered Fall Spring.

AAS 37500 - The Black Family

Credit Hours: 3.00. This course considers and examines the black family as a social institution, focusing on both recent research as well as more descriptive accounts of issues concerning the black family. Typically offered Fall Spring.

AAS 37600 - The Black Male

Credit Hours: 3.00. This course examines critically the factors contributing to the deteriorating status of African American males and the positive ways of coping with that experience. Includes an overview of research perspectives defining current knowledge on the subject. Typically offered Fall Spring.

AAS 37700 - African American Sexuality And Society

Credit Hours: 3.00. This course focuses on the history of ideas, approaches, and paradigms that have shaped and defined our understanding of Black sexuality through engaging stereotypes, symbols, and images that have influenced the sexual attitudes and behavior of African Americans. Typically offered Summer Fall Spring.

AAS 39200 - Caribbean History And Culture

Credit Hours: 3.00. (HIST 39200) This course introduces students to the rich and varied literary texts produced by black women writers. Literary analysis, along with a consideration of historical, cultural, gender, and racial contexts will be emphasized. Typically offered Summer Fall Spring.

AAS 47300 - Blacks In Hollywood Film

Credit Hours: 3.00. A history of the representation of blacks in mainstream film throughout the twentieth century. Typically offered Fall.

AAS 47400 - Research Methods In African American Studies

Credit Hours: 3.00. This course covers research techniques used by researchers to observe and to interpret scholarly investigation on race, class and gender from an African-American perspective. Typically offered Summer Fall Spring.

AAS 49000 - Directed Readings In African American Studies

Credit Hours: 3.00. This course allows students to create an independent course of study with an instructor on a topic relevant to the African, African American, or African Diasporic experience. Typically offered Fall Spring Summer.

AAS 49100 - Special Topics In African American Studies

Credit Hours: 1.00 to 4.00. Special Topics in African American Studies addresses special topics or projects under the direction of the instructor in the field of African American or African Diasporic Studies. The course may vary from 1-4 credit hours. It may be taught as a lecture or as a lecture with a lab. Typically offered Fall Spring Summer.

AAS 57400 - Research Methods In African American Studies

Credit Hours: 3.00. This course covers techniques used by researchers and to interpret scholarly investigation on race, class and gender from an African American perspective. Typically offered Fall Spring.

AAS 57500 - Theories Of African American Studies

Credit Hours: 3.00. This course addresses the development of an African American intellectual tradition. The course will span disciplines and swathes of time in order to understand how scholars not only created new ideas but developed theories that shaped and changed academic inquiry. Typically offered Fall Spring.

Agricultural and Biological Engineering

ABE 20100 - Thermodynamics In Biological Systems I

Credit Hours: 4.00. Thermodynamic principles associated with biological systems and processing of biological materials. Emphasis on the first law of thermodynamics. Fundamentals of steady-state mass and energy balances for reacting and non-reacting processes including multiple unit operations emphasizing living systems and bioprocessing. Applications of the first law conservation of energy to biological systems, energy conversion systems, and the environmental impacts of energy production. Development of engineering problem solving skills via MathCad and MatLab software. Laboratory emphasizes combining technical engineering skills with professional skill development through computer and laboratory exercises including two extensive projects that result in a biological product design. Typically offered Fall.

ABE 20200 - Thermodynamics In Biological Systems II

Credit Hours: 3.00. Thermodynamic principles and their applications to biochemical and biological systems with emphasis on the second law of thermodynamics and use of molecular interpretations of energies and entropies. Concept of entropy balances and process efficiency. Free energy and chemical equilibrium. Equilibrium between phases, colligative properties, binding of ligands and formation of biological membrances. Molecular motion and transport properties and their application in biochemical analytical methods. Development of physical chemical problem solving skills using MathCad and MatLab software. Typically offered Spring.

ABE 20500 - Computations For Engineering Systems

Credit Hours: 3.00. Development of engineering problem solving and design skills. Use of Excel, Matlab, and MathCad for problem solving, data analysis, numerical modeling, and statistics. Introduction to elementary statics, dynamics, materials, thermodynamics, fluid mechanics, and energy topics. Typically offered Fall.

ABE 21000 - Thermodynamics Principles Of Engineering And Biological Systems

Credit Hours: 3.00. Application of thermodynamic principles to the design and operation of biological and engineering systems. The focus is on mass and energy balances for non-reacting processes and on the second law of thermodynamics. These principles are applied to biological and agricultural engineering systems. Specific topics include refrigeration systems, power cycles, energy conversion systems, and environmental impacts of energy production. Typically offered Spring.

ABE 28100 - Professional Internship

Credit Hours: 0.00. Supervised professional experience in agricultural and biological engineering. Program conducted under the direction of an engineering faculty member and with the cooperation of an employer. Student submits a summary report. Permission of department required. Typically offered Fall Spring Summer.

ABE 29000 - Sophomore Seminar

Credit Hours: 1.00. Current agricultural and biological engineering issues will be discussed by students, staff, and guest speakers. Career planning, employment opportunities, professionalism, ethics, and improvement of communication skills will be emphasized. Typically offered Fall.

ABE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ABE 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ABE 30100 - Modeling And Computational Tools In Biological Engineering

Credit Hours: 3.00. Introduction to principles of analysis, setup, and modeling of biological systems using fundamental principles of engineering. Development of algebraic and differential models of steady state and transient processes involving material and energy balances, elementary thermodynamic, transport, and kinetic reaction principles, and economics in biological engineering systems. Typically offered Fall Spring.

ABE 30300 - Applications Of Physical Chemistry To Biological Processes

Credit Hours: 3.00. Physical chemical principles associated with transport of mass, momentum and energy in bioprocesses. Principles for measuring physical chemical properties, a description of predictive equations for their evaluation and the role of these principles in the design and optimization of bioprocesses. Typically offered Fall.

ABE 30400 - Bioprocess Engineering Laboratory

Credit Hours: 3.00. Laboratory course focused on bioprocessing topics such as fluid flow, mixing, rheology, hydrolysis, and fermentation of biomaterials. Students will participate in design of experiments, system set up, data collection, statistical data analysis, and presentation of results. Typically offered Spring.

ABE 30500 - Physical Properties Of Biological Materials

Credit Hours: 3.00. Physical properties of agricultural crops and food products and their relationship to harvesting, storage, and processing. Physical properties covered include: density, shape, moisture content, water potential, water activity, friction and flow or particulate solids, terminal velocity, thermal properties, interaction with electromagnetic radiation, and viscoelastic behavior of solids. Typically offered Fall.

ABE 30700 - Momentum Transfer In Food And Biological Systems

Credit Hours: 3.00. Fluid statics, Newton's law of viscosity, shell momentum balances, equations of continuity and motion, one dimensional flow problems, flow through porous media, velocity distributions with more than one independent variable, two dimensional flow through a channel, stream function, velocity potential, dimensional analysis, boundary layer, turbulent flow, Reynolds stress, form and skin friction, application of macroscopic momentum and mechanical energy balances to engineering problems. Typically offered Fall.

ABE 30800 - Heat And Mass Transfer In Food And Biological Systems

Credit Hours: 3.00. Principles of transport of energy and mass. Mechanisms of heat transfer, heat conduction, heat convection and heat radiation. Development of applications using macroscopic and microscopic balances of energy. Application of thermal energy balances and Fourier's Law to describe steady state and transient conduction applications including heat generation. Effect of the geometry on these processes. Basic principles of design of heat transfer equipment and its operation. Application of species mass balances and Fick's Law to steady state and transient diffusion problems. Effect of geometry on these processes. Analogies between transport of momentum, heat and mass applications to the solution of practical problems in the Food Process and Biological Engineering fields. Typically offered Spring.

ABE 31000 - Thermodynamics Of Food And Biological Systems

Credit Hours: 3.00. Basic concepts of thermodynamic energy and entropy functions applied to food and biological systems. Equations of state, phase rule, non-ideality, fugacity, activity models, vapor-liquid equilibria, colligative properties, osmotic pressure, ionic solutions, active transport, ATP cycle, characterization of macromolecules, chemical reaction equilibria. Typically offered Fall.

ABE 31400 - Design Of Electronic Systems

Credit Hours: 3.00. Fundamental aspects of circuits, microprocessors, transducers, sensors, instrumentation, and data acquisition are presented, with particular emphasis on electronic systems used in agricultural, biological, and food applications. Laboratory exercises used to apply the course material to constructing and testing circuits, microprocessor controlled systems, and the data collection and monitoring of systems. Typically offered Spring.

ABE 32000 - Solid Modeling, Simulation, And Analysis

Credit Hours: 3.00. Introduction to parametric, feature-based solid modeling; dimensioned 2D and 3D engineering drawings; tolerancing; mechanical dynamic simulation; kinematic models, analysis and simulation of simple linkages and complex systems; mechanism design and evaluation; visualization and animation of results; interfacing of computer aided engineering software. Projects involving industrial parts and assemblies will be discussed and assigned. Typically offered Spring.

ABE 32500 - Soil And Water Resource Engineering

Credit Hours: 4.00. Interrelationships of the plant-water-air-soil system; hydrologic processes; protection of surface and ground water quality; GIS targeting of soil and water protection measures; and design of subsurface and overland drainage systems, irrigation systems, and soil erosion control practices. Typically offered Fall.

ABE 33000 - Design Of Machine Components

Credit Hours: 3.00. Introduction to design; stress analysis; deformation and stiffness considerations; static and fatigue strength design; design of components of the food processing, farm and off-highway machines, and mechanical systems. Typically offered Spring.

ABE 33600 - All Terrain Vehicle Design

Credit Hours: 3.00. A structured approach to the design process, including innovation, analysis, evaluation, documentation, and presentation. Design areas typically focus on machinery and vehicles related to agricultural applications. During the first two weeks, the students will define their design problem, statement of work, approach, and timeline. Their final report will summarize the design process and the steps used to solve the proposed problem. All students will give a brief presentation of their design during the last weekly lab meeting. Typically offered Spring Summer.

ABE 37000 - Biological/Microbial Kinetics And Reaction Engineering

Credit Hours: 3.00. Study of the rates of chemical/biochemical reaction and catalysis in agricultural, food, and biological systems with applications to engineering process design. Applications include microbial growth, enzyme catalysis, fermentation and reactor design. Introductory enzymatic and microbial reaction concepts will be taught and incorporated into reactor design. Typically offered Spring.

ABE 38199 - Professional Practice Coop I

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Permission of department required. Professional Practice students only. Typically offered Fall Spring Summer.

ABE 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ABE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ABE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ABE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ABE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ABE 39699 - Professional Practice Internship

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ABE 43500 - Hydraulic Control Systems For Mobile Equipment

Credit Hours: 3.00. Design of basic fluid power components and systems. Includes power steering, hydrostatic and hydromechanical transmission, electrohydraulic servovalves, servomechanism, and manually controlled systems. Typically offered Fall.

ABE 44000 - Cell And Molecular Design Principles

Credit Hours: 3.00. This course examines the design principles underlying the organizations and dynamics of biological networks with an emphasis on genetic/molecular circuits. Topics include the structure and tuning of network motifs and relationship to performance parameters such as robustness to internal noise, temporal response, noise filtering, bi-stability, pattern generation and temporal programs. Examples are presented from the study of natural systems and the design of new synthetic systems. Typically offered Spring.

ABE 45000 - Finite Element Method In Design And Optimization

Credit Hours: 3.00. Fundamentals of the finite element method as it is used in modeling, analysis, and design of thermal/fluid and mechanical systems; one- and two-dimensional elements; boundary value problems, heat transfer and fluid flow problems; structural and solid mechanics problems involving beam, truss, plate and shell elements; computer-aided design and optimization of machine components, structural elements and thermal/fluid system. Typically offered Fall.

ABE 45700 - Transport Operations In Food And Biological Engineering I

Credit Hours: 3.00. Application of momentum and heat transfer to biological and food process engineering. Viscosity, non-Newtonian fluids, experimental methods of rheological characterization of food and biological systems; viscoelasticity; design equations for pipe flow, pumps, mixing, emulsification, extrusion, sheeting, heat exchanges, aseptic processing, sterilization, freezing, and evaporation. Typically offered Spring.

ABE 46000 - Sensors And Process Control

Credit Hours: 3.00. Fundamental aspects of transducers, biosensors, instrumentation, and computer control are presented, with particular emphasis on sensors and controls used in agricultural, biological, and food applications. Laboratory and pilot plant scale computer controlled equipment is used to examine response of process variables, sensor calibration, control system modeling, and controller selection and tuning. Prereq: differential equations and a course in either heat transfer or fluid mechanics. Typically offered Spring.

ABE 48400 - Project Planning And Management

Credit Hours: 1.00. Review of topics relevant to project planning and execution in industry, including technical communication, budgeting, team management, intellectual property rights, contracts and timelines. Students will select a Capstone project and assemble a project proposal within a team environment. Typically offered Fall.

ABE 48500 - Agricultural Engineering Project Management And Design

Credit Hours: 4.00. Review of information relative to project planning and execution in industry, including budgeting, intellectual property rights, contract and timelines. Machine or system environmental design projects, team or individual, related to contemporary or potential problems in agricultural engineering. Typically offered Fall Spring Summer.

ABE 48600 - Agricultural Engineering Design

Credit Hours: 3.00. Review of topics relevant to project planning and execution in industry, including technical communication, budgeting, team management, intellectual property rights, contracts and timelines. Students will select a Capstone project and assemble a project proposal within a team environment. Typically offered Spring.

ABE 49000 - Professional Practice In Agricultural And Biological Engineering

Credit Hours: 1.00. Career areas in agricultural engineering; job opportunities and graduate study; professional attitudes and ethics; contracts and specifications; patents. Typically offered Fall.

ABE 49500 - Select Topics In Agricultural And Biologicl Engineering

Credit Hours: 1.00 to 3.00. Credit and hours to be arranged. Special topics and projects of contemporary importance or of special interest that are outside the scope of the standard agricultural and biological engineering curriculum. The specific topic that is offered will be indicated on the student's record. A written report and oral presentation of final results are required. Permission of instructor required. Typically offered Fall Spring Summer.

ABE 49800 - Undergraduate Research In Agricultural And Biological Engineering

Arrange Hours and Credit. Credit and hours to be arranged. Individual research projects for students with the approval of their advisors. Requires prior approval of, and arrangement with, a faculty research advisor. A written report and public oral presentation of final results are required. Permission of instructor required. Typically offered Fall Spring Summer.

ABE 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. Credit and hours to be arranged. Individualized research on agricultural and biological engineering problems. Arrange with program coordinator before registering. A written report and public oral presentation of final results are required. Permission of instructor required. Typically offered Fall Spring Summer.

ABE 50100 - Welding Engineering

Credit Hours: 3.00. Design of weldments and modeling of heat transfer and residual stresses of the welding processes. Finite element theory of nonlinear properties for the many processes including laser, submerged arc, manual, Gas Tungsten Arc Welding (GTAW), plasma, and electron beam. Metallurgy topics include continuous cooling transformation curves in optimizing engineered joint strength, including cutting and welding. Offered in alternate years. Typically offered Spring.

ABE 52200 - Ecohydrology

Credit Hours: 3.00. Ecohydrology links hydrological and ecological processes at various spatiotemporal scales and is considered to be one of the most exciting frontiers of the future. Hydrological processes in individual ecosystems and the role of water in linking the myriad components of the landscape will be explored in this three-credit course. Interactions between hydrological and biological processes and factors that regulate and shape these interactions will be covered. The ecohydrology principles covered will include integration of water and biota at the catchment scale, nutrient transport and cycling, modeling ecohydrologic processes, and quantification of ecosystem services. Recommended: a prior course in hydrology. Typically offered Fall.

ABE 52500 - Irrigation Management And Design

Credit Hours: 3.00. Irrigation management and design, including water resources planning, soil moisture movement and utilization, irrigation scheduling, system selection and operation, pumping plant characteristics and efficiency, hydraulic network analysis, system evaluation, and environmental efficiency. Typically offered Spring.

ABE 52700 - Computer Models In Environmental And Natural Resources Engineering

Credit Hours: 3.00. Offers students in environmental and natural resources engineering programs an understanding of the hydrological processes and related design skills. Principles of soil erosion by water; drainage of agricultural lands; surface runoff; flood and reservoir routing; hydrodynamic and water quality in pipe network; nonpoint source pollution; and transport phenomenon are studied. Current computer models utilized in industry for decision support are applied using case studies to further enhance the understanding of the hydrological processes. Limitations and advantages of the models are discussed. Offered in alternate years. Typically offered Spring.

ABE 52900 - Nonpoint Source Pollution Engineering

Credit Hours: 3.00. Engineering principles involved in assessment and management of nonpoint source (NPS) pollution. Effect of NPS pollution on ecosystem integrity. Use of GIS/mathematical models to quantify extent of pollution. Design/implementation of best management practices to reduce nonpoint source pollution and improve water quality. Discussion of total maximum daily load (TMDL) principles and processes. Typically offered Spring.

ABE 53100 - Instrumentation And Data Acquisition

Credit Hours: 3.00. This course educates students in the use, selection, and design of instrumentation and data acquisition for agricultural, food, environmental, and biological systems. Emphasis is on measurement of position (GPS), force, pressure, power, torque, flow, and temperature along with environmental sensors. Labs focus on building and using measurement systems and programming PC computers for data acquisition and analysis. Prior knowledge of electrical circuitry is desirable. Typically offered Fall.

ABE 54500 - Design Of Off-Highway Vehicles

Credit Hours: 3.00. Problems associated with the design of off-highway vehicles, with special emphasis on farm and industrial tractors and self-propelled machines; engines; power trains; traction; vehicle control systems; human factors; testing and evaluation of performance. Typically offered Fall.

ABE 55500 - Biological And Food Processing Unit Operations

Credit Hours: 4.00. Analysis and design of operations, such as sterilization, freezing, dehydration, fermentation, and separation processes. Integration of pilot plant results into the design and scale-up process systems. Emphasis on how the properties of biological materials influence the quality of the processed product. Typically offered Fall.

ABE 55600 - Biological And Food Process Design

Credit Hours: 4.00. The course will focus on the synthesis, creation, evaluation and optimization of a preliminary process design to convert basic biological materials into a finished product. Concepts of materials and energy balances, thermodynamics, kinetics, transport phenomena of biological systems will be used to design processes to minimize energy and environmental impacts, and evaluate economic factors while maintaining product quality. Group projects, written and oral reports. Typically offered Spring.

ABE 55700 - Transport Operations In Food And Biological Systems II

Credit Hours: 3.00. Course includes analysis and design of operations, such as dehydration, fermentation, and separation processes. Development of experimental designs, integration of pilot plant results into the design , operation and scale-up process systems. Emphasis on how the properties of biological materials influence the quality of the processed product. Typically offered Fall.

ABE 55800 - Process Design For Food And Biological Systems

Credit Hours: 3.00. This course will focus on the design, synthesis, creation, evaluation, and optimization of processes to convert basic biological materials into a finished product. Concepts of materials and energy balances, thermodynamics, kinetics, transport phenomena of biological systems will be used to design processes to minimize energy and environmental impacts, and evaluate economic factors while maintaining product quality. Course will include group projects, oral and written reports. Typically offered Fall.

ABE 56000 - Biosensors: Fundamentals and Applications

Credit Hours: 3.00. (BME 52100) An introduction to the field of biosensors and an in-depth and quantitative view of device design and performance analysis. An overview of the current state of the art to enable continuation into advanced biosensor work and design. Topics emphasize biomedical, bioprocessing, environmental, food safety, and biosecurity applications. Typically offered Spring.

ABE 58000 - Process Engineering Of Renewal Resources

Credit Hours: 3.00. Physical and chemical structure of biomass. Reaction kinetics of hydrolysis of hemicellulose and cellulose to fermentable sugars. Fundamentals of ethanol production by fermentation. Separation of fermentation products into pure components. Typically offered Spring.

ABE 59000 - Special Problems

Credit Hours: 1.00 to 6.00. Assignment by consent of the instructor in the selected field of study. Laboratory, field, and library studies and reports on special problems related to agricultural and biological engineering not covered in regular coursework. Permission of instructor required. Typically offered Fall Spring Summer.

ABE 59100 - Special Topics

Credit Hours: 0.00 to 4.00. Primarily designed for students (two or more) desiring credit from subject areas for which no specific course, workshop, or individual study plan is offered. Area of study will deal with topics that have enough student interest to justify the formalized teaching of a specialized topic. The course may be repeated by a student as long as the topic being taught is not repeated. Permission of instructor required. Typically offered Fall Spring Summer.

ABE 62700 - Colloidal Phenomena In Bioprocessing

Credit Hours: 3.00. The structure, stability, and rheology of biological dispersions, emulsions, and foams are explained in terms of the principles of electrostatics, hydrodynamics, thermodynamics, and statistical mechanics. Additional topics include colloidal

phenomena in downstream bioprocessing, as well as colloidal aspects of some food systems. Prerequisite: Thermodynamics and physical chemistry. Typically offered Spring.

ABE 65100 - Environmental Informatics

Credit Hours: 3.00. This course will educate students in the use, manipulation and analysis of environmental data by introducing them to scripting languages. (e.g. c-shell, python), data types (e.g. ASCII, binary, NetCDF), databases (e.g. XML, DBF) and data visualization software (e.g. GMT, ArcMap) as well as techniques for checking data quality, working with missing data, and handling large diverse sources of time series and spatial data. Students will manipulate, check and insert data from a variety of sources, use that data as input to distributed hydrologic model, analyze model output and learn methods for properly documenting their data use (creation of metadata) and long-term archival storage of those data. Skills learned should be applicable to most computer operating systems, but the majority of work for this class will be done within the Unix/Linux environment. Students taking this course should have experience with one or more programming languages, including but not limited to C, Fortran, Perl, Python, java, Basic, or two writing scripts or macros within programs such as MatLab, S-Plus, R, SAS. Typically offered Fall.

ABE 68000 - Bioseparations And Bioprocess Engineering:Principles, Practice And Economics

Credit Hours: 3.00. Engineering fundamentals of separations and purification of biological molecules. Case studies and examples illustrate principles and practice of centrifugation, precipitation, crystallization, filtration, membrane separations, chromatography, and affinity separation of recombinant proteins and other biomolecules. Process scale-up and economics of biotechnology products and processes are mentioned in the context of their impact on purification development. Prerequisites: ABE 58000. Typically offered Fall.

ABE 69100 - Special Topics

Credit Hours: 1.00 to 4.00. Primarily designed for advanced specialized topic areas in agricultural and biological engineering for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of a course. Permission of instructor required. Typically offered Fall Spring Summer.

ABE 69400 - Graduate Research Training

Credit Hours: 0.00. Strategies for success in graduate study are taught. Students will learn how to write a graduate research proposal, effectively plan for degree milestones, and learn about benefits of participating in professional societies. Students will also complete required training for graduate student researchers, including responsible conduct of research, laboratory safety, and an equal access/equal opportunity briefing. Typically offered Fall.

ABE 69600 - Graduate Seminar

Credit Hours: 1.00. Best practices for effectively presenting scientific research are taught and practiced. Students will also present a twenty-minute seminar of original research results, as well as provide and receive constructive criticism on presentation form and content for improved future presentations. Typically offered Spring.

ABE 69700 - Doctoral Professional Development

Credit Hours: 1.00. Discussion of research problems, methods, procedure, and reports. Discussion and practice to improve written and oral communication. Professional development activites. Typically offered Fall Spring.

ABE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ABE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Agricultural Economics

AGEC 20200 - Spreadsheet Use In Agricultural Business

Credit Hours: 1.00. Use of computer spreadsheets in business and financial analysis. Students gain capability to use financial, statistical, and logical spreadsheet functions and a wide variety of other spreadsheet capabilities. Accounting, finance, and management principles are put into practice in a spreadsheet environment. Typically offered Fall Spring.

AGEC 20300 - Introductory Microeconomics For Food And Agribusiness

Credit Hours: 3.00. This course introduces the application of microeconomics as used by farms and agribusiness firms. The behavior of individual firms is evaluated as price and output are determined in various market structures (pure competition, pure monopoly, monopolistic competition, and oligopoly). Other topics include pricing and employment of resources, market failure and the social control of industry (government, economics policy, and regulation), cost and production theory. Typically offered Fall Spring.

AGEC 20400 - Introduction To Resource Economics And Environmental Policy

Credit Hours: 3.00. The course provides an overview of microeconomic theory and its application to issues related to evaluating resource economic issues and environmental policy. Topics discussed include efficiency, sustainability, valuation, externalities, governmental policies, and benefit cost analysis. Typically offered Spring.

AGEC 21700 - Economics

Credit Hours: 3.00. National economic problems such as unemployment, recessions, inflation, taxation, bank interest rates, the growth of government, monetary systems, and a rising national debt are discussed along with the principles, policies, and institutions for solving these macroeconomic problems. Typically offered Fall Spring Summer.

AGEC 22000 - Economics Of Agricultural Markets

Credit Hours: 3.00. This class provides an overview of U.S. and international agricultural markets, and develops a framework for analyzing those markets. Concepts include determination of agricultural prices, spatial dimensions of agricultural markets, and trade; temporal dimensions of agricultural markets, and futures and options markets; and public policy in agricultural markets. Typically offered Fall Spring.

AGEC 25000 - Economic Geography Of World Food And Resources

Credit Hours: 3.00. A study of the important issues and economic decisions about worldwide resource use for food and fiber production as influenced by geography, climate, history, social institutions, national self-interest, and the environment. Typically offered Fall Spring.

AGEC 26000 - Mentoring Leadership

Credit Hours: 1.00. This course is designed to teach upperclassmen how to mentor freshman to thrive and survive as entering freshmen in Agricultural Economics. The main focus is on the transition to college life, as well as practical information on time management, taking and rewriting classroom notes, preparing for examinations and quizzes, dealing with stress and interpersonal relationships, and health. Additional topics include opportunities for student involvement in campus life and organizations, career paths for the various programs of study in Agricultural Economics, and how to successfully work in groups. Mentors are restricted to AGBS, AGEC, AGFN, AGMG, FARM, FIMM, QAEC, and SLMK students. Permission of department required. Typically offered Fall.

AGEC 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first and second-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Enrollment in an honors program. Permission of department required. Typically offered Summer Fall Spring.

AGEC 28900 - Foundational Internship

Credit Hours: 1.00. Foundational internship that is preplanned and conducted under the direction of a faculty or staff member working in cooperation with an employer representative. A learning plan must be developed and approved by the student, faculty or staff coordinator, and employer representative prior to beginning the internship. A comprehensive report describing the management strategies used by the company or organization when he/she spent their internship is required. Permission of department required. Typically offered Summer Fall Spring.

AGEC 29600 - Selected Topics In Agricultural Economics

Credit Hours: 1.00 to 3.00. Special topics in agricultural economics aimed at sophomore-level students. May be repeated for credit under a different topic title. Typically offered Fall Spring.

AGEC 29800 - Sophomore Seminar

Credit Hours: 1.00. Current agricultural economics issues will be analyzed and discussed. Issue areas will be related to individual career planning and program development. Typically offered Fall.

AGEC 30500 - Agricultural Prices

Credit Hours: 3.00. Analysis of prices and the movement of farm product prices; relations of farm product prices to farm input and other prices; conceptual and statistical analysis of agricultural supply and demand relationships; application of price analysis, price forecasting, agricultural outlook, agricultural policy; adjustment of farming to new price conditions. Typically offered Fall.

AGEC 31000 - Farm Organization

Credit Hours: 3.00. Economic factors controlling success in farming; types of farming; business records and analysis; adjustment in organization to meet changing economic conditions; organization and management of successful farms. Typically offered Spring.

AGEC 31100 - Accounting For Farm Business Planning

Credit Hours: 3.00. This course emphasizes the development of procedures for providing and using data in decision making. Methods will be addressed for finding and organizing both financial and physical data to provide the business information needed in planning and control. Topics discussed include budgeting, reporting unit costs of production, measuring profitability and wealth accumulation, estimating credit needs and income tax liability, and evaluating the strengths and weaknesses of the business as the basis for improving the business. Typically offered Fall.

AGEC 32100 - Principles Of Commodity Marketing

Credit Hours: 3.00. An in-depth background on the origin, operation, and application of futures and options in risk management for agriculture. Covers grain, livestock, and yield futures and options. Applications of futures and options to price and yield risk management is provided. Comparison of expected results from various risk management alternatives and decision-making processes to use in selecting a risk management strategy. Typically offered Fall.

AGEC 32700 - Principles Of Food And Agribusiness Marketing

Credit Hours: 3.00. This course is a study of the major components of marketing decisions made by food and agribusiness firms. The course examines the marketing process, market research, marketing opportunities, and marketing strategies. Students will work on developing skills for evaluating and making marketing decisions. Typically offered Fall Spring.

AGEC 33000 - Management Methods For Agricultural Business

Credit Hours: 3.00. Management of nonfarm, agriculturally related businesses. Topics include tools for management decision making, legal forms of business organization, basics of accounting, and important financial management techniques. Case studies and computer simulation game. Typically offered Fall Spring.

AGEC 33100 - Principles Of Selling In Agricultural Business

Credit Hours: 3.00. The principles of salesmanship and their application to the agricultural business. Topics include attitudes and value systems, basic behavioral patterns, the purchase decision process, relationship of sales to marketing, selling strategies, preparing for sales calls, making sales presentations, handling objections, and closing sales. Emphasis is placed on application of principles to real-world situations and on building selling skills through class projects. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall Spring.

AGEC 33300 - Food Distribution - A Retailing Perspective

Credit Hours: 3.00. Distribution factors that affect the food industry. Particular attention to the food wholesaling and retailing sectors. Presentation of economic tools to evaluate performance in the food industry. Discussion of the relative importance of each of the major departments in the modern supermarket. Discussion of current and future industry prototypes. Typically offered Spring.

AGEC 34000 - International Economic Development

Credit Hours: 3.00. This course is designed to introduce students to issues and problems related to international economic development. Topics covered include a description of the current situation in developing countries and the history of growth and development. The course is grounded in the body of theory associated with economic development, but concentrates on the many practical problems such as poverty, population growth, urbanization, education and the environment. The three areas with the greatest attention are agricultural development, international trade, and policy analysis for developing countries. Typically offered Spring.

AGEC 35200 - Quantitative Techniques For Firm Decision Making

Credit Hours: 3.00. Introduction to mathematical programming and computing as an aid to agricultural decision making by firms, linear programming, game theory and strategy, simulation, the waiting-line problem, the equipment replacement decision, and multiproduct scheduling methods. Typically offered Fall Spring.

AGEC 37500 - The Process Of Economic Research

Credit Hours: 1.00. This course is a study of the process of conducting economic research. The course examines the research problem and objectives, literature review, conceptual framework, methods and procedures, and reporting research. Students will identify a research topic and project advisor. For Honors program students only in Agricultural Economics. Permission of instructor required. Typically offered Fall.

AGEC 39000 - Cooperative Professional Programs In Agricultural Economics

Credit Hours: 0.00. Supervised professional experiences in agricultural economics. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit a summary report. Permission of instructor required. Typically offered Fall Spring Summer.

AGEC 40000 - Agricultural Economics Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

AGEC 40600 - Natural Resource And Environmental Economics

Credit Hours: 3.00. (FNR 40600) Introduction to economic models of renewable and nonrenewable natural resources and the use of these models in the analysis of current resource use and environmental issues. Typically offered Fall Spring.

AGEC 41000 - Agricultural Policy

Credit Hours: 3.00. Economic analysis of U.S. food and agricultural policy; current and past farm legislation; international trade; agricultural policies in selected countries; domestic and foreign food assistance; structural change; agricultural research policy; macroeconomic linkages with the agricultural sector; and emerging environmental policy issues, land and water use. Typically offered Spring.

AGEC 41100 - Farm Management

Credit Hours: 4.00. Principles of farm organization and management, farmer interviews, and the application of computerized farm decision-making methods. Typically offered Fall.

AGEC 41200 - Farm Business Management Workshop

Credit Hours: 1.00 to 3.00. Making decisions regarding the organization and operation of farm businesses with which students will be associated after graduation. Areas of decision making include enterprise selection, farm growth, organizing large-scale farms, communication, labor management, machinery management, operating agreements, legal organization, and tax strategies. Typically offered Spring.

AGEC 41500 - Community And Resource Development

Credit Hours: 3.00. Principles and structures of group decision making for improving income and quality of living for people, including analysis of private and public interest in economic and social planning. Typically offered Spring.

AGEC 42100 - Advanced Commodity Marketing

Credit Hours: 3.00. Application of commodity marketing principles to grain, livestock, and other commodity sectors. Applications include hedging, speculation, risk management, and fundamental and technical price analysis. Examination and testing of pricing strategies and the development of commodity marketing plans. Typically offered Spring.

AGEC 42400 - Financial Management Of Agricultural Business

Credit Hours: 4.00. A study of the major types of financial decisions made by agriculturally related firms, including investment in inventory, receivables and cash, property, plant, and equipment; sources and types of short-term, intermediate, and long-term capital; legal patterns of the business organization, emphasis on implementation involving agribusiness case problems. Typically offered Fall Spring.

AGEC 42500 - Estate Planning And Property Transfer

Credit Hours: 3.00. The ownership and transfer of farm business property. Includes tax and other implications of life estates, trust arrangements, sale of property, and charitable contributions. Typically offered Fall.

AGEC 42700 - Advanced Agribusiness Marketing

Credit Hours: 3.00. Application of marketing principles to market planning, research, and analysis. Development of strategic marketing plans for agribusiness. Typically offered Fall.

AGEC 42900 - Agribusiness Marketing Workshop

Credit Hours: 2.00. Research, development, and presentation of a strategic agribusiness marketing plan. Permission of instructor required. Typically offered Spring.

AGEC 43000 - Agricultural And Food Business Strategy

Credit Hours: 3.00. An advanced course in business planning and strategy for potential agribusiness and food firm managers. Focuses on development of viable business strategy in the context of the firm's market and its internal condition. Makes extensive use of case studies that document management dilemmas of agribusiness firms, ranging from those providing inputs to agricultural producers to firms involved in the retail distribution of food. Typically offered Fall Spring.

AGEC 43100 - Advanced Agri-Sales And Marketing

Credit Hours: 4.00. Advanced techniques of salesmanship, field application of selling techniques, improving communication skills, study of agribusiness marketing strategies, interaction with industry agri-marketers, and strategies for career development in agri-marketing. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Permission of instructor required. Typically offered Fall.

AGEC 43300 - Executive In The Classroom

Credit Hours: 1.00. Students meet weekly with industry leaders in the food processing, wholesaling, and retailing industries. Discussion of management philosophies and strategies, exploration of career opportunities, and review of trends, issues, and problems in the contemporary food industry. Students participate in the Midwest Grocers Association and the Food Marketing Institute trade shows. Typically offered Spring.

AGEC 43500 - Leadership In A Changing World

Credit Hours: 3.00. An examination of various leadership theories and the importance of leadership. Drawing upon research from many disciplines and fundamental aspects of leadership, students will read, discuss, and apply these concepts to leadership experiences and to develop competencies to be more effective leaders in their family, workplace, and community. Typically offered Spring.

AGEC 45000 - International Agricultural Trade

Credit Hours: 3.00. Study of U.S. agricultural trade with emphasis on international trade theory, exchange rates and their determination, relationships between domestic agricultural policies and trade policies, and analysis of institutional arrangements for world trade in agricultural products. Typically offered Fall.

AGEC 45100 - Applied Econometrics

Credit Hours: 3.00. Application of strategies to economic problems. Simple and multiple regression, dummy variables, logit analysis, time series, and forecasting. Typically offered Spring.

AGEC 45500 - Agricultural Law

Credit Hours: 3.00. Selected general legal topics (courts, contracts, torts, property and commercial law) with emphasis on farming problems (e.g., landowner-tenant, grain contracts, fences, and animal liability) and cases. Typically offered Fall.

AGEC 45600 - Federal Income Tax Law

Credit Hours: 3.00. Introduction to the federal income tax laws applicable to individuals and small business with emphasis on the farming business. The course includes management implications and the policy basis for the tax law system. Techniques and practice for the preparation of selected forms will be included. There will be limited exposure to taxation of partnerships, corporations, estates, and to federal gift and estate tax law. Typically offered Spring.

AGEC 47500 - Honors Course - Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third and fourth-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Enrollment in an honors program. Permission of department required. Typically offered Summer Fall Spring.

AGEC 48900 - Professional Internship

Credit Hours: 2.00. Professional internship that is preplanned and conducted under the direction of a faculty or staff member working in cooperation with an employer repesentative. A learning plan must be developed and approved by the student, faculty or staff coordinator, and employer representative prior to beginning the internship. A summary report describing their economic or business analysis for the company or organization where he/she spent their internship is required. Permission of department required. Typically offered Summer Fall Spring.

AGEC 49600 - Selected Topics In Agribusiness Management

Credit Hours: 1.00. Intended for individuals in the food industry marketing and management, sales and marketing, agribusiness management, agricultural finance, and farm management options. Also open to students in other agricultural economics options as well as to students outside the department. Focuses on current topics in the management of food and agribusiness firms. Provides advanced treatment of these topics for upper-division students. This is a set of one-hour seminars that will address current topics in food and agribusiness management. The topics of focus will be those that either are not treated in other courses, or are not treated in depth needed by a student pursuing a management career in the food and agribusiness industries. Topics will be reviewed annually as to relevance and will be changed as needed. Five week session. Typically offered Fall Spring.

AGEC 49800 - Special Problems

Credit Hours: 1.00 to 3.00. Open primarily to qualified seniors who want to study special problems in agricultural economics not covered in regular work. Permission of instructor required. Typically offered Fall Spring Summer.

AGEC 49900 - Thesis

Credit Hours: 1.00 to 6.00. Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

AGEC 50600 - Agricultural Marketing And Price Analysis

Credit Hours: 3.00. Marketing margins and derived demand; elasticity. Modeling supply and demand relationships; single and multiple equation systems; forecasting. Industrial organization economics applied to the food processing, wholesaling, and retailing industries; subsector analysis, vertical coordination; marketing and competition policies. Typically offered Spring.

AGEC 51600 - Mathematical Tools For Agricultural And Applied Economics

Credit Hours: 3.00. This course provides first year graduate students and advanced undergraduate students with the specific set of applied mathematical tools needed to support graduate coursework in microeconomics, macroeconomics, economic programming, and econometrics. The course reviews skills and concepts from a number of fields of mathematics including matrix algebra, calculus, optimization theory, and mathematical statistics. The course emphasizes specific applications to economic theory and applied problems in agricultural economics and related areas. Students should be comfortable with introductory-level calculus before entering the course. Permission of instructor required. Typically offered Fall.

AGEC 52400 - Agricultural Finance

Credit Hours: 3.00. Designed to provide students the concepts and tools to apply financial management principles to farm businesses. Topics include financing alternatives, preparation and interpretation of financial statements, and capital investment analysis using discounted cash flows. Typically offered Spring.

AGEC 52500 - Environmental Policy Analysis

Credit Hours: 3.00. Designed to assist in understanding how environmental information and knowledge are produced, disseminated, and utilized in a variety of institutional contexts. Readings are selected to promote discussion and interaction concerning alternative mechanisms for protecting environmental resources. Prerequisite: introductory microeconomics course suggested. Typically offered Spring.

AGEC 52600 - International Food And Agribusiness Marketing Strategy

Credit Hours: 3.00. Students will develop their analytical, decision-making, and communication skills related to marketing management of food systems in the world economy. They will analyze a foreign market's potential and market entry strategies;

compare consumer differences and similarities across markets; define issues related to marketing mix standardization or adaptation; and evaluate effects of economic, social, and legal environments on marketing strategy. Typically offered Fall.

AGEC 53000 - Strategic Agribusiness Management

Credit Hours: 3.00. Addresses issues in the strategic management of agricultural and food businesses. Emphasis is on developing a framework for formulating strategy, making strategic choices in a variety of business environments, and implementing strategy. Extensive use of management case studies and a major term project with an agribusiness firm focus on developing managerial problem-solving skills. Typically offered Fall.

AGEC 53300 - Supply Chain Management For Food And Agribusiness

Credit Hours: 3.00. Students will develop an understanding of how the theory of logistics is applied as supply chain management for food and agribusiness firms. Through case studies and problem sets, students will analyze and consider contemporary issues and problems. Analyses will focus on tradeoffs among customer service, forecasting, inventory control, information technology, transportation management, warehousing and materials handling, and supply chain planning. Typically offered Spring.

AGEC 55200 - Introduction To Mathematical Programming

Credit Hours: 3.00. Introduction to constrained and optimization problems and their solution using mathematical programming techniques. Theory and implementation of linear, quadratic, and integer programming methods are examined. Applications to farm management, diet and feed rations, spatial market equilibrium, agricultural sector analysis, and other problems from agricultural economics. Use of computer software packages for practical problems. Typically offered Fall.

AGEC 59600 - Seminars In Current Issues In Agricultural Economics

Credit Hours: 1.00 to 3.00. Study of selected current developments in agricultural economics. Topics will be announced in advance. Permission of instructor required. Typically offered Fall Spring Summer.

AGEC 60000 - Agricultural Finance

Credit Hours: 3.00. Advanced capital budgeting topics including: tax policy, inflation, optimal replacement, bid models, and inclusion of financing flows; application of expected utility theory and mathematical programming to optimal capital structure decisions of proprietors; farmland investment, pricing, and dynamics; pricing contingent claims. Prerequisite: AGEC 52400; AGEC 55200 suggested. Typically offered Spring.

AGEC 60200 - Preparation And Procedures For Policy Analysis

Credit Hours: 3.00. Research methods, scientific methodology, problem identification, and the nature of policy problems including economic policy readings, case studies, and practice project proposals. Typically offered Spring.

AGEC 60400 - Fundamentals Of Applied Welfare Economics

Credit Hours: 1.00. Basic concepts and principles of applied welfare economics including Pareto conditions for welfare maximization; public goods, externalities, and property rights; consumer and producer surplus; theory of the second best; and neoclassical and contemporary theories of income distribution. Concurrent Prerequisite: ECON 51100. Typically offered Spring.

AGEC 60500 - Agricultural Price Analysis

Credit Hours: 3.00. Use of economic theory and quantitative methods to solve problems in price analysis, problem formulation, estimation, forecasting, and model evaluation. Prerequisite: AGEC 65000, ECON 51100. Typically offered Fall.

AGEC 60800 - Benefit-Cost Analysis

Credit Hours: 2.00. Principles and practice for analysis of the benefits and costs of public investments. Topics include measures of project worth, choice of the discount rate, analysis of projects with multiple objectives and purposes, identifying and quantifying benefits and costs, applications of consumer and producer surplus in project analysis, treatment of risk and uncertainty, and shadow pricing techniques for project evaluation in developing counties. Concurrent Prerequisite: AGEC 60400; a graduate course in microeconomic theory. Typically offered Spring.

AGEC 61200 - Agricultural Production Economics I

Credit Hours: 3.00. Economic theory and empirical research methods for management of natural resource based production systems. Topics include: analysis of response in crops and livestock production, resource allocation, economics of site specific management, commodity supply and input demand. Concurrent Prerequisite: ECON 51100. Typically offered Summer.

AGEC 61300 - Introduction To Economics Of Risk

Credit Hours: 3.00. A background in expected utility theory and applications. EUH axioms, risk aversion, utility elicitation, expected utility and moments, stochastic dominance, mean-variance, risk free asset, diversification, single index model, increasing risk, production under risk, programming models and applications. Prerequisite: AGEC 55200, ECON 51100, STAT 51100. Typically offered Fall.

AGEC 61400 - Advanced Agricultural Production Economics

Credit Hours: 3.00. Course covers advanced techniques for economic analysis of agricultural production economics. Students are required to produce a course project demonstrating competency at the applied research frontier of the field and participate in presentation, discussion, and peer review of course members' work. Prerequisites: AGEC 61200 and ECON 60700 or consent of Instructor. Typically offered Spring.

AGEC 61600 - Resource Economics And Policy

Credit Hours: 3.00. Natural resource development and allocation in both static and dynamic contexts. Analysis of scarcity and growth issues, equity considerations, derivation of optimal pricing and depletion rules. Application of advanced production concepts to national resource problems. Prerequisite: AGEC 60400, ECON 51100. Typically offered Fall.

AGEC 61700 - Applied Welfare And Environmental Economics

Credit Hours: 3.00. Theory of welfare economics relevant to understanding foundations of benefit-cost analysis and concepts for policy design in areas such as environment, resources, and trade. Applied projects to be selected and analyzed by students. Prerequisite: AGEC 60400 and ECON 60700, or consent of Instructor. Typically offered Spring,

AGEC 61800 - Applied General Equilibrium Analysis

Credit Hours: 3.00. Theory and empirical techniques behind numerical general equilibrium analysis. The course is divided into two parts: 1) development of the basic analytical framework and model properties, and 2) in-depth study of selected applications in international trade, price analysis, and resource and environmental economics. Homework assignments involve a mix of qualitative analysis and microcomputer-based computational exercises. Prerequisite: AGEC 60400; Prerequisite: ECON 51100 or ECON 60700. Typically offered Spring.

AGEC 61900 - Applied Microeconomic Theory

Credit Hours: 3.00. Provides students with the capability to apply microeconomic theory and econometrics to analyses of economic issues and problems. Students will work through applied producer/consumer problems to gain experience in the uses of econometric estimation. Topics include: primal-dual approaches, direct and indirect functions, flexible functional forms, static optimization, separability and aggregation, risk and expectations, dynamics and demographics. Examples are drawn from both consumer and producer applications. Prerequisite: AGEC 65100, ECON 60700. Typically offered Summer Fall.

AGEC 62000 - Computational Analysis Of Markets And Policy

Credit Hours: 3.00. Exposes students to a variety of topics in applied economics relating to markets and policy. Students build, calibrate, and revise simple economic models, with the basic structure of more complex models being provided. Through a series of problem sets focusing on analytical skills and computation, students bridge theory and application in economics. . Typically offered Fall.

AGEC 62200 - Food System Organization And Policy

Credit Hours: 3.00. Development of framework to study food system organization and policy; survey of measurement and empirical testing problems in industrial-organization research on food-system market structure and performance; review of competition policies and evaluation of policy alternatives. Prerequisite: Graduate courses in microeconomic theory and marketing. Typically offered Summer.

AGEC 62500 - Macroeconomic Issues In Agriculture

Credit Hours: 3.00. Studies the nature and importance of linkages between agriculture and the macro economy, and examines theories and methods used to establish or quantify these linkages in agricultural models. Extensions of macroeconomic accounting and theory into an open economy are explored by examining attempts by agricultural economists to estimate macroeconomic linkages and build them into commodity models, and considering consequences of implicit and explicit macroeconomic assumptions in much of our work. The changing role of agriculture in an economy under structural transformation will be key to understanding these linkages and how they evolve, as shown in several new developments seeking to explain both recent events and policy history in macro-theoretical frameworks consistent with observed empirical regularities. Typically offered Fall.

AGEC 63000 - Urban And Regional Economics

Credit Hours: 3.00. The literature discussed in this urban and regional economics course covers theoretical texts, conceptual as well as statistical, and empirical applications in order to introduce the student to the economist's view on spatial variation in economic outcomes. This ranges from coverage of the theory of industrial location choice, through theoretical and empirical analysis of the spatial distribution of economic activities (agglomeration theory, industrial clusters, central place theory), to theoretical and empirical explanations for the spatial structure of cities, the working of regional labor markets and migration. The course covers various empirical tools utilized in spatial data analysis (spatial econometrics) and modeling of regional economies and their interrelations (interregional input-output analysis). Prerequisites: AGEC 20300 or ECON 34000 or ECON 51100. Typically offered Spring.

AGEC 63100 - The Theory And Practice Of Spatial Econometrics

Credit Hours: 3.00. This course deals with the analysis of spatial data and centers on both exploratory tools developed in spatial

statistics and GIScience, as well as on econometric models that have been the main focus in spatial econometrics. During the course, the theoretical basis for the analysis of spatial data and spatial models will be covered. This theoretical angle will be combined with ample opportunities to acquire hands-on experience in the analysis of spatial data. To the effect, up-to-date software, such as GeoDa, R, Stata, and Matlab will be used. A good working knowledge of basic statistics and regression techniques is needed. Prior experience with GIS is helpful but not required. Prerequisites: AGEC 45100 or AGEC 65000 or ECON 67100 or STAT 41700 or STAT 51200 or STAT 51700. Typically offered Spring.

AGEC 63200 - The Economics Of Health Care And Health Policy

Credit Hours: 3.00. An introduction to the economic analysis of health outcomes, the health-care sector and health policy issues in the United States. The course explores the allocation and distribution of resources in the health-care industry. Topics covered include: the demand for health care, health insurance, hospitals and hospital care, and the services and health-care professionals. The health outcomes will include analyses of studies on obesity, race and socioeconomic status on child and adult health. This course also introduces the student to the unique economic challenges of financing and developing effective health services in developing countries. The course is especially suitable for students who are considering a career in a health profession, in health management or administration, health policy, or in public policy with a strong emphasis on health care. Prerequisites: STAT 30100 or STAT 50100 or STAT 51100 or STAT 51200 or SOC 38200 or SOC 58100 or PSY 50000 or AGEC 55200. Typically offered Fall.

AGEC 63300 - Advanced Topics In Space, Health, And Population Economics

Credit Hours: 1.00. This course is designed to introduce students to advanced research in space, health, and population economics. It is designed to introduce both topical content and state-of-the-art research tools to students through a combination of guest speakers, faculty presentations, and discussions. The seminar also serves as a forum for students to present their own work and receive critical commentary from faculty and peers. The course is organized as a graduate seminar and gives students a chance to actively explore their own research ideas. Typically offered Fall Spring.

AGEC 64000 - Agricultural Policy

Credit Hours: 3.00. Policy analysis for agriculture in the world economy. Emphasis on application of economic theory to analyze commodity programs, international trade, environmental concerns, and investment in human capital and agricultural research. Prerequisite: AGEC 41000, AGEC 60400. Typically offered Fall.

AGEC 64300 - Theory Of Economic Development

Credit Hours: 3.00. The economic theories behind the predominant approaches to economic development are reviewed. Both the sources of growth and problems in the development process are stressed. Emphasis is on the analysis and evolution of the models supporting the different approaches and the empirical analysis leading to changes in the paradigms. The role of agriculture in the economic development process is one of the topics. Other important issues are technological change, income distribution, structural adjustment, and the debt problem. Prerequisite: ECON 51100, ECON 51200. Typically offered Summer.

AGEC 64400 - International Agricultural Trade

Credit Hours: 3.00. International trade theory relevant to understanding world agricultural trade and the problems of agriculture in an open economy. Models for analyzing the effects of trade policy and market conditions on the agricultural sector. Welfare analysis of restrictions on trade. Prerequisite: ECON 51100, ECON 51200 Typically offered Spring.

AGEC 65000 - Application Of Quantitative Analysis: Econometrics I

Credit Hours: 3.00. Brief presentation of probability concepts, mathematical expectation, probability density and distribution functions as background for studying principles of economic model construction. Emphasis is on econometric single equation models, principles of estimation, the general linear model, tests of hypothesis, confidence interval estimation, and special topics such as errors in the variables, multicollinearity, dummy variables, hetero-scedasticity, autocorrelation and prediction problems. Prerequisite: STAT 51100; ECON 51100 or ECON 60700, matrix algebra. Typically offered Fall.

AGEC 65100 - Application Of Quantitative Analysis: Econometrics II

Credit Hours: 3.00. Emphasis is on using advanced econometric techniques. The course covers use of computer software and interpretation and reporting of econometric results. The first part of the course includes general econometric concepts, such as least squares and maximum likelihood estimation, desirable statistical properties, assumptions of the classical linear regression model, Monte Carlo methods, nested and non-nested hypothesis tests. Later, more specialized topics are covered, including multiple equation models, simultaneous equation models, limited dependent variable models, and other topics that are deemed relevant. Prerequisite: AGEC 65000. Typically offered Spring.

AGEC 65200 - Application Of Quantitative Analysis: Mathematical Programming

Credit Hours: 3.00. Recent literature on the theory and application of mathematical programming and agricultural modeling. Model building and analysis techniques with focus on matching solution methods to problems. Prerequisite: AGEC 55200, ECON 61200; a course in matrix alegbra. Typically offered Spring.

AGEC 65400 - Economic Dynamics

Credit Hours: 2.00. Focuses on the application of the tools of dynamic optimization to problems in economics. Covers continuous-time and discrete-time dynamic optimization techniques, including the calculus of variations, optimal control theory, and dynamic programming. Applications are drawn from a range of problems in microeconomics and macroeconomics, including current topics in agricultural economics, natural resource economics, and investment theory. Course meets weeks 1 - 10. Prerequisite: AGEC 65200, ECON 60700. Typically offered Fall.

AGEC 65500 - Applied Economic Time Series Analysis

Credit Hours: 3.00. This course is designed to improve students' abilities to estimate and interpret time series models. The course begins with univariate models and progresses to multivariate analysis. Alternative methods for identifying, estimating, and forecasting with time series models will be discussed. In addition, analysis of non-stationary time series and co-integration modeling will be covered in this course. Prerequisite: AGEC 65100 or Consent of Instructor. Mastery of applied statistics, calculus, and microeconomic theory at the Masters level or higher is desirable. Typically offered Fall.

AGEC 66000 - Teaching Agricultural Economics

Credit Hours: 1.00. A study of approaches successful teachers of agricultural economics use in undergraduate classrooms, starting with course organization and content through giving grades. Each student will critically observe experienced teachers and participate in a thorough microteaching experience. Permission of instructor required. Typically offered Fall.

AGEC 68100 - Economics for Food and Agribusiness Managers

Credit Hours: 3.00. Addresses the institutional setting, business climate, and structure of the food and agricultural markets. Encompasses both the domestic and international dimensions of the food chain, including consumer demand, global sourcing, and worldwide production potential. Focuses on managerial economics, as applied to such topics as food system market structure, the nature and dimensions of domestic and global competition, the components of cost and revenue, and the food system value chain. MS-MBA in Food and Agribusiness majors only. Prerequisite: EMBA Food Agr Business majors only. Permission of department required. Typically offered Fall.

AGEC 68200 - The Macroeconomics and Trade Environment of the Food System

Credit Hours: 3.00. Exposes students to the nature of linkages among agriculture, international markets, and the macro-economy, which are key to the fortunes of U.S. farmers and agribusiness. Exam theories and methods that allow students to establish or quantify these linkages and evaluate the consequences of alternative policies, demonstrating the usefulness of economic analysis as a tool. Also explores current policy issues facing the food and agribusiness industries, which might include farm legislation; environmental regulations; and food safety and nutrition labeling rules, among other policy topics. Prerequisite: EMBA Food Agr Business majors only. Permission of department required. Typically offered Fall.

AGEC 68400 - Applied Quantitative Methods For Decision Making

Credit Hours: 3.00. Explores the application of contemporary concepts and quantitative techniques for decision making in the face of uncertainty. Focus is on application of statistical tools to decisions facing the food and agricultural business manager. Prerequisite: EMBA Food Agr Business majors only. Permission of department required. Typically offered Fall.

AGEC 68500 - Advanced Quantitative Methods For Decision Making Under Uncertainty

Credit Hours: 3.00. Explores key areas of risk management of the food and agricultural firm, including price, production, strategic, regulatory, technology, market/competitor, political, financial, and exchange rate risk. Contemporary tools, such as score carding, decision trees, and real options are introduced for quantifying and managing uncertain decisions. Prerequisite: EMBA Food Agr Business majors only. Permission of department required. Typically offered Fall.

AGEC 68600 - Strategic Food and Agribusiness Management

Credit Hours: 3.00. This course explores integration of the functional areas of business at the corporate level. Heavy emphasis is on analysis of the business environment, setting strategic direction, assessing core competencies, choosing a market position and developing competitive advantage, and organizational implementation and control in the context of the food and agricultural markets. The course makes heavy use of case studies of firms in the food and agricultural marketplace. Prerequisite: EMBA Food Agr Business majors only. Permission of department required. Typically offered Spring.

AGEC 68700 - Problem Solving And Project Management For Decision Makers

Credit Hours: 3.00. Develops a structured approach to problem solving, including problem definition, development of alternatives, identifying consequences, assessing trade-offs, and making informed choices. Research methods and project management concepts will be addressed. A major business analysis project will be framed during the course, to be completed as part of the capstone course in business analysis. Prerequisite: EMBA Food Agr Business majors only. Permission of department required. Typically offered Summer.

AGEC 68800 - Business Analysis Capstone Project

Credit Hours: 3.00. Capstone experience where students will work on individual projects focused on a comprehensive detailed analysis of an issue facing their employer or an issue of general interest to the student. It is expected that this project will draw on tools and concepts developed throughout the MS program and be delivered to an appropriate audience of decision-makers upon completion. Prerequisite: EMBA Food Agr Business majors only. Permission of department required. Typically offered Spring Fall.

AGEC 69000 - Seminars In Agricultural Economics

Arrange Hours and Credit. Intensive study of selected current developments in agricultural economics. Topics will be announced in advance. Permission of instructor required. Typically offered Fall.

AGEC 69100 - Topical Research In Agricultural Economics

Credit Hours: 1.00 to 6.00. Topics of interest to the student. Designed to give training in research. Credit dependent upon amount of work done. Permission of instructor required. Typically offered Fall Spring Summer.

AGEC 69200 - Workshop In Applied Economics

Credit Hours: 1.00. A workshop on how to communicate research results in a seminar setting. Students present at least once during the course and will be present for other students' presentations. Students may present their own research, or a paper from a recent journal also is acceptable. The course is open to master's students, and one credit of this course is required of doctoral students. Typically offered Fall Spring Summer.

AGEC 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

AGEC 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Agricultural Systems Management

ASM 10400 - Introduction To Agricultural Systems

Credit Hours: 3.00. Basic principles of selection and operation of agricultural production equipment, including farm tractors and machines and crop-processing equipment. Planning considerations for crop storage and animal production systems and devices for water conservation and erosion control. Typically offered Fall Spring.

ASM 10500 - Agricultural Systems Computations And Communication

Credit Hours: 3.00. Use of computers to solve problems related to agricultural technology and businesses. Spreadsheets, word processors, and presentation software will be the focus. Emphasis will be on logical problem solving and data presentation using advanced features of office software. A 10000-level number is being used because it is intended as a first-year course. Typically offered Spring.

ASM 20100 - Construction And Maintenance

Credit Hours: 3.00. Fundamental principles in the selection and use of tools for the construction and maintenance of agricultural and related facilities, equipment, and machines. Areas covered include small engines, concrete and masonry, wood, plumbing, electricity, and metal. Typically offered Fall Spring.

ASM 21100 - Technical Graphic Communications

Credit Hours: 3.00. Introduction to graphic communication methods using traditional techniques and emphasizing modern computer-based techniques. Topics covered include: free-hand sketching, lettering, and dimensioning; selection of data presentation methods; and plan interpretation and cost calculations. A majority of assignments will include use of commercially available computer-aided drawing packages. Typically offered Fall Spring.

ASM 21500 - Surveying

Credit Hours: 3.00. Introduction to plane surveying. Instruction and practice in the use of surveying instruments for distance measurement, leveling, angle measurement, direction determination, traversing, and mapping. Office procedures for surveying data reduction. Practical problems and field exercises of the type encountered by the landscape architect and forester. Typically offered Fall Spring.

ASM 22100 - Career Opportunities Seminar

Credit Hours: 1.00. An introductory course to acquaint students with career and employment opportunities in the field of agricultural systems management. Guest speakers are invited to share their experiences and philosophies with the students. Special emphasis is given to improving communication skills. Typically offered Fall.

ASM 22200 - Crop Production Equipment

Credit Hours: 3.00. Principles of machine performance, capacity, machinery components, and operation. Study of tractors, trucks, utility vehicles, and combines. Equipment topics include chemical application, tillage tools, planters and seeders, hay and forage harvesters, electronic monitors and controllers. Computer-based analysis of equipment sizing and systems selection. Typically offered Fall.

ASM 24500 - Materials Handling And Processing

Credit Hours: 3.00. Principles of materials handling and processing. Physical properties and characteristics of food, fiber, and feed materials as related to harvesting, handling, processing, and storage. Processing of agricultural materials including drying, preservation, size reduction (e.g. grinding, crushing, shredding), mixing and blending, refrigeration, extrusion, and pelleting. Conveying and transport systems with consideration of their effects on damage and quality. The course elements are tied together by a treatment of scheduling and coordination of biologically based systems, which involve production, handling, quality control, and processing. Typically offered Spring.

ASM 31100 - Advanced Technical Graphics Communications

Credit Hours: 3.00. Symbol library creation and manipulation, computer-aided drawing (CAD) data-base extraction for report generation, introduction to Lisp programming and drawing automation, three-dimensional wire frame modeling, surface rendering, and introduction to solid modeling. Assignments will include use of commercially available CAD packages. Typically offered Fall.

ASM 32200 - Technology For Precision Agriculture

Credit Hours: 3.00. Technology and applications of electronics for precision agriculture. Characteristics of personal computer hardware, electronic sensors, monitors, machine controllers, environmental monitors, and global positioning systems. Production management information systems; processing and marketing information systems; and yield mapping, geographic information system data handling, and software options. Typically offered Fall.

ASM 33300 - Facilities Planning And Management

Credit Hours: 3.00. Principles of facility (system) planning and management involving buildings, equipment, and materials handling and flow. Student teams select a case firm (problem) with instructor approval. Principles learned week by week are applied to the development of an overall plan for the complex, over the course of the semester. Case examples can include firms handling supplies, seeds, grains, feeds, chemicals, wastes, and farm produce, as well as farming operations producing grain, forage, and/or livestock products. Students will learn to use AutoCAD to develop drawings, without prior computer drafting experience. Typically offered Spring.

ASM 33600 - Environmental Systems Management

Credit Hours: 3.00. Analysis of environmental systems with special emphasis on non-urban and agribusiness needs. Technological and sociological solutions to environmental problems. Computer-based tools are used to analyze global environmental issues, chemical use and management, waste disposal and management, water and air quality, soil and water conservation, sustainable agriculture, regulatory and policy issues. Typically offered Fall.

ASM 34500 - Power Units And Power Trains

Credit Hours: 3.00. An introduction to power generation and transfer in mechanical and fluid power systems. Internal combustion engines, fuels, and cycles are introduced. Clutches, mechanical transmissions, automatic transmissions, hydrostatic transmissions, and final drives are discussed. Principles of hydraulics, fluids, cylinders, pumps, motors, valves, hoses, filters, reservoirs, and accumulators are studied. Typically offered Fall.

ASM 35000 - Safety In Agriculture

Credit Hours: 1.00. An overview of the agricultural safety movement in the United States with consideration given to the specific human environmental and technological factors influencing farm-related accidents. Special emphasis is given to reduction of unnecessary risks in agricultural production. Course meets during weeks 1-8. Typically offered Spring.

ASM 39000 - Agricultural Systems Management Co-Op

Credit Hours: 0.00. Supervised professional experiences in agricultural systems management. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit a summary report. Consent of the departmental cooperative professional program coordinator required. Permission of department required. Typically offered Fall Spring Summer.

ASM 40000 - Agricultural Systems Management Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

ASM 42000 - Electric Power And Controls

Credit Hours: 3.00. Fundamentals and application of electric power for agricultural facilities; safe wiring principles; operation and performance characteristics of electric motors; applications of control systems that include monitors, sensors, relays, and programmable logic controllers. Typically offered Fall.

ASM 42100 - Senior Seminar

Credit Hours: 1.00. Professional attitudes and ethics, resume preparation and interview procedures, business correspondence, meetings, and career planning. Typically offered Fall.

ASM 44100 - Methods Of Teaching Agricultural Mechanics

Credit Hours: 1.00. Emphasis on facilities, shop layout, organization, course planning, and demonstrations. Course meets during weeks 1-6. For students seeking certification as teachers of agriculture. Typically offered Spring.

ASM 49000 - Special Problems

Credit Hours: 1.00 to 6.00. Assignment by consent of instructor in the field of selected study. Laboratory, field, and library studies and reports on special problems related to agricultural systems management not covered in regular coursework. A written report and oral presentation of final results is required. Permission of instructor required. Typically offered Fall Spring Summer.

ASM 49100 - Special Topics

Credit Hours: 1.00 to 4.00. Designed for specialized topic areas for which there is no specific course, but have enough student interest to justify formalized teaching of an undergraduate-level course. The course may be repeated by a student as long as the topic being taught is not repeated. The specific topic that is offered will be indicated on the student's record. Permission of instructor required. Typically offered Fall Spring Summer.

ASM 49400 - Project Planning And Management

Credit Hours: 1.00. Discussion of topics relevant to project planning and execution in industry, including technical communication, budgeting, team management, intellectual property, and timelines. Student teams will develop project proposal to address contemporary issues in agricultural systems management. Typically offered Fall.

ASM 49500 - Agricultural Systems Management Capstone Project

Credit Hours: 3.00. Planning, organization, and analysis of individual or team projects related to contemporary issues in agricultural systems management. Typically offered Spring.

ASM 49800 - Directed Experience In Teaching Mechanized Agriculture

Credit Hours: 1.00 to 3.00. This course is designed primarily for students majoring in agricultural education, extension education,

agricultural systems management, and agricultural engineering. Permission of instructor required. Typically offered Fall Spring Summer.

ASM 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. Thesis Research. Admission to honors program. Permission of instructor required. Typically offered Fall Spring Summer.

ASM 51000 - Agrosecurity-Emergency Management For Agricultural Production Operations

Credit Hours: 3.00. Prepares individuals for management and loss control positions in agricultural production, agribusiness operations, and emergency management agencies. Addresses prevention, preparation, mitigation, response, and recovery from disasters such as fires, explosions, entrapments, tornadoes, floods, winter storms, earthquakes, vandalism, chemical releases, and bio-terrorism. Students complete a community service learning activity, in which they assist a farm or agribusiness manager in developing formal emergency preparedness plans. Typically offered Fall.

ASM 53000 - Power And Machinery Management

Credit Hours: 3.00. Management and selection of farm machines and power units with emphasis on cost analysis and evaluation of new machines and practices. Typically offered Fall.

ASM 54000 - Geographic Information System Application

Credit Hours: 3.00. Fundamentals of GIS analysis applied to environmental, agricultural, and engineering-related problems. Topics include data sources, spatial analysis; projections; creating data and metadata, and conceptualizing and solving spatial problems using GIS. Typically offered Fall.

ASM 55000 - Grain Drying And Storage

Credit Hours: 3.00. Crop drying and storage principles including equilibrium moisture, psychrometrics, and drying rates. Modern drying and conditioning techniques including dryeration, in-bin counterflow drying, and combination drying. Estimating fixed and variable drying costs, aeration of stored grain, and maintenance of grain quality. Offered in even-numbered years. Typically offered Spring.

ASM 59000 - Special Problems

Credit Hours: 1.00 to 6.00. Assignment by consent of the instructor in the field of selected study. Laboratory, field, and library studies and reports on special problems related to agricultural systems management not covered in regular coursework. Permission of instructor required. Typically offered Fall Spring Summer.

ASM 59100 - Special Topics

Credit Hours: 1.00 to 4.00. Primarily designed for specialized topic areas in agricultural systems management for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of a course. Permission of instructor required. Typically offered Fall Spring Summer.

ASM 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ASM 69900 - ASM Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of Instructor required. Typically offered Fall Spring Summer.

Agriculture

AGR 10100 - Introduction To The College Of Agriculture And Purdue University

Credit Hours: 0.50. Students are introduced to the College of Agriculture and Purdue University. Specific areas discussed include the diversity of career opportunities within agriculture, the relationships between different areas of agriculture, ethics, the impact of undergraduate coursework, including the core curriculum, on scholarship and career preparation, and the challenges facing the food, agricultural, and natural resource system. The use of guest lecturers provides a networking opportunity for students. Enrollment in this course is restricted to beginning freshmen students. Course meets weeks 1-8. Typically offered Fall.

AGR 11100 - Introduction To Agricultural And Biological Engineering Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Agricultural and Biological Engineering which include Agricultural Systems Management, Agricultural and Natural Resources Engineering, and Biological and Food Process Engineering. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11200 - Introduction To Agricultural Economics Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Agricultural Economics. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11300 - Introduction To Agronomy Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Agronomy, which includes Applied Meteorology, Agronomic Business and Marketing, Environmental Soil Science, International Agronomy, Plant Genetics and Plant Breeding, Soil and Crop Management, Soil and Crop Science, Turf Science, and associate degrees. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11400 - Introduction to Animal Sciences Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Animal Sciences. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11500 - Introduction To Biochemistry Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Biochemistry. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11600 - Introduction To Botany And Plant Pathology Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Botany and Plant Pathology. Topics

include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11700 - Introduction To Entomology Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Entomology. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11800 - Introduction To Food Science Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Food Science. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 11900 - Introduction To Forestry And Natural Resources Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Forestry and Natural Resources. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 12000 - Introduction To Horticulture And Landscape Architecture Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Horticulture and Landscape Architecture. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 12100 - Introduction To Youth Development And Agricultural Education Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in the Department of Youth Development and Agricultural Education which includes Agricultural Communication and Agricultural Education. Topics include, but are not limited to

undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 12200 - Introduction To Natural Resources And Environmental Science Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in Pre-Environmental Studies and Natural Resources and Environmental Science. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 12300 - Introduction To College of Agriculture Interdisciplinary Agriculture Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in Interdisciplinary Agriculture. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 12400 - Introduction To College Of Agriculture Pre Veterinary Medicine Academic Programs

Credit Hours: 0.50. An introduction to the academic programs offered in Pre-Veterinary Medicine. Topics include, but are not limited to undergraduate plans of study, courses, experiential programs, internships, student organizations, career opportunities, academic policies, scholarships, and student services. Course meets during weeks 1-8. Typically offered Fall.

AGR 20100 - Communicating Across Culture

Credit Hours: 3.00. This course will provide students with an opportunity to understand their place in a multicultural, multiethnic, multinational country, the United States. It is designed to provide an academic overview of the field of multicultural education as it evolved to this day. The course will offer an introductory overview of the many differences that exist within all human beings. Because the diversity among individuals is endless, we cannot study all differences, but will study a sampling such as race, ethnicity, gender identity, age, social class, disability, learning styles, and religion/spiritual orientation. Issues of poverty, language, and social justice may also be examined in relationship to the above major areas of emphasis. Typically offered Fall Spring.

AGR 29000 - Special Topics In Agriculture

Credit Hours: 0.00 to 3.00. Presentation of subject matter not available in other courses offered by the college. The specific topic that is offered will be indicated on the student's academic record. Typically offered Summer Fall Spring.

AGR 29400 - Directed Readings In Agriculture, Environment, and Society

Credit Hours: 0.00 to 3.00. Presentation of subject matter not available in other courses offered by the college. Directed reading and discussion of books and other documents of significant importance and current interest in agriculture, food systems, renewable natural resources, and the environment. The specific topic that is covered will be indicated on the student's academic record. Permission of instructor required. Typically offered Fall Spring Summer.

AGR 40000 - Agriculture Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

AGR 49000 - Special Problems

Credit Hours: 0.00 to 3.00. Topics and credit hours to be arranged. Typically offered Fall Spring Summer.

AGR 49300 - Special Topics In International Agriculture

Credit Hours: 0.00 to 3.00. A course that provides students interested in international agriculture opportunity for in-depth study and analysis of major issues associated with the relationship of U.S. agriculture to world agriculture and agricultural development abroad. Current and significant topics will be selected. Permission of instructor required. Typically offered Fall Spring Summer.

AGR 49400 - Advanced Readings In Agriculture, Environment, and Society

Credit Hours: 0.00 to 3.00. Presentation of subject matter not available in other courses offered by the college. Directed reading and discussion of books and other documents of significant importance and current interest in agriculture, food systems, renewable resources and the environment. The specific topic that is offered will be indicated on the student's academic record. Permission of instructor required. Typically offered Fall Spring Summer.

AGR 49500 - International Professional Experience In Agriculture, Food, Or Natural Resources

Credit Hours: 0.00. Supervised international professional experiences in agricultural, food, or natural resource disciplines. The professional experience period must be preplanned and conducted under the supervision of a College of Agriculture faculty member. Students must submit a summary report. Consent of the College of Agriculture international professional experience program coordinator required. Permission of instructor required. Typically offered Fall Spring Summer.

AGR 49600 - Multicultural Professional Experience

Credit Hours: 0.00. The multicultural professional experience must be pre-planned and conducted under the supervision of a College of Agriculture faculty member. The experience must be a minimum of four weeks in length. Students must submit a summary report. Typically offered Summer Fall Spring.

Agronomy

AGRY 10500 - Crop Production

Credit Hours: 3.00. Fundamental principles of crop production and distribution. Emphasis is placed on applying technological advances in agronomy to active crop-production situations, including basic soils, agricultural meteorology, and crop physiology and breeding. Typically offered Spring Fall.

AGRY 11000 - Survey Of Turfgrass Culture

Credit Hours: 1.00. A survey of the challenges and opportunities available in the turfgrass industry. Students will visit a wide range of turf sites to see turf problems and their solutions. Professional turf managers, upperclass undergraduate students, and faculty will share their experiences with the class to provide a broad perspective of the turf industry to the students. Typically offered Fall.

AGRY 15500 - Introduction To Soil Morphology

Credit Hours: 2.00. This course features an introductory field experience in evaluating soil morphology. Students will develop skills determining horizon nomenclature, texture, soil color, structure, consistence and drainage. Basic concepts regarding the impact of soil morphology on use of soils for various purposes will be presented. Collegiate soil judging is a portion of the subjet matter discussed. Typically offered Fall.

AGRY 20400 - Crop And Weed Identification

Credit Hours: 1.00 or 2.00. (BTNY 20400) The identification by sight of plant mounts and seeds of over 200 crops and weeds is taught. The first eight weeks, which covers restricted weeds, prohibited noxious weeds, common weeds, and seed diseases, can be taken for one credit; the last eight weeks covers cereals, grass and legume forages, and legume crops. The list of species to be studied for two credits is obtained from the Intercollegiate Crops Judging Manual. The species to be covered for one credit include the above-listed weeds and additional weed specimens pertinent to the weeds contest. The use and origins of the species are discussed briefly. Suggested course in preparation for AGRY 30500 - Seed Analysis And Grain Grading. Typically offered Spring.

AGRY 21000 - Fundamentals Of Turfgrass Culture

Credit Hours: 3.00. An introductory course in turfgrass management emphasizing turfgrass growth and development, species characteristics, their adaptation and basic cultural requirements for ornamental and functional turfgrass areas. The requirements and cultural inputs needed for proper establishment and maintenance of a high quality, low maintenance lawn will be discussed. Typically offered Spring.

AGRY 21100 - Fundamentals Of Turfgrass Culture Laboratory

Credit Hours: 1.00. (HORT 21100) Companion lab to AGRY 21000. Laboratory exercises will focus on turfgrass and seed anatomy, morphology, identification as well as the hands-on basic principles of turfgrass culture. Designed for the student who intends to pursue a career in turfgrass management and plans to enroll in AGRY 510. Enrollment preference will be given to Turfgrass Science Majors. Typically offered Spring.

AGRY 25100 - Introduction To Soils

Credit Hours: 1.00. Characteristics of soils and associated landscapes; soil genesis and classification; relation of soils to land use; soil management relative to erosion, tillage, drainage, moisture supply, and aeration. Credit cannot be given in both AGRY 25100 and AGRY 25500/NRES 25500 or AGRY 27000. Course meets during weeks 1-6. Typically offered Fall Spring.

AGRY 25500 - Soil Science

Credit Hours: 3.00. (NRES 25500) Differences in soils; soils genesis; physical, chemical, and biological properties of soils; relation of soils to problems of land use and pollution; soil management relative to tillage, erosion, drainage, moisture supply, temperature, aeration, fertility, and plant nutrition. Introduction to fertilizer chemistry and use. Not available to students who have taken AGRY 27000. Typically offered Fall Spring.

AGRY 27000 - Forest Soils

Credit Hours: 3.00. Development, distribution, and classification of soil profile; soil characteristics related to forest practices; nature and cause of soil differences; fertility and plant nutrition. Not available to students who have taken AGRY 25500 or NRES 25500. Typically offered Spring.

AGRY 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first- and second-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

AGRY 28500 - World Crop Adaptation And Distribution

Credit Hours: 3.00. Examination of how environmental factors, including climate and soils, impact the global distribution of major food crops. Identification of the types of naturally occurring plant communities and comparison of these communities with those of environmentally and economically sound field cropping systems. Exploration of how man's intervention has maintained or modified the productivity of food crops in agricultural communities and how his intervention has affected the environment. Typically offered Spring.

AGRY 29000 - Introduction To Environmental Science

Credit Hours: 3.00. (NRES 29000, EAPS 11300) An introduction to environmental science, including issues such as air and water pollution, toxic waste disposal, soil erosion, natural hazards, climate change, energy resources, and environmental planning. Includes extensive in-class discussion of case studies. Typically offered Fall.

AGRY 30500 - Seed Analysis And Grain Grading

Credit Hours: 2.00. A practical study of factors influencing commercial grain quality and purity of seed lots. Training in the ability to recognize crop products for their market worth by knowing defects that reduce grain quality. Purity analysis of seed lots will be performed. In-depth identification of 200 crops and weeds important to United States agriculture. Intercollegiate crops judging is a portion of the subject matter discussed. Typically offered Fall.

AGRY 30600 - Seed Technology

Credit Hours: 2.00. An introduction to the seed industry with emphasis on morphological development, production, cleaning, and testing as well as storage and merchandising techniques. Typically offered Fall.

AGRY 31100 - Turfgrass Diagnostics

Credit Hours: 1.00. An intermediate to advanced level course covering relevant applied problem solving skills required to be a professional turfgrass manager. Typically offered Spring.

AGRY 32000 - Genetics

Credit Hours: 3.00. The transmission of heritable traits; probability; genotypic-environmental interactions; chromosomal aberrations; polyploidy; gene mutations; genes in populations; the structure and function of nucleic acids; biochemical genetics; molecular genetics; coding. Typically offered Fall Spring.

AGRY 32100 - Genetics Laboratory

Credit Hours: 1.00. Experiments with plants and microorganisms to elucidate the basic concepts of molecular and classical genetics as applied to genome analysis. Typically offered Fall Spring.

AGRY 33500 - Weather And Climate

Credit Hours: 3.00. An introductory course in meteorology and climatology with applications to daily life. The study of the fundamental physical principles behind weather and climate and how they apply to the homeowner and the world citizen. Emphasis is on how to interpret weather conditions and forecasts, what controls the wide range of climates in the world, and what the future may hold. Typically offered Spring.

AGRY 33700 - Environmental Hydrology

Credit Hours: 3.00. This course is designed to provide undergraduate students with both the basics of how water moves through the environment and current theories as to how hydrologic response is modified by environmental change at a variety of temporal and spatial scales. Typically offered Spring.

AGRY 33800 - Environmental Hydrology Laboratory

Credit Hours: 1.00. This laboratory course is designed to provide hands-on examples of the hydrologic concepts covered in the

AGRY 33700 - Environmental Hydrology class and with practical experience in hydrologic field techniques. Typically offered Spring.

AGRY 34900 - Soil Ecology

Credit Hours: 3.00. An introductory course that will cover the basic concepts of soil ecology. Biological diversity and the interactions between and within biotic and abiotic components of the soil ecosystem, nutrient cycling, and genetic engineering are introduced. Typically offered Fall.

AGRY 35000 - Global Awareness

Credit Hours: 1.00 to 3.00. A seminar-type course about world geography, cultures, and agriculture. Speakers are selected from the many Purdue graduate students and visiting scholars from around the world. Extra credit may be earned through independent study of a global issue. Typically offered Spring.

AGRY 35500 - Soil Morphology And Geography

Credit Hours: 2.00. This course features field experience in advanced techniques in soil morphology including the study of the relationship of soils to landscaped, common parent materials of Midwest and classification of soils in the Soil Taxonomy. Course material emphasizes the development of detailed descriptions of soil properties and how these properties directly impact the interpretations and recommendations for land use options. Use and management of soils based on landscape position and morphology will be covered including on-site waste disposal, homes with basements as well as road and street construction. Collegiate soil judging is a portion of the subject matter discussed. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

AGRY 36500 - Soil Fertility

Credit Hours: 3.00. Principles of soil chemistry and physics influencing plant nutrition; emphasis on diagnosis and solution of problems on soil reaction and nutrient status; fertilizer chemistry and use; reaction of pesticides and growth regulators with soils. Typically offered Spring.

AGRY 37500 - Crop Production Systems

Credit Hours: 3.00. Factors affecting management decisions in crop production systems. Development of small grain and row cropping systems. Interaction of factors affecting efficient production systems, including seed selection, tillage, planting management, pest management, and harvesting and storage considerations. Typically offered Fall Spring.

AGRY 38000 - Field Crop Diagnostic Techniques

Credit Hours: 1.00. (BTNY 380, ENTM 380) Identification of field crop problems via in-field diagnostic techniques, determination of the magnitude of problems utilizing in-field thresholds, evaluation of optional multidisciplinary management strategies, and development of appropriate strategies based upon economic, environmental, and cultural concepts. Permission of instructor required. Typically offered Summer.

AGRY 38500 - Environmental Soil Chemistry

Credit Hours: 4.00. (NRES 38500) Designed as an upper level introductory course covering environmental soil chemistry concepts in framework most applicable to inorganic and organic chemical contamination of soil and water resources and intended for students in environmental science fields that may not have a strong chemistry and/or math background. (el.5). Typically offered Fall.

AGRY 39000 - Professional Cooperative Programs In Agronomy

Credit Hours: 0.00. Supervised professional experiences in agronomy. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit a summary report. Consent of the departmental cooperative professional program coordinator required. Typically offered Fall Spring Summer.

AGRY 39800 - Agronomy Seminar

Credit Hours: 1.00. Weekly discussions of agronomic topics and other subjects relative to agronomic interest. Students are expected to participate in the discussions. Typically offered Fall.

AGRY 39900 - Individual Study

Credit Hours: 1.00 to 3.00. Supervised individual study or research over topics not covered in other courses. Arrange with agronomy faculty before registering. Permission of instructor required. Typically offered Fall Spring.

AGRY 40000 - Agronomy Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

AGRY 43100 - Atmospheric Thermodynamics

Credit Hours: 3.00. (EAPS 42100) Structure and composition of the atmosphere. Thermodynamics of dry and moist air, including adiabatic and pseudoadiabatic processes, hydrostatic stability, and air mass determination. Typically offered Fall.

AGRY 43200 - Atmospheric Dynamics I

Credit Hours: 3.00. (EAPS 42200) A study of the general system of equations governing mass and momentum changes in the atmosphere; special horizontal wind representations; thermal wind relationships; circulation, vorticity, divergence, and vertical motion. Typically offered Spring.

AGRY 43300 - Atmospheric Dynamics II

Credit Hours: 3.00. (EAPS 42300) An extension of AGRY 43200 with the emphasis on perturbation theory and hydrodynamic stability, air mass and frontal theory, barotrophic and baroclinic models, wave cyclone theory, and numerical weather prediction. Typically offered Fall.

AGRY 44100 - Synoptic Laboratory I

Credit Hours: 1.00. (EAPS 43100) Analysis of vertical distributions of temperature and moisture with applications to adiabatic and pseudoadiabatic processes, hydrostatic stability, and air mass determination. Typically offered Fall.

AGRY 44200 - Synoptic Laboratory II

Credit Hours: 1.00. (EAPS 43200) Analysis of horizontal distributions of pressure, temperature, wind, vorticity, and vertical motions. Applications to synopticscale wave propagation. Typically offered Spring.

AGRY 44300 - Synoptic Laboratory III

Credit Hours: 1.00. (EAPS 43300) Diagnosis of midtropospheric wave propagation and growth. Analysis of surface pressure

fields and fronts and their relationships to upper air features. Extensive use is made of teletype and facsimile weather information. Typically offered Fall.

AGRY 44400 - Weather Analysis And Forecasting

Credit Hours: 3.00. (EAPS 43400) In-depth study of contemporary weather analysis and forecasting techniques and problems. Extensive use is made of teletype and facsimile data and numerical weather prediction guidance provided by the National Meteorological Center. Typically offered Spring.

AGRY 45000 - Soil Conservation and Water Management

Credit Hours: 3.00. (NRES 45000) Principles of soil conservation with emphasis on control of soil erosion by wind and water; impact of soil management decisions on environment; soil-water-plant relations, includes agronomic aspects of water management for both irrigation and drainage. Typically offered Fall.

AGRY 46000 - Contemporary Issues In Agriculture

Credit Hours: 3.00. (ANTH 46000) Current agricultural issues are examined from a problem-solving standpoint. Class includes discussion and debate of the social, economic, and technological decisions facing agricultural communities. Agricultural issues are examined from a humanistic as well as a scientific viewpoint. Typically offered Spring.

AGRY 46500 - Soil Physical Properties

Credit Hours: 3.00. Physical properties and processes in soils; water flow, soil structure, chemical movement; principles and methods of physical analysis of soils; the influence of soil physical processes on environmental quality and plant growth. Typically offered Fall.

AGRY 47500 - Honors Course - Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third- and fourth-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

AGRY 48000 - Plant Genetics

Credit Hours: 3.00. Principles and recent advances in plant genetics including: genetic segregation, linkage, DNA markers and applications, chromosomes and genomes, variation in chromosome number and structure, mutation, recombination and DNA repair, quantitatively inherited traits, introduction to principles of population genetics, gene expression, gene organization, regulation of gene activity, gene function, identifying important genes, cloning genes, reverse genetics, plant transformation, applications of genetic engineering, genome sequencing, using sequence data. Typically offered Fall.

AGRY 49800 - Agronomy Senior Seminar

Credit Hours: 1.00. Weekly discussions and presentations on assigned topics in Agronomy, interpersonal interactions, professional ethics, and leadership skills. Student teams will evaluate case studies and present their analysis orally and in writing. Typically offered Fall.

AGRY 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. For students doing individualized research on agronomic problems; report required. Arrange with academic advisor and honors research advisor before registering. Admission to honors program. Permission of instructor required. Typically offered Fall Spring Summer.

AGRY 50500 - Forage Management

Credit Hours: 3.00. The study of the role of economically important crop species in the soil-plant-animal complex. Physiology, utilization, and management of forage species will be emphasized. Typically offered Spring.

AGRY 51000 - Turfgrass Science

Credit Hours: 3.00. An advanced course in turfgrass management which focuses on the management requirements of intensively cultured turfgrass areas, with a specific emphasis on golf course and athletic fields. Interrelationships among soil, plant and atmospheric environments, management practices and turfgrass quality will be stressed. Typically offered Fall.

AGRY 51100 - Population Genetics

Credit Hours: 3.00. (ANSC 51100, FNR 51100) Basic concepts of population genetics. Characterization of populations using gene frequencies, gametic and zygotic disequilibrium; forces changing gene frequencies (mutation, migration, selection, and random genetic drift) and genotypic frequencies (mating systems: inbreeding, crossbreeding, and phenotypic assortative) and related hypothesis testing; gene trees and the coalescent process; and molecular phylogenies. Typically offered Fall.

AGRY 51200 - Integrated Turfgrass Systems

Credit Hours: 3.00. Integration of agronomic principles for professionally managing golf courses, athletic complexes, lawn care companies, and sod production facilities in an efficient and environmentally friendly manner. Emphasizes independent thinking and team cooperation for understanding the social, ethical, and economical aspects underlying the daily agronomic management decisions, including construction, establishment, cultural practices, fertilization, and pest management. Course meets for weeks 1-10. Typically offered Fall.

AGRY 51500 - Plant Mineral Nutrition

Credit Hours: 3.00. Fundamental principles and concepts of the mineral nutrition of higher plants; processes and mechanisms controlling nutrient bioavailablilty and acquisition; physiological, genetic, and ecological aspects of plant nutrition including rhizosphere dynamics and interaction with disease. Offered in even-numbered years. Typically offered Fall.

AGRY 52000 - Principles And Methods Of Plant Breeding

Credit Hours: 3.00. Introduction to methods and techniques of breeding field crops, with emphasis on the application of genetic principles; analysis of and present approach to the solution of specific breeding problems in selected field crops. Typically offered Fall.

AGRY 52500 - Crop Physiology And Ecology

Credit Hours: 3.00. Study of the physiological basis for growth, yield, and adaptation of crop plants. Topics emphasized include: carbohydrate assimilation and partitioning, nitrogen metabolism, crop growth and development, water relations, stress tolerance, and crop improvement using physiological genetics. Basic background in college level plant biology is recommended. Typically offered Spring.

AGRY 53000 - Advanced Plant Genetics

Credit Hours: 3.00. Advanced treatment of principles and recent advances in plant genetics including: mutagenesis; cell, molecular and direct approaches to genetic analysis and genetic interactions; haploidy; chromosomal organization and aberrations; transposable elements; mutations, paramutation and epigenetics in higher plants; extranuclear inheritance; cytogenetic and molecular affinities between crop plants and their wild relatives; genetic manipulations; gene discovery; genetic approaches to understanding agriculturally useful plant traits. ESTs and global gene expression analysis, proteomics, metabolic profiling, comparative genomics and geonme evolution. Offered in odd-numbered years. Typically offered Fall.

AGRY 53500 - Boundary Layer Meteorology

Credit Hours: 3.00. (EASP 52500) This course has required class trips. Students will pay individual lodging or meal expenses where necessary. A study of the physical nature of the lowest layers of the atmosphere. The energy balance concept and the turbulent transfer of heat, momentum, and water vapor are discussed in detail. Some specific microclimates are studied in this context. Typically offered Spring.

AGRY 53600 - Environmental Biophysics

Credit Hours: 3.00. An analysis of the energy fluxes to and from terrestrial plants, insects, mammals, and humans as they exist in their macro and microclimates. Agricultural meteorology methods (both research and operational) will be presented. Labs will be both in-laboratory and in-field with reports required. A special project will be required of all students and will be presented in class and written as if for publication. Typically offered Spring.

AGRY 54000 - Soil Chemistry

Credit Hours: 3.00. Emphasis on processes controlling the gaseous, solution, and solid phases in soils including precipitation, acid-base, oxidation-reduction, complexation, absorption, and ion exchange. Typically offered Spring.

AGRY 54400 - Environmental Organic Chemistry

Credit Hours: 3.00. The fundamental properties and processes responsible for the fate of organic chemicals in the environment, with emphasis on soil and water chemistry. Areas to be addressed will include both conceptual and theoretical aspects of processes relevant to environmental fate of contaminants; measurement, estimation, correlation, and application of the parameters most commonly used to assess various chemodynamic properties in soil-water systems. Typically offered in spring semester of even-numbered years.

AGRY 54500 - Remote Sensing Of Land Resources

Credit Hours: 3.00. Application of remote sensing and spatial databases for observing and managing land resources within the Earth System; analysis and interpretation of remotely sensed data in combination with field observations and other data sources; conceptualization and design of a global earth resources information system. Typically offered Fall.

AGRY 55000 - Field Crops Breeding Techniques

Credit Hours: 2.00. Field nursery experience, including crossing procedures, plant evaluation, selection for pest resistance and for agronomic characters, and field data evaluation. Typically offered Summer.

AGRY 55300 - Introduction To SAS For Statistical Analysis

Credit Hours: 1.00. Introduction to SAS as a programming language, for students with no prior exposure to programming languages. Basics of programming languages, SAS concepts, data input and manipulation. Introduction to SAS for graphs, univariate statistics, simple statistics for classification data, analysis of variance, simple and multiple regression. Typically offered Summer Fall.

AGRY 55500 - Soil And Plant Analysis

Credit Hours: 3.00. Principles and methods of chemical analysis of plants and soils. Topics include soil carbon analysis, exchangeable cations, soil acidity, salinity, pesticide analysis, and elemental analysis of plant tissue and forage analysis. Quantitative gravimetric and volumetric techniques are reviewed followed by use of instrumental methods of analysis including atomic absorption, UV/Visible spectrometry, HPLC, and gas chromatography. Laboratory safety, quality assurance/quality control, and data reporting are emphasized. Students having at lease one year of chemistry including a quantitative analysis laboratory will be suitably prepared. Typically offered Spring.

AGRY 56000 - Soil Physics

Credit Hours: 3.00. Fundamentals of soil physics; transport of chemicals, heat, and gases; field spatial variability; principles and methods of physical analysis of soils; the influence of soil physical processes on environmental quality and agricultural production. Students having an understanding of introductory soil science will be suitably prepared. Typically offered Fall.

AGRY 56500 - Soils And Landscapes

Credit Hours: 3.00. Soils as natural components of landscapes, geomorphology and soil characteristics; processes of soil formation; principal soils of Indiana, their adaptations, limitations, productivity and use; global soil distributions; application of GPS and mobile GIS in the field. This course requires two all-day field trips. Students will pay individual meal expenses when necessary. Typically offered Fall.

AGRY 57200 - Molecular Cytogenetics

Credit Hours: 2.00. Principles of chromosome biology: behavior of chromosomes at meiosis and mitosis, polyploidy, haploidy, aneuploidy, chromosome rearrangements, chromosome structure/evolution, chromatin organization and regulation of gene

activity, chromosome engineering and genome architecture, and application of molecular techniques to chromosome biology. . Typically offered Spring.

AGRY 57300 - Molecular Cytogenetics Laboratory

Credit Hours: 1.00. Application of principles from Molecular Cytogenetics. Lab consists of chromosome preparation from mitotic/meiotic samples, identification of meiotic stages, chromosome banding, fluorescence in situ hybridization, and preparation of dipteran polytene chromosomes. Students are encouraged to bring samples from their own thesis research to use as test samples for molecular analysis. Offered in odd-numbered years. . Typically offered Spring.

AGRY 58000 - Soil Microbiology

Credit Hours: 3.00. The soil microbial population and its role in the soil ecosystem; microbial transformations of inorganic and organic compounds; decomposition of residues; and dynamics of soil organic matter. Typically offered Spring.

AGRY 58200 - Environmental Fate Of Pesticides

Credit Hours: 3.00. Emphasis is given to developing a fundamental understanding of the processes controlling the fate of organic chemicals, such as pesticides, in the environment. Processes considered include: volatilization, degradation, leaching, and sorption. Typically offered Spring.

AGRY 58500 - Soils And Land Use

Credit Hours: 3.00. Soils as a resource in development planning; soil properties affecting land use; use of soil survey, aerial photos, topographic maps, and other resource data in land-use allocation; nonengineering aspects of site selection for various land uses, water conservation, waste disposal, and erosion control. Typically offered Spring.

AGRY 59600 - Professional Presentations

Credit Hours: 1.00. Develop confidence and skills in preparing and delivering professional presentations to both peer scientific and student audiences. (el. 7). Typically offered Fall.

AGRY 59700 - Communicating With The Public

Credit Hours: 1.00. This course will prepare students being trained as agronomy professionals to enhance their communication skills so they can successfully interact with the public. (el. 7) Offered in alternate years. Typically offered Spring.

AGRY 59800 - Special Problems

Credit Hours: 1.00 to 6.00. Research on agronomic problems conducted in laboratory, field, or library; report required; arrange with an agronomy staff member before registering. Permission of instructor required. Typically offered Fall Spring Summer.

AGRY 60000 - Genomics

Credit Hours: 3.00. An introduction to the technologies and analytical methods used in studying genomes, their functions and systems biology. This course prepares graduate students for further study of these techniques in additional courses and in their research. Students with an understanding of introductory genetics and statistics will be suitably prepared for this course. Offered in even-numbered years. Typically offered Fall.

AGRY 60500 - Advanced Plant Breeding

Credit Hours: 3.00. Advanced study of genetic principles and their application to plant breeding systems, techniques, and objectives. Offered in alternate years. Prerequisite: AGRY 52000; a course in statistics covering simple analysis of variance. Typically offered Fall.

AGRY 61100 - Quantitative Genetics

Credit Hours: 3.00. Continuation of AGRY 51100, ANSC 51100. Quantitative genetics in animals and plants. Genotypic and environmental variances; covariances between relatives; single- and multiple-trait selection and correlated responses; genotype-environment interaction. Inbreeding and crossbreeding: means, variances, heterosis, intra- and inter-population improvement. Prerequisite: STAT 51200; Prerequisite: AGRY 51100 OR ANSC 51100. Typically offered Fall.

AGRY 63500 - Micrometeorology

Credit Hours: 3.00. A rigorous study of the atmospheric boundary layer with special attention to turbulent diffusion processes in the lower atmosphere. Offered in alternate years. Prerequisite: AGRY 53500. Typically offered Spring.

AGRY 64900 - Molecular Microbial Ecology

Credit Hours: 3.00. Focuses on the application of various molecular genetic techniques for studying micro-organisms from and in the environment. The method, theoretical basis of each method, and interpretation of results are covered. The major areas discussed are the application of molecular genetic techniques to study: (1) total microbial communities; (2) diversity of micro-organisms in a community; and (3) biotechnological uses of micro-organisms. Prerequisite: AGRY 32000 or AGRY 58000 or BCHM 56200 or BIOL 24100 or BIOL 43800 or BIOL 54900. Typically offered Fall.

AGRY 65000 - Clay Mineralogy

Credit Hours: 4.00. Principles of crystal chemistry, survey of clay mineral structures, and identification of clay minerals by X-ray diffraction, chemical methods, differential thermal analysis, infrared spectroscopy, and specific surface area measurements. Role of clay minerals in the natural environment. Offered in alternate years. Typically offered Spring.

AGRY 65500 - Soil Genesis And Classification

Credit Hours: 3.00. Principles of soil classification in general and of U.S. soil taxonomy in particular. Factors and processes of soil formation. Mineral weathering, geomorphology, and climate as related to the formation and distribution of soils. Offered in alternate years. Prerequisite: AGRY 56500. Typically offered Spring.

AGRY 69600 - Agronomy Graduate Seminar

Credit Hours: 1.00. Weekly discussion of assigned topics in soil and crop science. Typically offered Spring.

AGRY 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

AGRY 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

American Sign Language

ASL 10100 - American Sign Language I

Credit Hours: 3.00. A basic introduction to American Sign Language. This course introduces students to the tools for mastering the grammar at a basic expressive and receptive level. Introduction to cultural and historical aspects of ASL and the deaf community. Typically offered Fall Spring Summer.

ASL 10200 - American Sign Language II

Credit Hours: 3.00. A continuation of ASL 10100. Further study of the language with more emphasis on receptive and expressive conversational skills. Includes readings of research studies relevant to lectures. Typically offered Fall Spring Summer.

ASL 20100 - American Sign Language III

Credit Hours: 3.00. A more advanced study of American Sign Language. Further development of receptive and expressive skills using more advanced material. Continued emphasis on cultural and historical aspects in relation to the evolution of the language and language usage. Typically offered Summer Fall Spring.

ASL 20200 - American Sign Language IV

Credit Hours: 3.00. A continuation of ASL 20100. Includes some introduction to linguistic structure, especially classifiers, temporal sequencing and aspect, and conversational regulators. Typically offered Fall Spring.

ASL 23000 - ASL In Conversaion And Narrative

Credit Hours: 3.00. Development of expressive skills in ASL. Guided practice in conversation designed to enhance communicative competence. Introduction to a variety of artistic uses of ASL narrative, poetry and theatre. Typically offered Fall.

ASL 28000 - American Deaf Community: Language, Culture, And Society

Credit Hours: 3.00. The linguistic, cultural, and societal context of the deaf community in America. Both historical and contemporary aspects of deaf identity will be included, with an emphasis on the central role that ASL plays in the lives of deaf individuals. Typically offered Spring.

ASL 39000 - Undergraduate Research In American Sign Language

Credit Hours: 3.00. This course is designed to allow for the investigation of topics related to the linguistic structure of ASL, populations of ASL language learners, sub-populations of the Deaf Community at the undergraduate level. Permission of instructor required. Typically offered Summer Fall Spring.

American Studies

AMST 20100 - Introduction To American Studies

Credit Hours: 3.00. Introduction to the interdisciplinary study of American culture, history, and society in its national and global contexts. Typically offered Fall Spring.

AMST 30100 - Perspectives On America

Credit Hours: 3.00. Advanced interdisciplinary study of American culture, history, and society in their national and global contexts. Typically offered Fall Spring.

AMST 49000 - Senior Capstone In American Studies

Credit Hours: 6.00. Interdisciplinary senior capstone project in American Studies. Permission of department required. Typically offered Fall Spring.

AMST 59000 - Directed Readings In American Studies

Credit Hours: 1.00 to 3.00. A reading course in aspects of American Studies directed by the instructor in whose particular field of specialization the content on the reading falls. Permission of Instructor required. Typically offered Fall Spring Summer.

AMST 60100 - Introduction To American Studies

Credit Hours: 3.00. An exploration of the cultural and institutional history of American Studies designed to acquaint students with the interdisciplinary concepts of American Studies by focusing on major canonical texts associated with that history. Prerequisite: Master's student standing and American Studies majors only. Typically offered Fall.

AMST 60200 - Contemporary Issues In American Studies

Credit Hours: 3.00. An investigation of analytical categories, particularly race, class and gender, the multiple methodologies, and theoretical premises that shape developments in the field of American Studies. Prerequisite: AMST 60100. Typically offered Spring.

AMST 60300 - American Studies Interdisciplinary Project

Credit Hours: 3.00. Students will conduct independent research under faculty supervision towards completion of the Special Field examination for the Ph.D. degree. The project should be an extended, original research essay, based upon interdisciplinary research. The project should aim to produce original findings on a clearly defined topic or problem. In addition to the research and essay, students must produce a statement of methodology in which they explain their choice of sources and how their project contributes to the field of American Studies. To be taken in the final semester of coursework. Prerequisite: AMST 60100. Typically offered Fall Spring.

AMST 61000 - Transnational American Studies Abroad

Credit Hours: 3.00. Provides students an annual opportunity to study abroad and to familiarize themselves with Transnational scholarship in the field of American Studies. The seminar reflects efforts of the program to internationalize its curriculum and to establish ties with international universities. The course also complements the requirement of second language study for the Ph.D. in American Studies. Prerequisite: AMST 60100. Typically offered Summer.

AMST 62000 - Archival Theory And Practice

Credit Hours: 3.00. This class explores recent theories of the Archive, as well as theories of archiving, examines scholarly approaches to archival research, and introduces students to the practical aspects of accessioning, arranging, describing, and preserving archival collections. Archival work for the class will be conducted under the supervision of a faculty member and a partnering library. Prerequisite: AMST 60100, AMST 60200. Typically offered Fall Spring.

AMST 63000 - M A Research Seminar

Credit Hours: 6.00. A research seminar required of all M.A. students in their final semester. Students write substantial essays based upon original research in which they seek to crystallize, in practice, methods and concepts of American Studies. Prerequisite: AMST 60100. Typically offered Spring.

AMST 65000 - Reading Seminar In American Studies

Credit Hours: 3.00. A reading seminar on a selected topic in American Studies, taught by two faculty members from different disciplines, usually one from the humanities and one from the social sciences. Prerequisite: AMST 60100. Typically offered Fall Spring.

AMST 69500 - American Studies Service Learning/Internship

Credit Hours: 3.00. This course is to be used by students to complete a service learning or internship project that provides professional development towards completion of the degree. The project must be conducted under the supervision of a faculty member and community partner. The faculty supervisor will be responsible for determining the academic content of the course and requirements of service. In addition to academic requirements for the course, a final written report on the project must be filed with the American Studies program. The final report must describe the relationship between work completed for the course and the student's plan of study. Prerequisite: AMST 60100, AMST 60200. Typically offered Summer Fall Spring.

AMST 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring.

Animal Sciences

ANSC 10100 - Animal Agriculture

Credit Hours: 3.00. Importance of livestock in the field of agriculture, and the place of meats and other animal products in the human diet. Course not available for students enrolled at the West Lafayette campus. Credit cannot be obtained for both ANSC 10100 and ANSC 10200. Offered at regional campuses, Vincennes University, and other distance education sites. Typically offered Fall Spring Summer.

ANSC 10200 - Introduction To Animal Agriculture

Credit Hours: 3.00. A study of animal agriculture emphasizing the efficient production of animal food products from poultry, dairy and meat animals. Credit cannot be obtained for both ANSC 10100 and 10200. Course may also be offered for dual credit with cooperating Indiana high schools upon documented approval by Department of Animal Sciences. Typically offered Fall Spring.

ANSC 10600 - Biology Companion Animal

Credit Hours: 3.00. Introduction to the various aspects of companion animal biology. Topics include anatomy, physiology, health, immunity, nutrition, growth, digestion, metabolism, behavior, genetics, reproduction and lactation. Typically offered Spring.

ANSC 18100 - Orientation To Animal Sciences

Credit Hours: 1.00. Introduction to the faculty, programs, opportunities, career preparation, and personal development requirements needed to succeed in a career in the animal industries. Course meets during weeks 1-8. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Spring.

ANSC 20100 - Functional Anatomy And Animal Performance

Credit Hours: 3.00. A course designed to observe the norms for acceptable conformation of breeds of farm animals and to relate significant characteristics of farm animals to performance and profitability. Typically offered Fall.

ANSC 22100 - Principles Of Animal Nutrition

Credit Hours: 3.00. Classification and function of nutrients, deficiency symptoms, digestive processes, characterization of feedstuffs, and formulation of diets for domestic animals. Typically offered Summer Fall Spring.

ANSC 23000 - Physiology Of Domestic Animals

Credit Hours: 4.00. A lecture course designed to present physiology of domestic farm animals. Function of tissues and organs, maintenance of internal steady-state conditions, and body responses to external environmental conditions will be presented. Physiological mechanisms involved in lactation, growth, and reproduction will be included. Typically offered Fall Spring.

ANSC 24500 - Applied Animal Management

Credit Hours: 2.00. Skills and practices related to handling and care of beef and dairy cattle, horses, poultry, sheep, and swine. Typically offered Fall Spring.

ANSC 28100 - Career Planning In Animal Sciences

Credit Hours: 1.00. A seminar course designed to inform students of the career opportunities in animal industries, develop their interviewing and other interpersonal skills, and begin to plan the course of study, work experiences, and marketing methods needed to obtain a successful internship and employment. Typically offered Spring.

ANSC 29200 - Special Assignments

Credit Hours: 0.00. To be arranged with individual staff members prior to registration. Reading, discussions, written reports, seminar presentations, teaching, field or laboratory experiences provided for enrichment in special areas of animal science. . Permission of department required. Typically offered Summer Fall Spring.

ANSC 29300 - Special Assignments

Credit Hours: 1.00 to 3.00. Reading, discussions, written reports, seminar presentations, teaching, field or laboratory experiences provided for enrichment in special areas of animal science. Combination of ANSC 29300 and AGR 49300 cannot exceed six credits. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 29400 - Exploring International Animal Agriculture

Credit Hours: 3.00. An experiential learning class. Interrelationship of animal agriculture with agronomic production, feed industries, culture, national infrastructure, political systems and international trade will be investigated through international travel. Critical thinking and communication skills will be enhanced by topic leadership, comparative analysis and seminar presentation. May be repeated for credit with variable title. Typically offered Summer.

ANSC 29500 - Special Topics In Animal Sciences

Credit Hours: 0.00 to 3.00. Lecture presentation of specialized material not available in formal courses of the department. The specific topic that is offered will be indicated on the student's record. May be repeated for credit with variable title. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 30100 - Animal Growth, Development, And Evaluation

Credit Hours: 4.00. A study of meat animal growth and developmental processes, including micro and gross anatomy, and factors that affect body/carcass composition with application to animal and carcass evaluation. Typically offered Fall.

ANSC 30300 - Animal Behavior

Credit Hours: 3.00. Discussion of animal behavior with emphasis on developing an understanding of the reasons domesticated animals react the way they do toward their kind and to humans. The laboratory will be used for observation of behavior patterns in animals. Solutions for unusual behavior include behavior modification techniques. Typically offered Spring.

ANSC 31100 - Animal Breeding

Credit Hours: 4.00. Genetic principles and their applications in improvement of production efficiency in livestock. Typically offered Fall Spring.

ANSC 32400 - Applied Animal Nutrition

Credit Hours: 3.00. Application of the principles of animal nutrition to the formulation and feeding of supplements and complete rations for animals; ration ingredients and substitution values; computer applications; legal aspects of feed formulation; and industry practices. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Spring.

ANSC 33200 - Environmental Physiology Of Domestic Animals

Credit Hours: 2.00. Interactions of environmental factors with physiological processes in domestic animals. Typically offered Spring.

ANSC 33300 - Physiology Of Reproduction

Credit Hours: 3.00. Basic information on the physiological processes of reproduction. Typically offered Fall Spring.

ANSC 33400 - Physiology Of Reproduction Laboratory

Credit Hours: 1.00. Anatomical structures, physiological processes, and techniques concerned with animal reproduction. Typically offered Spring.

ANSC 34500 - Animal Health Management

Credit Hours: 3.00. The objectives of this course are to familiarize the student with disease processes and mechanisms. Management techniques in food, companion, and research animal species that minimize or prevent disease will be emphasized, as well as the consequences on animal production, reproduction, and human health. Typically offered Fall.

ANSC 35100 - Meat Science

Credit Hours: 3.00. Study of muscle and meat, principles involved in the conversion of living animals to meat and by-products; efficient utilization of all types of meat as food. Typically offered Spring.

ANSC 35101 - Meat Science Laboratory

Credit Hours: 1.00. Application of scientific principles to the meat industry, with emphasis on all aspects of processing including: harvest; carcass grading and evaluation; fabrication; cured, smoked, and comminuted meat products; quality control; product development; and retail and food service merchandising. Typically offered Spring.

ANSC 37000 - Livestock Evaluation

Credit Hours: 2.00. This course is designed to develop logical thinking and speaking skills, while developing the ability to critically evaluate livestock in their production environments. Prior experience in public speaking or judging is not required. The combination of ANSC 37000, ANSC 37100, ANSC 37200, ANSC 47000, ANSC 47100, and ANSC 47200 cannot exceed three credits toward ANSC electives. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Spring.

ANSC 37100 - Dairy Evaluation

Credit Hours: 2.00. This course will enable the student to become familiar with breeds of dairy, parts of dairy cattle and their relationship to function. Opportunities will exist to associate with people from various breed organizations within the dairy industry. The combination of ANSC 37000, 37100, ANSC 37200, ANSC 47000, ANSC 47100, and ANSC 47200 cannot exceed three credits toward ANSC electives. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Spring.

ANSC 37200 - Horse Evaluation

Credit Hours: 2.00. A student-centered laboratory course designed to familiarize students with functional horse conformation and

type that maximizes athletic ability, applies selection criteria established by national breed associations for evaluating performance events, and prepares students to select halter and performance horses of many breeds and disciplines. The combination of ANSC 37000, ANSC 37100, 37200, ANSC 47000, ANSC 47100, and ANSC 47200 cannot exceed three credits toward ANSC electives. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Spring.

ANSC 38100 - Leadership For A Diverse Workplace

Credit Hours: 3.00. An interactive, small group discussion class covering effective interpersonal and group skills needed to enhance career satisfaction in a diverse workplace including building networks within industry, cross-cultural communication and gaining experiences in group problem-solving and decision-making. This course may be used as an additional written communication elective as required in all plans of study in Animal Sciences. Typically offered Spring.

ANSC 39000 - Animal Sciences Internship

Credit Hours: 0.00. Internships with producers, businesses, or agencies arranged in cooperation with faculty coordinator. Permission of department required. Typically offered Fall Spring Summer.

ANSC 39300 - Animal Industry Travel Course

Credit Hours: 1.00 or 2.00. A classroom and travel course designed to expose students to animal production operations, agribusinesses, industry leaders, and their philosophies as well as critical contemporary issues throughout various geographical areas of the United States. Travel is conducted during spring break or summer sessions and includes visits to animal production farms, universities, and agribusinesses. Additional fee required. Limited to two credits toward Animal Sciences electives. Offered in odd numbered years. Permission of instructor required. Typically offered Spring.

ANSC 40000 - Animal Sciences Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

ANSC 40400 - Animal Welfare

Credit Hours: 3.00. A multi-disciplinary course that introduces students to the fields of animal welfare and the ethics of animal use. The course will emphasize farm animal welfare and production issues. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

ANSC 43500 - Reproductive Management Of Farm Animals

Credit Hours: 3.00. Management practices associated with improved reproductive efficiency. Procedures for diagnosis of reproductive failure and practical methods of controlling reproduction will be identified. Typically offered Fall.

ANSC 44000 - Horse Management

Credit Hours: 3.00. Current breeding, feeding, housing, selection, disease control, and other management practices essential for sound economic planning of horse operations in today's horse industry. Laboratory farm visits provide students with real application examples and industry contacts. Typically offered Fall.

ANSC 44100 - Beef Management

Credit Hours: 3.00. Breeding, feeding, and management practices essential for economical beef production, including performance testing. Typically offered Fall.

ANSC 44200 - Sheep Management

Credit Hours: 3.00. Breeding, feeding, and management practices essential for economical sheep production and commercial lamb feeding, including performance testing. Typically offered Spring.

ANSC 44300 - Swine Management

Credit Hours: 3.00. Breeding, feeding, and management practices essential for commercial swine production, including performance testing. Typically offered Spring.

ANSC 44400 - Dairy Management

Credit Hours: 3.00. Current breeding, feeding, physiology, disease prevention, and management practices essential for economical milk production. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

ANSC 44500 - Commercial Poultry Management

Credit Hours: 3.00. Current developments and practices in the commercial production of eggs, broilers, and turkeys; principles of breeding, physiology, nutrition, management, and disease prevention. Typically offered Spring.

ANSC 44600 - Companion Animal Management

Credit Hours: 3.00. This course details understanding of the economic scope of the pet industry as well as the role of pets in American society. The students will acquire the information to be responsible pet owners by experiencing their knowledge of housing practices, nutritional care, health care, behavior and breeding of companion animals. Typically offered Fall.

ANSC 47000 - Livestock Judging

Credit Hours: 1.00. This course is designed to teach livestock evaluation, relationship of production data to live animal evaluation characteristics, expand logical thinking and reasoning skills, and enhance oral communication skills. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

ANSC 47100 - Dairy Judging

Credit Hours: 1.00. Opportunities will exist to allow the student to practice analysis and enhance decision-making processes in placing animals in collegiate dairy contests. Communication skills will be developed to properly present and defend those decisions with confidence. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

ANSC 47200 - Horse Judging

Credit Hours: 1.00. An intensive capstone experience for those students wishing to apply their knowledge of functional horse conformation, athletic ability, selection criteria established by national breed associations, and develop advanced decision making, communication, and experience working within a team environment by preparing and competing in national judging contests. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

ANSC 48100 - Contemporary Issues in Animal Sciences

Credit Hours: 1.00. Industry-led and student-led discussions and debate of current issues facing animal industries. Experiences from internships, research problems, study abroad, or job shadowing will be shared among the students. Course meets during weeks 1-8. Typically offered Fall.

ANSC 48300 - Contemporary Issues In Animal Sciences II

Credit Hours: 0.50. Student-led discussion and debate of current issues facing animal industries. Topics include environmental impact, food safety, animal care and well-being, ethics, use of biotechnology, world food supply, and international agricultural trade issues. Students will share their experiences with each other from course work, internships, research problems, study abroad and club activities as they address contemporary issues facing animal industries. Course meets during weeks 1-8. Typically offered Spring.

ANSC 48500 - Dairy Farm Evaluation

Credit Hours: 2.00. This course will provide students with an opportunity to integrate and apply knowledge of dairy cattle management systems, nutrition, reproduction, genetics, milk quality, animal handling, physical farm facilities, manure handling and management, personnel and their financial implications. Students will develop critical analysis skills and apply troubleshooting principles in the identification and resolution of dairy farm management issues in a learning environment that is structured around farm evaluation field trips and case studies. Typically offered Spring.

ANSC 49100 - Special Problems

Credit Hours: 1.00 to 3.00. Supervised individual laboratory or library assignments. Written reports required. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 49200 - Special Assignments

Credit Hours: 0.00. To be arranged with individual staff members prior to registration. Reading, discussions, written reports, seminar presentations, teaching, field or laboaratory experiences provided for enrichment in special areas of animal science. Permission of department required. Typically offered Summer Fall Spring.

ANSC 49300 - Special Assignments

Credit Hours: 1.00 to 3.00. Reading, discussions, written reports, seminar presentations, teaching, field or laboratory experiences provided for enrichment in special areas of animal science. Combination of ANSC 29300 and 49300 cannot exceed six credits. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 49400 - Animals And Food Security: International Services Learning

Credit Hours: 1.00 to 4.00. This course prepares students for a service learning international experience and includes the planning of the trip, the actual trip and a reflective learning post-trip class. The course is a partnership between Purdue Animal Sciences, a host university and their students, a local community organization, and an international community development, NGO. The core of the experience is the faculty-led international service learning course where students live and work in villages in a developing country. Students will learn extension methodologies and how to contribute to sustainable projects. Students will be expected to work in bi-national teams across agricultural and community disciplines to not only contribute to the communities served but to apply their classroom knowledge and experience to make a difference in the community. AGEC 43000 - Agricultural And Food Business Strategy is a highly recommended prerequisite. Prerequisites: Multicultural Awareness course (COA list). Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 49500 - Special Topics In Animal Sciences

Credit Hours: 0.00 to 3.00. Lecture presentation of specialized material not available in the formal courses of the department. The specific topic that is offered will be indicated on the student's record. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. For students doing specialized animal sciences research; report required. Arrange with academic advisor and honors research coordinator before registering. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 51100 - Population Genetics

Credit Hours: 3.00. (AGRY 51100, FNR 51100) Basic concepts of population genetics. Characterization of populations using gene frequencies, gametic and zygotic disequilibrium; forces changing gene frequencies (mutation, migration, selection, and random genetic drift) and genotypic frequencies (mating systems: inbreeding, crossbreeding, and phenotypic assortative) and related hypothesis testing; gene trees and the coalescent process; and molecular phylogenies. Typically offered Fall.

ANSC 51300 - Design Of Animal Breeding Programs

Credit Hours: 3.00. Integration of principles of animal breeding and genetics into animal improvement programs. Emphasis is placed on the interaction among genetics, nutrition, and physiology. Typically offered Spring.

ANSC 51400 - Animal Biotechnology

Credit Hours: 3.00. Presentation and discussion of the history, developments, and applications of molecular genetic analysis of human and animal genomes, and use of gene transfer in research, animal agriculture, and human medicine. Ethical and economical ramifications of biotechnology in society will be introduced through reading assignments and discussion. Typically offered Fall.

ANSC 52200 - Monogastric Nutrition

Credit Hours: 3.00. Digestion and absorption, nutrient utilization and interrelationships in poultry, swine, and other monogastric animals. Typically offered Fall.

ANSC 52400 - Ruminant Nutrition And Physiology

Credit Hours: 3.00. Physiological, microbiological, and biochemical effects and their interrelationships on digestion and metabolism in the ruminant animal. Typically offered Spring.

ANSC 53400 - Advanced Reproductive Physiology

Credit Hours: 3.00. A study of mechanisms that interact to control reproduction in farm animals. Current scientific literature and hypotheses are presented, and potential methods to enhance reproductive efficiency are examined. Typically offered Spring.

ANSC 53500 - Avian Physiology

Credit Hours: 2.00. (BMS 82800) A study of the basic principles of physiology and functional anatomy of birds. Topics include the following systems: muscular, nervous, cardiovascular, respiratory, digestive, lymphoid, endocrine, and reproductive. Typically offered Spring.

ANSC 53600 - The Digestive System In Health And Disease

Credit Hours: 2.00. Comparative study of the physiology of the gastrointestinal tract focused on the importance of, and interactions between, gut physiology, gut associated immune system, and intestinal microorganisms in relation to health and disease. Offered in odd-numbered years. Typically offered Spring.

ANSC 53700 - Adipocyte Biology

Credit Hours: 2.00. This course will provide the student with a conceptual background in the development of adipose tissue and its biological function with emphasis on the endocrine and immunologic aspects of the adipocyte. Differences between species will be emphasized where possible. Typically offered Fall.

ANSC 55500 - Animal Growth And Development

Credit Hours: 3.00. A study of the molecular and cellular processes controlling embryonic development and growth of domesticated animals. Includes discussions of current research concerning molecular mechanisms of fertilization, egg activation, early development, and endocrine factors controlling cell growth, differentiation, and tissue formation. Experimental approaches utilized for developmental and growth biology research are discussed. Typically offered Spring.

ANSC 55600 - Stem Cell Biology

Credit Hours: 3.00. Adult or tissue cells are stem cells that reside in different tissues and, depending on where they are from, have different properties. This dual level course aims to cover the origin, identification, isolation, differentiation, self-renewal, and senescence of various tissue-specific stem cells and their function in animal growth and maintenance. The course will focus on the latest advances in adult stem cells and their applications in tissue regeneration. Typically offered Fall.

ANSC 59500 - Special Topics In Animal Sciences

Credit Hours: 0.00 to 3.00. Lecture presentation of specialized material not available in the formal courses of the department. The specific topic offered is indicated on the student's record. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 62000 - Proteins And Amino Acids In Nutrition

Credit Hours: 3.00. Presentation of concepts concerning requirements for dietary amino acids, nutritional regulation of amino acid metabolism, and regulation of protein metabolism. Integrates biochemical and physiological functions of amino acids and features topics in nutritional regulation of whole-body protein turnover in mammalian and avian species. Offered in odd numbered years. Prerequisite: BCHM 56200. Typically offered Fall.

ANSC 62600 - Nutritional Biochemistry And Physiology II

Credit Hours: 2.00. (F&N 606) Integration of biochemical and physiological functions of nutrients in humans and animals emphasizing post-absorptive use of nutrients as sources of energy and for the synthesis of macromolecules. Offered weeks 1 - 8. Prerequisite: ANSC 62500. Typically offered Spring.

ANSC 62700 - Nutritional Biochemistry And Physiology III

Credit Hours: 2.00. (F&N 60700) Integration of biochemical and physiological functions of nutrients in humans and animals, emphasizing lipid metabolism and transport in the context of cardiovascular function. Offered weeks 9 - 16. Prerequisite: ANSC 62600. Typically offered Spring.

ANSC 66000 - Intestinal Microbiology And Immunology

Credit Hours: 1.00. (FS 66000) Discussion and critique of recent journal articles related to intestinal microbiology/immunology. The specific areas covered under this forum are: (1) intestinal microbiology, (2) food microbiology as it relates to gastrointestinal diseases, (3) probiotics and prebiotics-related to intestinal health or pathogen control, and (4) mucosal immunity with major emphasis on intestinal immunology. Typically offered Fall Spring.

ANSC 68100 - Animal Sciences Graduate Seminar

Credit Hours: 1.00. Presentations by graduate students on topics of interest in animal sciences. Permission of department required. Typically offered Summer Fall Spring.

ANSC 69100 - Topical Research Problems

Credit Hours: 1.00 to 4.00. To be arranged with individual staff members prior to registration. Requires approval of the department head. Supervised individual research projects. Written reports required. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ANSC 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Anthropology

ANTH 10000 - Introduction To Anthropology

Credit Hours: 3.00. A general introduction to anthropology's holistic approach to human nature and behavior. A basic survey of biocultural developmental and evolutionary processes, and human uniformity and diversity through time and across space. Typically offered Summer.

ANTH 20100 - Introduction To Archaeology And World Prehistory

Credit Hours: 3.00. Introduction to the ideas and practices of archaeology that are used in the study of human prehistory, from the earliest stone tools to the development of agriculture and states. Emphasis is placed on the objectives and methods of contemporary archaeology. Typically offered Summer Fall Spring.

ANTH 20300 - Biological Bases Of Human Social Behavior

Credit Hours: 3.00. This course is an introduction to human social behavior from the perspective of biological anthropology, with special emphasis on human evolution and non-human primates. Topics include aggression, communication, learning, maturation, sexuality, and the evolution of social systems. Typically offered Fall Spring.

ANTH 20400 - Introduction To Biological Anthropology And Human Evolution

Credit Hours: 3.00. This course surveys biological anthropology through a review of evolutionary theory and genetics, the fossil evidence for current theories in human evolution with insight from modern non-human primates, and the influence of environmental stressors on modern human biological variation. Typically offered Fall Spring Summer.

ANTH 20500 - Human Cultural Diversity

Credit Hours: 3.00. Using concepts and models of cultural anthropology, this course will survey the principal cultural types of the world and their distribution, and will undertake a detailed analysis of societies representative of each type. Typically offered Fall Spring.

ANTH 21000 - Technology And Culture

Credit Hours: 3.00. This course explores the social dimensions of technology from the perspective of ancient, modern, and post-modern society. Topics include the origins of particular technologies; processes of technical development and dissemination; the politics of everyday artifacts; virtual identities; and technologies of the body. Suggested courses (not pre-requisite): ANTH 10000, ANTH 20100 and/or ANTH 20500. Typically offered Fall Spring.

ANTH 21200 - Culture, Food And Health

Credit Hours: 3.00. This course is designed to provide an introduction to the field of Medical Anthropology in which we will examine issues related to health and illness from various perspectives outside of the Western biomedical perspective. Typically offered Fall Spring.

ANTH 23000 - Gender Across Cultures

Credit Hours: 3.00. Explores gender and sexuality from a cross-cultural perspective. Draws on case studies to explore the complexities of women's and men's lives. Examines gender hierarchies, gender in a globalized world, and the cultural construction of sexuality and gender. Typically offered Summer Fall Spring.

ANTH 23500 - The Great Apes

Credit Hours: 3.00. Students will learn the behavior and conservation of our closest relatives and how early ape studies changed our understanding of what it meant to be human. Topics include gender in science, ethics of research and cross-cultural understandings. Typically offered Fall Spring.

ANTH 28200 - Introduction To LGBT Studies

Credit Hours: 3.00. (WGSS 28200) This course offers students an introduction to the interdisciplinary study of lesbian, gay, bisexual, transgender and queer lives. It provides a basic grounding in theories of sexuality and LGBT histories, identities and movements in the U.S. and globally. Typically offered Fall Spring.

ANTH 30500 - Ethnographic Methods

Credit Hours: 3.00. This course introduces students to the basic methods of ethnographic research: the collection, analysis, and presentation of data derived from the systematic, direct observation of human behavior and interviewing of key informants. Students are required to complete a field project. Typically offered Fall Spring.

ANTH 31000 - Mortuary Practices Across Cultures

Credit Hours: 3.00. Explores how death is treated or has been treated in diverse world cultures and time periods. Death is viewed as an expression of social behavior and as an expression of symbolic meaning. Typically offered Summer Fall Spring.

ANTH 31100 - The Archaeology Of The Ancient Andes

Credit Hours: 3.00. Development of Andean culture from its earliest roots through the Spanish conquest of the Inca empire in the 16th century. Topics will include first settlement, the development of the first complex societies, and the emergence and collapse of the Inca Empire. Typically offered Summer Fall Spring.

ANTH 31200 - The Archaeology Of Ancient Egypt And The Near East

Credit Hours: 3.00. Selected topics on the archaeology of ancient Near Eastern cultures in Mesopotamia, the circum-Mediterranean area, Egypt, and the Nile Valley, emphasizing an anthropological interpretation of the political, social, religious, and economic systems that contributed to their development. Typically offered Summer Fall Spring.

ANTH 31300 - Archaeology Of North America

Credit Hours: 3.00. Archaeological overview of North America emphasizing Indigenous cultures prior to the arrival of Europeans, but including Contact and Post-Contact communities of the Historic Period. Topics will include the peopling of the Americas, culture and environment, social complexity, and Cultural Resource Management. Typically offered Fall Spring Summer.

ANTH 32000 - The Evolution Of Prehistoric Civilizations

Credit Hours: 3.00. Based on archaeological sources, compares the nature of political, social, and technological change during the formative periods of the world's major early civilizations, emphasizing Mesoamerica, the Central Andes, Nile Valley, Mesopotamia, Indus Valley, and China. Typically offered Fall Spring.

ANTH 32700 - Environment And Culture

Credit Hours: 3.00. This course provides a general overview to the field of environmental anthropology, and surveys key methods, and theories that anthropologists use to interpret human-environment interactions. Topics include culture ecology, agroecology, ethnobiology, political ecology, and environmental justice. Typically offered Summer, Fall, or Spring.

ANTH 33500 - Primate Behavior

Credit Hours: 3.00. This course is an introduction to the primate order and primate studies. The emphasis is on field studies. Ecological influences on social organization and behavior, learning, play, and communication will be considered as adaptations within an evolutionary framework. Typically offered Fall Spring.

ANTH 33600 - Human Variation

Credit Hours: 3.00. Biological differences between human individuals and groups, causes of variations, the role of genetics, concepts of race, and the interrelationship between the social and biological meanings of race will be considered. Typically offered Fall Spring.

ANTH 33700 - Human Diet: Origins And Evolution

Credit Hours: 3.00. This course will survey humans evolving relationship with food over the last few million years; from our Pilo-pleistocene origins (foraging) through the origins of agriculture to modern industrial food production. Typically offered Fall Spring.

ANTH 34000 - Global Perspectives On Health

Credit Hours: 3.00. This course examines health issues and risks faced by individuals around the world, but especially in resource poor geographical areas. We will explore in-depth the gendered, ethnic, cultural, and class dimensions that underlie the patterning of disease and illness worldwide. Typically offered Fall Spring.

ANTH 34100 - Culture And Personality

Credit Hours: 3.00. A cross-cultural survey stressing different basic personality types and the processes by which adult personality is acquired. Case studies of selected non-Western cultures will be used to provide comparative perspective. Typically offered Fall Spring Summer.

ANTH 35200 - Drugs, Culture, And Society

Credit Hours: 3.00. (SOC 35200) The course provides an overview of the social and cultural underpinnings of drug use across

societies. Students engage with various topics, including addiction, global markets, drug epidemics, public policy, and cross-cultural differences in drug use. Typically offered Summer Fall Spring.

ANTH 35800 - African Cultures

Credit Hours: 3.00. An introduction to the diversity of African cultures emphasizing detailed studies of selected cultural groups. Ethnographic writings about African cultures are assessed in relation to general information about the continent, its people and the colonial experience. Typically offered Summer, Fall, or Spring.

ANTH 36800 - Sociolinguistic Study Of African American English

Credit Hours: 3.00. A study of the history, structure, uses, and educational concerns of African American speech communities and the culture at large. Typically offered Fall Spring.

ANTH 37000 - Ethnicity And Culture

Credit Hours: 3.00. Course examines ethnicity and nation as constructs that vary across cultures, history and space, and surveys theories of cultures, ethnicity and nationalism. Issues examined include cultural identities, power, domination and resistance, and the role of identity politics in contemporary conflicts. Typically offered Fall Spring Summer.

ANTH 37300 - Anthropology Of Religion

Credit Hours: 3.00. Anthropological theories of the origin, development, and functions of religion, ritual, and myth. Data drawn from western and non-western societies, with special emphasis on the relationship of religion to social structure, cultural patterns, and social change. Typically offered Summer Fall Spring.

ANTH 37700 - Anthropology Of Hunter-Gatherer Societies

Credit Hours: 3.00. Selective global survey of societies whose mode of subsistence is/was based on the collection of wild food resources. Topics to be covered include: the development and current state of theory, ecology, social organization, land use, demography, subsistence rights, and worldview. Typically offered Spring.

ANTH 37800 - Archaeology And Cultural Anthropology Of Mesoamerica (Mexico, Belize And Guatemala)

Credit Hours: 3.00. Overview of Mesoamerican peoples, cultures, and languages from the earliest periods to the rise of civilizations including Aztec, Maya, and Zapotec, and from the Spanish Conquest to the modern Indian communities of Mexico, Guatemala, and Belize. Typically offered Fall Spring.

ANTH 37900 - Native American Cultures

Credit Hours: 3.00. General survey of Native cultures of the Americas. Topics to be covered include prehistory, language, religion, aesthetics, culture contact and change, contemporary issues, and social, economic and political organization. Typically offered Fall (and occasionally in the Spring).

ANTH 38000 - Using Anthropology In The World

Credit Hours: 3.00. The use of anthropology in practical contexts. What anthropological practice is, how it originated, how it can be applied in non- academic and interdisciplinary contexts and careers. The main contemporary issues surrounding anthropological practice, including training, ethics, relevance, and rigor. For majors and non-majors. Typically offered Fall Spring Summer.

ANTH 38500 - Community Engagement In Anthropology

Credit Hours: 3.00. This course offers hands-on service learning experience with local community organizations involved with minority and immigrant populations. Part of the semester will include class meetings to explore issues and experiences of immigrant and ethnic groups in the U.S. Typically offered Fall Spring Summer.

ANTH 39000 - Individual Research In Anthropology

Credit Hours: 1.00 to 3.00. Individual research or reading in an area of anthropology under the guidance of an anthropology faculty member. Permission of instructor required. Typically offered Fall Spring Summer.

ANTH 39200 - Selected Topics In Anthropology

Credit Hours: 1.00 to 3.00. Various topics in anthropology that may change from semester to semester are presented by anthropology faculty members. Typically offered Fall Spring Summer.

ANTH 40400 - Comparative Social Organization

Credit Hours: 3.00. The course uses a broad cross-cultural comparative perspective to identify and analyze the major forms of human social organization. Emphasis is on kinship terminology, descent, marriage, residence units, economic exchange, political structure, and social inequality. Typically offered Fall Spring.

ANTH 40700 - The Development Of Contemporary Anthropological Theory

Credit Hours: 3.00. Explores the history of anthropological theories pertaining to the understanding of commonality and variation in human biology, behavior, society, and cultures as they have developed over the approximately two centuries since anthropology was founded as a separate discipline. Considers those social, cultural, and historical factors that have influenced the history of anthropological ideas. Permission of instructor required. Typically offered Summer Fall Spring.

ANTH 41400 - Introduction To Language And Culture

Credit Hours: 3.00. An exploration into the nature of human communication, particularly the structures, functions, and substance of human language. Focus is on the interpenetration of language, culture and cognition, on the evolution of language and speech, and on their uses in everyday life. Typically offered Fall.

ANTH 41800 - Field Methods In Cultural Anthropology

Credit Hours: 1.00 to 9.00. Introduces basic field methods in Cultural Anthropology. Topics may include ethnographic or other interviewing techniques and methods of inquiry into any of the broad topics covered by Cultural Anthropology. Permission of department required. Typically offered Fall Spring Summer.

ANTH 42500 - Anthropological Archaeology

Credit Hours: 3.00. Introduction to the theory and methods of contemporary American archaeology. Basic field and laboratory methods are placed in the context of theoretical viewpoints and problems. Major theoretical issues in the field are explored, showing the integration of American archaeology with anthropology. Typically offered Summer Fall Spring.

ANTH 42800 - Field Methods In Archaeology

Credit Hours: 1.0 to 9.0. Introduces basic field and laboratory methods in contemporary archaeology: methods of site survey, mapping, and excavation through the excavation of archaeological sites; the basics of archaeological data analysis and classification, and the computer-based analysis of archaeological data. Permission of instructor required. Typically offered Summer.

ANTH 43600 - Human Evolution

Credit Hours: 3.00. This class examines the fossil evidence for human evolution and theories proposed to explain the development that led from the origin of primates to modern humans. This course will include lectures, exercises with fossil casts, presentation, and discussions. Typically offered Summer Fall Spring.

ANTH 43800 - Field Methods In Biological Anthropology

Credit Hours: 1.00 to 9.00. Introduces basic laboratory methods in Biological Anthropology. Topics may include analysis of human or primate nutritional and biological markers or laboratory methods in the analysis of human skeletal populations. Permission of department required. Typically offered Fall Spring Summer.

ANTH 46000 - Contemporary Issues In Agriculture

Credit Hours: 3.00. (AGRY 46000) Evaluates environmental, social, and humanistic implications of technological change in modern agriculture, using a problem-solving perspective. Typically offered Spring.

ANTH 48200 - Sexual Diversity In Global Perspectives

Credit Hours: 3.00. This course focuses on anthropological and interdisciplinary research in the study of sexuality with particular attention to lesbian, gay, bisexual and transgender identities. It explores historical, theoretical and ethnographic work on sexualities and genders in the US and globally. Typically offered Summer, Fall or Spring.

ANTH 49700 - Senior Honors Seminar

Credit Hours: 3.00. A critical examination of some major works in anthropology and sociology, both classical and modern, and of some current theoretical and substantive issues in these disciplines. Open only to students in the departmental honors program. Typically offered Fall Spring.

ANTH 49800 - Senior Honors Paper

Credit Hours: 3.00. Requires a substantial paper on a topic approved by the instructor. The student is expected to work closely

with the instructor on the paper's content and style. A presentation of the results of the work is made at the end of the semester. Open only to students in the departmental honors program. Typically offered Fall Spring.

ANTH 50400 - Problems In World Prehistory

Credit Hours: 3.00. Key problems in the evolution of human culture examined using the most recent theories and data. Major topics include understanding early human behavior, the processes of domestication of plants and animals, and the emergence of complex societies. Typically offered Spring.

ANTH 50500 - Culture And Society

Credit Hours: 3.00. An introduction to cultural anthropology for the advanced student. A review will be made of the history of anthropology and its place in the social sciences. Emphasis will be placed on problem formulation and methodology in the study of culture change. Typically offered Fall.

ANTH 50600 - The Development Of Modern Anthropology

Credit Hours: 3.00. The ways and kinds of thinking about the human species in pre-nineteenth-century Europe: nineteenth- and twentieth-century developments in Europe and North America; the central scientific paradigms; professional societies and journals; and national/international anthropologies will all be covered. Typically offered Spring.

ANTH 50700 - Theory In Sociocultural Anthropology

Credit Hours: 3.00. Theoretical orientations (evolutionism, historicism, functionalism, cultural ecology), types of culture theory (technoeconomics, social structure, ideology, personality), and methods of formal analysis (ethnoscience, structuralism, symbolic) will be examined. Typically offered Fall.

ANTH 51400 - Anthropological Linguistics

Credit Hours: 3.00. An introduction to the anthropological view of linguistics and the ways in which anthropologists use linguistics as a research tool. The emphasis will be on structural and historical linguistics, but other approaches to the study of language will be considered. Typically offered Spring.

ANTH 51900 - Introduction To Semiotics

Credit Hours: 3.00. (AUSL 58900, COM 50700, ENGL 57000, LC 57000) The study of languages, literatures, and other systems of human communication. Includes a wide range of phenomena which can be brought together by means of a general theory of signs. The course deals with three fundamental areas: 1) verbal communication, 2) nonverbal communication (iconic systems, gestures, body language, etc.), and 3) communication through art forms. Typically offered Spring.

ANTH 53400 - Human Osteology

Credit Hours: 3.00. Anatomy of the human skeleton and dentition. Detailed study of skeletal elements and teeth, morphology, function, disease, and pathology. Identification of human remains with regard to age at death, gender, growth, and development in biocultural context. Typically offered Fall Spring.

ANTH 53500 - Foundations Of Biological Anthropology

Credit Hours: 3.00. This course covers such topics important in Biological anthropology as applied to both living and extinct humans and primates. Possible topics include: evolutionary thought; genetics, race, and human variation; the intersection of biology and culture; fossils and paleoanthropology; ecology and speciation; primate behavior; and theories on the social behavior of early humans. Typically offered Fall.

ANTH 53600 - Primate Ecology

Credit Hours: 3.00. An examination of the complex interrelationships between populations of nonhuman primates and their habitats. Course topics focus on behavioral ecology and conservation including, predator-prey relationships, diet, and interspecific relations. Typically offered Fall.

ANTH 56500 - Sociolinguistics

Credit Hours: 3.00. (SLHS 56500, COM 56500, ENGL 56500, LC 56500, LING 56500) An introduction to language in its social context, focusing on uses and users of language. Topics include social class, ethnic group, gender, language attitudes, and bilingualism. Typically offered Fall Spring.

ANTH 57500 - Economic Anthropology

Credit Hours: 3.00. Investigates economic aspects of nonindustrial societies, including forager, tribal, and peasant social formations. Emphasis on the economics of the domestic sphere and how households are linked to larger structures such as market systems and "world systems.". Typically offered Fall Spring.

ANTH 58900 - Archaeology And Materials Science

Credit Hours: 3.00. This course provides instruction in the methods and theories used by archaeologists and materials scientists to study ancient and historic technology. The course focuses on the analysis and interpretation of archaeological artifacts and provides opportunities for hands-on learning. Typically offered Fall Spring.

ANTH 59000 - Individual Research Problems

Credit Hours: 1.00 to 3.00. Individual research or reading in an area of anthropology under an anthropology staff member. Does not include thesis work. Permission of instructor required. Typically offered Fall Spring Summer.

ANTH 59200 - Selected Topics In Anthropology

Credit Hours: 1.00 to 3.00. Topics vary. Typically offered Fall Spring Summer.

ANTH 60500 - Seminar In Ethnographic Analysis

Credit Hours: 3.00. A selection of ethnographic monographs will be read, reported on, and discussed by seminar participants under the direction of the anthropology staff. The monographs will be discussed in terms of field methods employed, particular theoretical strengths and weaknesses, and their value to current anthropological method and theory. Participants will assume responsibility for presenting materials to stimulate discussion. 12 credit hours in Anthropology, or Sociology; Prerequisite: ANTH 50500 or ANTH 50600. Typically offered Spring.

ANTH 60600 - The Conduct Of Anthropological Inquiry

Credit Hours: 3.00. The course provides a broad overview of research strategies and techniques commonly employed in the various subfields of anthropology. Topics would include field techniques, the use of data banks (e.g., the HRAF files), sampling, hypothesis testing, and computer application. Typically offered Fall.

ANTH 60900 - Seminar In Anthropology

Credit Hours: 2.00 or 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

ANTH 61100 - Special Topics In Archaeology

Credit Hours: 3.00. Critical examination of a selected aspect of contemporary archaeological research and theory. Topics will vary from year to year. Typically offered Fall Spring Summer.

ANTH 62000 - Special Topics In Cultural Anthropology

Credit Hours: 3.00. Critical examination of a selected aspect of contemporary cultural anthropology research and theory. Topics will vary from year to year. Typically offered Fall Spring.

ANTH 67300 - Seminar In The Anthropology Of Religion

Credit Hours: 3.00. Explores anthropological approaches to studying the place of religion in human experience. Considers different theories that anthropologists have developed for understanding religion - symbolic, materialist, evolutionary, psychological, and others - and how they fit with ethnographic data on religion in different cultures. Typically offered Fall Spring Summer.

ANTH 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ANTH 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Arabic

ARAB 10100 - Standard Arabic Level I

Credit Hours: 3.00. Introduction to Modern Standard Arabic: the writing and sound systems, and systematic presentation of basic grammatical structures. Reading, writing, and vocabulary building are emphasized throughout. The course also includes an introduction to Arab culture. No previous knowledge of Arabic required. Typically offered Fall Spring.

ARAB 10200 - Standard Arabic Level II

Credit Hours: 3.00. Further study of Modern Standard Arabic. Continued presentation of the basic structures of Arabic grammar and expansion of vocabulary. Reading and writing will be emphasized. Typically offered Fall Spring.

ARAB 11100 - Elementary Standard Arabic Conversation I

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in conversation to enhance communicative competence. Group discussions in Standard Arabic on practical topics. Typically offered Summer Fall Spring.

ARAB 11200 - Elementary Standard Arabic Conversation II

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in conversation to enhance communicative competence. Small group discussions in Standard Arabic on practical topics. May be taken concurrently with ARAB 10200. Typically offered Fall Spring.

ARAB 20100 - Standard Arabic Level III

Credit Hours: 3.00. This course is designed to allow students to use the grammar and vocabulary acquired in the first two semesters in dealing with specific social situations. Continued improvement of conversational, reading, and writing abilities and expansion of vocabulary. Typically offered Fall Spring.

ARAB 20200 - Standard Arabic Level IV

Credit Hours: 3.00. Increased mastery of the four language skills, with emphasis on reading and translation using materials from literary classical and modern Arabic. The course includes a study of some parts of the Koran. Typically offered Fall Spring.

ARAB 21100 - Elementary Standard Arabic Conversation II

Credit Hours: 1.00. Continuation of ARAB 11200. May be taken concurrently with ARAB 20100. Typically offered Fall Spring.

ARAB 21200 - Elementary Standard Arabic Conversation IV

Credit Hours: 1.00. Continuation of ARAB 21100. May be taken concurrently with ARAB 20200. Typically offered Fall Spring.

ARAB 22400 - Arabic level IV: Business Arabic

Credit Hours: 3.00. Practical reading, writing, speaking, and listening comprehension skills directed toward use of Arabic for business purposes, including language needed for business negotiations, financial situations, travel, and memo writing. Aspects of cultural and social appropriateness needed in business situations in the Arab world. Typically offered Fall Spring Summer.

ARAB 23000 - Arabic Literature In Translation

Credit Hours: 3.00. Survey of Arabic literature, from the classical to the postmodern period. Emphasis on connections between literary works and contemporary life. Conducted in English; no knowledge of Arabic required. Typically offered Fall Spring.

ARAB 23900 - Arab Women Writers

Credit Hours: 3.00. Survey of Arab women writers from North Africa, the Middle East, and Arab communities in the western world. Emphasis on issues of sexuality, marriage, work, travel and immigration. Conducted in English; no knowledge of Arabic required. Typically offered Fall Spring.

ARAB 28000 - Arabic Culture

Credit Hours: 3.00. A historical and literary survey of defining characteristics of Arabic culture from pre-Islamic times to the modern period. Typically offered Summer Fall Spring.

ARAB 28100 - Introduction To Islamic Civilization And Culture

Credit Hours: 3.00. This course is a survey of broad currents in the cultures, thought and civilization of the Muslim world. It emphasizes religious, intellectual and cultural trends, social and political structures and contemporary issues of Muslim societies within the current global cultural world. Taught in English. Typically offered Fall Spring Summer.

ARAB 30100 - Standard Arabic Level V

Credit Hours: 3.00. Continued development of Arabic speaking, listening, reading, and writing abilities, using materials dealing

primarily with the everyday life and civilization of Arabic-speaking countries, from various sources (newspapers, poetry, chapters from the Qu'ran). Conducted primarily in Arabic. Typically offered Fall Spring.

ARAB 30200 - Standard Arabic Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading and composition skills in Standard Arabic, using materials dealing with ideas and events that have shaped the Arabic-speaking culture. Conducted primarily in Arabic. Typically offered Fall Spring.

ARAB 33400 - Maghrebi Literature And Culture

Credit Hours: 3.00. A view of the culture and society of the Maghreb (Morocco, Algeria, Tunisia, and Libya). Emphasis on issues of race, politics, religion, and gender through literature and other forms of artistic expression, including film and music. Conducted in English; no knowledge of Arabic required. Typically offered Fall Spring.

ARAB 58700 - Modern Arab Thought

Credit Hours: 3.00. Prominent and critical issues in modern Arab thought. Identity, historical meaning, the Arab-Islamic cultural legacy, and tradition vs. modernity are engaged through Arab encounters with the West. Conducted in English; no knowledge of Arabic required. Typically offered Fall Spring.

Art and Design

AD 10500 - Design I

Credit Hours: 3.00. Two-dimensional design fundamentals: concepts and processes. Studio problems are used to introduce concepts, vocabulary, and skills applicable to continued study in a variety of visual disciplines. Includes introduction to a variety of two-dimensional media and computer applications. Typically offered Summer Fall Spring.

AD 10600 - Design II

Credit Hours: 3.00. Three-dimensional fundamentals: concepts and processes. Studio problems introduce design concepts, vocabulary, and construction skills applicable to continued study in a variety of visual disciplines. Includes introduction to a variety of 3-D media and 3-D computer graphics concepts. Typically offered Summer Fall Spring.

AD 11300 - Basic Drawing

Credit Hours: 3.00. An introduction to drawing and sketching as a means of communication of ideas. Typically offered Summer Fall Spring. CTL:IFA 1320 Drawing

AD 11400 - Drawing II

Credit Hours: 3.00. Continuation of AD 11300; emphasis is given to the exploration of a variety of media, the structuring of pictorial space, and figure drawing. Typically offered Fall Spring.

AD 11700 - Photography I: Black And White Processes And Aesthetics

Credit Hours: 3.00. An introductory course in silver-based photographic processes and creative image making. Emphasis is on the development of camera and darkroom techniques, and fostering critical thinking skills related to the traditions and aesthetics of black and white photographic practice. Typically offered Summer Fall Spring.

AD 11900 - Photography II: Color Imaging And Studio Practice

Credit Hours: 3.00. Introductory course in creative use of color photographic processes and studio practices. Emphasis is on the acquisition of digital cameras, studio, and digital printing skills which enable students to successfully perceive and structure images reflecting color's formal, symbolic, and emotional impact. Typically offered Summer Fall Spring.

AD 12500 - Introduction To Interior Design

Credit Hours: 3.00. Introductory survey of interior spaces and their impact upon the physical, social, psychological, and aesthetic needs of people. Critical evaluation of concepts in the interior design profession and related fields will be emphasized. Typically offered Fall.

AD 13000 - Interior Design Communication

Credit Hours: 3.00. Process of problem solving, design analysis, spatial studies, conceptual ideation, and methods of communicating in various two- and three-dimensional media. Typically offered Spring.

AD 14600 - Design Drawing I

Credit Hours: 3.00. Problems in the skills and methods of professional design drawing. Emphasis on development of drawing as a conceptual tool and as part of the design process. Concentration on the media and techniques used in contemporary design drawing. Typically offered Spring.

AD 19000 - Special Topics In Art And Design

Credit Hours: 1.00 to 3.00. Topics will vary. Permission of department required. Typically offered Summer Fall Spring.

AD 19100 - Cooperative And Professional Work Experience I

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Permission of department required. Typically offered Fall Spring Summer.

AD 19200 - Cooperative And Professional Work Experience II

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Permission of department required. Typically offered Fall Spring Summer.

AD 19300 - Cooperative And Professional Work Experience III

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Permission of department required. Typically offered Fall Spring Summer.

AD 19400 - Cooperative And Professional Work Experience IV

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Permission of department required. Typically offered Fall Spring Summer.

AD 19500 - Cooperative And Professional Work Experience V

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Permission of department required. Typically offered Fall Spring Summer.

AD 20000 - Beginning Painting

Credit Hours: 3.00. This course is an introduction to painting, emphasizing fundamental painting techniques and materials in conjunction with varied subject matter. Traditional and nontraditional approaches and their art historical meanings will be examined and applied. Typically offered Fall Spring.

AD 20100 - Art For Elementary School Teachers

Credit Hours: 3.00. Art theory and experiences, curriculum theory, and materials preparatory for instruction of elementary school children. No undergraduate students may be enrolled in this course until they have been admitted to teacher education and a copy of this acceptance is on file. Typically offered Summer Fall Spring.

AD 20200 - Introduction To Art Education

Credit Hours: 2.00. Lectures, readings, and discussions covering the history, theory, and professional literature of art education. Typically offered Fall Spring.

AD 20500 - Design III

Credit Hours: 3.00. Problems in two- and three-dimensional design, utilizing a variety of tools, materials, and processes. Study is made of the interaction between designer and society, involving concepts in art, psychology, technology, anthropology, and history. Typically offered Fall.

AD 20600 - Studio In Visual Communications Design

Credit Hours: 3.00. Investigation of visual communications design theory, history, skills, and methodology, as well as preparation of art and mechanicals for graphic arts reproduction. Typically offered Spring.

AD 21300 - Life Drawing I

Credit Hours: 3.00. Introduction to drawing the human figure with emphasis upon structure and gesture. . Typically offered Fall Spring.

AD 21500 - Materials and Processes

Credit Hours: 3.00. An introductory course in the selection of materials and processes as relevant to design, with laboratory experiences in the safe and proper use of tools and equipment. Required of students wishing extensive access to A&D tools and equipment. Typically offered Fall Spring.

AD 22000 - Computers In Art

Credit Hours: 3.00. Introduction to computer graphics concepts and the electronic image as a fine art form. Emphasis is placed on personal expression, using the computer as a two-dimensional art tool. Typically offered Fall Spring.

AD 22400 - Interior Design Textiles Laboratory

Credit Hours: 1.00. Laboratory component to AD 32400. Field trips will be required. Typically offered Fall Spring.

AD 22600 - History Of Art To 1400

Credit Hours: 3.00. Review of painting, sculpture, and architecture from their beginnings to the end of the Middle Ages. Typically offered Fall. CTL:IFA 1311 Art History I

AD 22700 - History Of Art Since 1400

Credit Hours: 3.00. Review of painting, sculpture, and architecture from 1400 to present. Typically offered Spring. CTL:IFA 1312 Art History II

AD 22800 - Visual Communications Design Computing I

Credit Hours: 3.00. An introductory course in visual design computing programs used in the study and production of Visual Communications Design. Typically offered Summer Fall Spring.

AD 22900 - Visual Communications Design Computing II

Credit Hours: 3.00. An intermediate course in visual design computing programs used in the study and production of Visual Communications Design. Typically offered Summer Fall Spring.

AD 23000 - Interior Design I

Credit Hours: 3.00. Study of behavior patterns, perceptions, needs, and usage of three-dimensional space through conceptual solutions to human environments. Interior design theory and application of design process through analysis, research, and synthesis will be explored. Typically offered Fall.

AD 23300 - Electronic Media Studio

Credit Hours: 3.00. Introductory class to artistic practices on the computer. Students will work with digital still images, sounds, stop-frame animation and HTML-based websites and learn how to connect simple sensors to the computer to control digital images and sounds interactively. Typically offered Fall Spring.

AD 23400 - Art And Design Internship Preparation

Credit Hours: 1.00. Introduction and preparation for Art & Design Internship experience. Students will develop a resume, cover letter, and other resources in their search for a suitable internship placement. Typically offered Fall Spring Summer.

AD 23500 - Materials and Processes II

Credit Hours: 3.00. Problems in three-dimensional design, incorporating materials, production processes, and applications of current technology, emphasizing aspects of society and technology. An introduction to complete industrial design problems, including problem definition, concepts, resource information, design development, final proposals, and presentation techniques. Typically offered Spring.

AD 23600 - Lighting Fundamentals For Photography

Credit Hours: 3.00. Introductory course in understanding electronic strobe lighting. Begins with a review of basic lighting principles and a series of problem-solving assignments, which introduce control, and applications of electronic strobe lighting. Still life photography and portraiture are emphasized and covers on-location lighting. Typically offered Spring.

AD 24000 - Interior Drafting And Drawing

Credit Hours: 3.00. Basic drafting and drawing techniques used in residential and small commercial buildings. Emphasis on interior projects, on multi-view drawing, isometrics, perspective, and architectural construction drawings, and rendering techniques. Typically offered Fall.

AD 24200 - Ceramics I

Credit Hours: 3.00. An introduction to ceramic materials and processes used in creating wheelthrown and hand-formed pottery and sculpture. Emphasis on contemporary interpretations of traditional forms. Freshman and Sophomore students have priority. Typically offered Fall Spring.

AD 24600 - Design Drawing II

Credit Hours: 3.00. Continuation of the work done in A&D 245. Emphasis on development of skills and presentation quality design drawing. Typically offered Fall.

AD 25000 - Interior Design II

Credit Hours: 3.00. Introduction to space planning methodology applied to small-scale residential and nonresidential environments. Human factors and user requirements, physical and psychological, will be emphasized. Interior materials, components, and special environmental concerns will be explored. Typically offered Spring.

AD 25100 - History Of Photography I

Credit Hours: 3.00. An introduction of the history of photography from the medium's inception until 1950. Emphasis is placed on understanding photographs from a variety of aesthetic, social, and cultural perspectives, including those of race, class, and gender. Typically offered Summer Fall Spring.

AD 25500 - Art Appreciation

Credit Hours: 3.00. Understanding and appreciation of the problems overcome by mankind in the origins and growth of art. Typically offered Fall Spring. CTL:IFA 1310 Art Appreciation

AD 25600 - Presentation Techniques

Credit Hours: 3.00. Studio preparing students for project presentations. Classes will cover graphic techniques, including page layout, typography, portfolio formats, perspective drawings, photography, and verbal communication. Typically offered Spring.

AD 26000 - Computer-Aided Design For Interiors

Credit Hours: 3.00. Computer-aided design and drafting on the microcomputer for interior design. Students learn to draw architectural spaces, interior furnishings, and mechanical objects and to manipulate them in two- and three-dimensional space. Typically offered Spring.

AD 26200 - Jewelry And Metalwork I

Credit Hours: 3.00. An introduction to the design and execution of hand-wrought jewelry and metalwork. Typically offered Fall Spring.

AD 26500 - Relief Printmaking

Credit Hours: 3.00. An introduction to the techniques of woodcut, linocut, collagraph, and related media. Emphasis on fine art conceptual issues, creativity, matting and framing art, and professional practices. Typically offered Fall Spring.

AD 26600 - Silkscreen Printmaking

Credit Hours: 3.00. An introduction to the techniques of silkscreen printmaking on paper, including the uses of handmade and light-sensitive stencils. Emphasis on fine art conceptual issues, creativity, matting, and framing art, and professional practices. Typically offered Fall Spring.

AD 26700 - Digital Media I: Photography And Digital Imaging

Credit Hours: 3.00. An introductory course in the creative generation and digital enhancement of photo-related imagery.

Emphasis is on the development of technical and critical thinking skills, as well as fostering an awareness of pertinent theoretical issues in digital age. Typically offered Spring.

AD 27000 - Constructed Textiles

Credit Hours: 3.00. A beginning class in non-loom constructed textile techniques such as macram and card-weaving. Emphasis on three-dimensional design in fiber using historical textile structures as the basis for contemporary interpretations. Typically offered Fall Spring.

AD 27100 - Dyed Textiles

Credit Hours: 3.00. Beginning course in non-screen fabric dyeing techniques such as tie-dye and batik. Survey of historical surface design for contemporary interpretations in both two and three dimensions. Typically offered Fall Spring.

AD 27500 - Beginning Sculpture

Credit Hours: 3.00. An introductory course in sculpture, exploring basic concepts, techniques, and materials. Problems in class will emphasize individual student's aesthetic understanding of techniques and inventive use of materials. Typically offered Fall Spring.

AD 28500 - Interior Components And Materials

Credit Hours: 3.00. Study of surface materials and subsystems and their application to architectural interior spaces. Emphasis on specification guidelines, including product performance, building codes, fire, safety, and health regulations. Typically offered Spring.

AD 29000 - Special Topics In Art And Design

Credit Hours: 1.00 to 3.00. Topics will vary. . Permission of department required. Typically offered Spring Fall.

AD 30000 - Life Drawing II

Credit Hours: 3.00. Emphasis is given to organizing the figure in pictorial space. Typically offered Fall Spring.

AD 30200 - Theory And Practice Of Elementary School Art

Credit Hours: 3.00. Theory and practice of art education for elementary school from early childhood through middle childhood. Restricted to art education majors. Typically offered Fall Spring.

AD 30300 - Art in Middle/Junior High Schools

Credit Hours: 3.00. Theory and practice of art education for early adolescent students in the middle/junior high school. . Typically offered Spring Fall.

AD 30400 - Video Art

Credit Hours: 3.00. Introduction to digital video as a creative medium for artistic expression. Students will record, digitize, edit and distribute digital video content and author a digital portfolio of their work in the form of an interactive DVD. Permission of department required. Typically offered Fall Spring.

AD 30500 - Industrial Design I

Credit Hours: 3.00. Introduction to design principles in processes employing basic problem-solving techniques. Emphasis will be placed on man's interaction with form, thought processes, procedures, craftsmanship, and use of materials. Acceptance into professional industrial design concentration by successful performance in the mandatory portfolio review. Prerequisites: Passing mandatory portfolio review. Typically offered Fall.

AD 30600 - Industrial Design II

Credit Hours: 3.00. An analysis of design through organic and aesthetic principles, natural solutions, and man-made systems. Skills and techniques for communication of creative design solutions. Rapid visualization, rendering, model making, and working models will be stressed. Typically offered Spring.

AD 30701 - History Of Contemporary Photography

Credit Hours: 3.00. This course examines evolution of major themes in contemporary photography (Digital era to Present) from a

variety of aesthetic, social, and cultural perspectives, fostering an awareness of pertinent theoretical issues. Typically offered Spring.

AD 31100 - Greek Art

Credit Hours: 3.00. The great variety of Greek art, which helped lay the foundation of Western artistic tradition, is presented in several different media and over a period of several centuries. The social context and cultural context of Greek art, especially its humanistic values, is emphasized. Offered every two years. Typically offered Spring.

AD 31200 - Roman Art

Credit Hours: 3.00. The history of Roman art in several different media is studied, from its origins to the end of the Empire, stressing the social and historical content of this art and its legacy to the modern world. Architecture, sculpture, painting and mosaics are emphasized along with small-scale arts. Offered every two years. Typically offered Fall.

AD 31400 - Illustrative Drawing

Credit Hours: 3.00. Individual development of students' drawing abilities and skills at intermediate and advanced levels, emphasizing illustration and drawing as primary means of expression. Typically offered Spring. .

AD 31500 - Design Methodology

Credit Hours: 3.00. This course will cover the fundamental concepts of design methodology. Studies in various problem-solving and research methods as they apply to the designer and society. Typically offered Fall.

AD 31600 - Seminar On Ideas In Industrial Design I: Design And Society

Credit Hours: 3.00. A study of design and the designer and the factors in society that affect his or her work. Typically offered Spring.

AD 31800 - Fundamentals of Interactive Multimedia Design

Credit Hours: 3.00. Fundamental issues of interactive multimedia design: Animation, interface design, and experience design from a visual communications perspective. Typically offered Fall.

AD 31900 - Web Design for Visual Communications

Credit Hours: 3.00. Introduction to web-based design from a visual communications application. Typically offered Spring.

AD 32000 - Interior Lighting Design

Credit Hours: 3.00. Study of principles of illumination, design criteria, specifications, and systems applied to architectural interiors in public and private spaces. Must pass mandatory portfolio review. Prerequisites: Passing mandatory portfolio review. Typically offered Fall.

AD 32200 - Computer Modeling And Animation

Credit Hours: 3.00. A fine arts approach to three-dimensional computer graphics. Introduction to three-dimensional computer graphics concepts and their application to still and animated images. Typically offered Fall Spring.

AD 32400 - Textiles For Interiors

Credit Hours: 2.00. An introduction to textile fibers and fabrics used in interior environments with emphasis on design, product performance, and selection criteria. Field trips will be required. Typically offered Fall Spring.

AD 32600 - Physical Computing

Credit Hours: 3.00. Introduction to electronics and computer vision for artists. Students learn to create expressive audiovisual systems that can respond to events in the physical world (movement, light/temperature change, sound, touch, etc.) through custom interfaces. Typically offered Fall Spring.

AD 32700 - Art History Methodology

Credit Hours: 3.00. Offered in 2002-2003 and alternate years. A comprehensive introduction to the study of the history of art, associated areas of investigation, and the writing of research papers in the field. Practical experience for the serious student of art history. Typically offered Fall Spring.

AD 33000 - Interior Design III

Credit Hours: 3.00. Study of advanced space-planning criteria and selection of furnishings, equipment, materials, and finishes. Design considerations for special populations (e.g., disabled, aged, low-income) will be explored. Must pass mandatory portfolio review. Prerequisites: Passing mandatory portfolio review. Typically offered Fall.

AD 33100 - Digital Video Production And Aesthetics

Credit Hours: 3.00. Introduction to video as an art medium. Approaches include documentary, narrative, experimental, performance, installation, and web-based work. Students gain profiency in technical and conceptual aspects of the medium through shooting exercises, production workshops, digital editing, and group critiques. Prerequisites: Acceptance into Photography and Related Media program by sucessful performance in the mandatory portfolio review. Typically offered Fall Spring.

AD 33200 - Visual Communications Design I

Credit Hours: 3.00. A course designed to introduce the student to projects that will develop an understanding of basic problem-solving techniques in the areas of publication and promotional graphics. Acceptance into professional VCD sequence via mandatory portfolio review. Typically offered Fall.

AD 33300 - Photo Silk Screen

Credit Hours: 3.00. Advanced study of the techniques of photo silkscreen and light-sensitive stencils. Emphasis on fine art conceptual issues, creativity, matting and framing art, and professional practices. Typically offered Fall Spring.

AD 33400 - New Media Culture

Credit Hours: 3.00. This lecture course provides a historical overview of the development of new media art. In their research, project papers, and practical assignments, students explore issues of media criticism, technology's impact on culture and society and visions of media utopias. Typically offered Fall Spring.

AD 33700 - Commercial And Professional Practice In Photography

Credit Hours: 3.00. This course introduces students the skills necessary to attain entry-level employment in the photographic field and familiarizes students with the vocabulary, procedures, and working realities specific to occupations in the field of

photography in the areas of photo-journalism, magazine illustration, advertising/web design, and fine arts. Permission of department required. Typically offered Fall.

AD 33900 - Women Artists In The 20th Century

Credit Hours: 3.00. This course offers a critical yet comprehensive overview of the creative achievements of women artists in the 20th century. It focuses on major female artists, whose works and contributions are considered in both their specific socio-cultural context and in a larger art-historical perspective. Typically offered Spring.

AD 34200 - Ceramics II

Credit Hours: 3.00. A continuation of AD 24200; according to student needs in creating ceramic forms, a variety of in-depth experiences: experimental kiln building and firing techniques, methods of ceramic construction, surface treatment, and clay and glaze formulation. Typically offered Fall Spring.

AD 34400 - Latin American Art In The 20th Century

Credit Hours: 3.00. This course offers a critical yet comprehensive overview of modern and contemporary art from Latin America. It focuses on major artists, whose works and contributions are considered in both their specific socio-cultural context and in a larger art historical perspective. Typically offered Fall.

AD 34800 - History Of Islamic Art

Credit Hours: 3.00. Islamic art, one of the world's richest artistic traditions, is surveyed from its origins in the 7th century AD to the modern day. All types of artistic media, from large to small-scale, are included and seen against the background of the Islamic religion and history. Offered on a two-year rotation. Typically offered Spring.

AD 35000 - Interior Design IV

Credit Hours: 3.00. Study of large-scale public and social spaces, emphasizing interior systems and components. Application of design for historic preservation, renovation, or adaptive reuse will be considered. Typically offered Spring.

AD 35900 - Medieval European Art

Credit Hours: 3.00. A comprehensive study of the varied art forms in Western Europe from the decline of the Roman Empire until the beginnings of the Italian Renaissance: 500 A.D. to 1500 A.D. Typically offered Fall Spring.

AD 36101 - The Constructed Image

Credit Hours: 3.00. An intermediate level course focusing on the production of creative images constructed both in the studio and the field. Readings and discussions investigate both historical and contemporary trends in the art of the photographically-constructed images. Typically offered Fall Spring.

AD 36200 - Jewelry And Metalwork

Credit Hours: 3.00. Lost wax casting and mold making, mechanisms and stone setting for jewelry and metalwork. Typically offered Fall.

AD 36300 - Documentary Photography

Credit Hours: 3.00. An introduction to the concept and practice of the documentary mode in photography. Research options entail a variable combination of theory and practice. Prerequisites: Acceptance into Photography and Related Media program by sucessful performance in the mandatory portfolio review. Typically offered Fall.

AD 36500 - Intermediate Painting

Credit Hours: 3.00. A studio course concentrating on the development of conceptual and technical skills of painting. This course is designed to help individual students gain a greater awareness of their personal creative goals and to foster means of expression. Typically offered Fall Spring.

AD 36600 - Visual Communications Design II

Credit Hours: 3.00. Field trips may be required. The study of corporate graphics and visual identity programs. Typically offered Spring.

AD 36800 - Etching And Intaglio Printmaking

Credit Hours: 3.00. An introduction to the techniques of etching, engraving, aquatint, drypoint, collagraph, monoprint, and related processes. Emphasis on fine art conceptual issues, creativity, matting and framing art, and professional practices. Typically offered Fall Spring.

AD 36900 - Lithographic Printmaking

Credit Hours: 3.00. An introduction to the techniques of stone and plate lithography. Emphasis on fine art conceptual issues, creativity, matting and framing art, and professional practices. Typically offered Fall Spring.

AD 37000 - Woven Textiles

Credit Hours: 3.00. A beginning course in loom-woven textiles and pattern drafting. Emphasis on two- and three-dimensional design in fiber, using historical textile structures as the basis for contemporary interpretations. Typically offered Fall Spring.

AD 38000 - Baroque Art

Credit Hours: 3.00. A survey of European art and architecture during the 17th century, focused on Italy and the Netherlands, and emphasizing some of their leading painters. Works of art are seen in a broad social and cultural context, including the Counter-Reformation and the rise of capitalism. Typically offered every other Spring.

AD 38100 - Fine Art Photographic Printmaking And Artist's Book

Credit Hours: 3.00. An intermediate level course in fine art photographic printmaking, portfolio production, and integration of image with text. Students will explore camera formats, presentation issues, and bookmaking techniques. Special emphasis placed upon the creative process. Prerequisites: Acceptance into Photography and Related Media program by sucessful performance in the mandatory portfolio review. Typically offered Fall.

AD 38200 - 19th Century Art: A Global Perspective

Credit Hours: 3.00. An overview of the 19th century art, emphasizing artistic and other cultural exchanges between Europe, Asia, and the Middle East Movements such as Chinoiserie, Orientalism, and Japonisme are examined within their historical context and as part of a globalizing tendency. Typically offered every other Spring.

AD 38300 - Modern Art

Credit Hours: 3.00. A comprehensive overview of the visual arts from impressionism to Surrealism, designed to help students understand the cultural, social, and historical dynamics that influence artistic creation, and reflect upon the meanings of modernism. Typically offered Fall Spring.

AD 38400 - Contemporary Art

Credit Hours: 3.00. A comprehensive overview of the visual arts from the 1940's to the present, designed to help students understand the cultural, social, and historical dynamics that influence artistic creation, and reflect upon the artists' role in contemporary societies. Typically offered Spring.

AD 38500 - History Of Interior Design

Credit Hours: 3.00. A study of the principle styles, trends, and movements of interior design from antiquity to the Industrial Revolution, emphasizing decorative arts, furnishings, and their relationship to the built environment. Typically offered Spring.

AD 39100 - History Of Chinese Art

Credit Hours: 3.00. A historical survey of the visual arts and architecture of China from antiquity to the present. Emphasis will be placed on the relation of a broad range of art forms to their social and cultural contexts. Typically offered Spring.

AD 39500 - History Of Design

Credit Hours: 3.00. A survey of the development of design ideas and structures and the influence of technology upon their direction. The course will cover a cross section of ideas developed from the late nineteenth century to the present. Typically offered Fall Spring.

AD 39600 - Art Museum Practices

Credit Hours: 3.00. This course examines art museums as cultural institutions with varied collections, serving an important social role. Museum administration and operation are discussed, as are exhibition preparation and museum architecture; a few field trips are required. Museum careers also are explored. Typically offered Fall Spring.

AD 39700 - Sustainability In The Built Environment

Credit Hours: 3.00. The study of philosophical concepts, principles, and theories of sustainability as they pertain to building methods, materials, systems, and occupants. To provide a foundation for evaluation of materials, processes, and applications of design components for environmentally responsible. Field trips will be required. Typically offered Fall Spring.

AD 40000 - Advanced Painting

Credit Hours: 3.00. A studio course concentrating on the development of an advanced body of work built upon the conceptual and technical skills of painting. This course is designed to help individual students gain a greater awareness of their personal creative goals and to foster means of expression. Typically offered Fall Spring.

AD 40200 - Art In Secondary School

Credit Hours: 3.00. Theory and practice of art education for adolescent and young adult students in the secondary school. Required prior to professional semester. . Typically offered Fall Spring.

AD 40400 - Moldmaking And/Or Wheel-Throwing Production Techniques In Ceramics

Credit Hours: 3.00 to 6.00. This course will teach mold-making or wheel-throwing (depending on the individual student's interest) with a view to creating ceramic objects suitable for commercial mass-production. Both tableware and/or sculptural objects will be explored. For the wheel-throwing option the students must have at least one year of high school throwing or AD 24200 with a grade of at least "B" or permission of instructor. For the mold making and casting option only, students must be an Art and Design student or have permission of instructor. Typically offered Fall Spring.

AD 40500 - Industrial Design III

Credit Hours: 3.00. Design projects emphasizing sophisticated problem-solving methods. Design projects will stress diversity of industrial design and will trace the development of products from initial concept, research, and development through production. Typically offered Fall.

AD 40600 - Industrial Design IV

Credit Hours: 3.00. Design of products in their relation to economic, physiological, psychological, and behavioral patterns of the consumer. Emphasis upon total thought processes to allow environmental considerations as well as technological realities. Typically offered Spring.

AD 41500 - Professional Techniques

Credit Hours: 3.00. Research development for product design, with emphasis on socioeconomic concerns and documentation techniques. Portfolio refinement, including verbal, written, and other visual documentation and presentation skills in various media, such as drawing. Photography and computer-generated graphics will be stressed. Typically offered Fall.

AD 41600 - Seminar On Ideas In Industrial Design II: Design And Creative Problem Solving Methods

Credit Hours: 3.00. A study of creative problem solving methods as used by the designer in his or her work. Typically offered Fall Spring.

AD 41700 - Variable Topics In Electronic And Time-Based Art

Credit Hours: 3.00. Examination of thematic or specialized topics reflecting the most recent developments and contemporary artistic practices in Electronic and Time-Based Art. Permission of department required. Typically offered Fall Spring.

AD 42100 - Advanced Studies In Photography And Related Media I

Credit Hours: 3.00. The first of two advanced level courses in photography/related media focusing on production of a formally and conceptually coherent body of work. Course emphasizes development of studio and critical thinking skills, and initiates investigation of the creative process. Typically offered Fall Spring.

AD 42200 - Advanced Studies In Photography And Related Media II

Credit Hours: 3.00. An advanced level course in photography and related media focusing on production of a formally and conceptually coherent body of work, articulated within an appropriate, informed critical context. Culminates in curation of formal exhibition. Typically offered Fall.

AD 42600 - Robotic Art

Credit Hours: 3.00. The Robotic Art Studio is an experimental and interdisciplinary class that explores the aesthetics, technologies, ideologies and cultural impact of robotics. Students build robots that beep, blink, bounce and walk. Typically offered Fall Spring.

AD 43000 - Interior Design V

Credit Hours: 3.00. Design of multi-use complex environments, emphasizing program and problem solving, facility planning, building systems, and materials technology. Application of alternative presentation technologies will be explored. Typically offered Fall.

AD 43100 - Visual Communications Design III

Credit Hours: 3.00. The advanced study of communication concepts of poster and poster application in current media. Typically offered Fall.

AD 43200 - Visual Communications Design IV

Credit Hours: 3.00. The study of product identity, packaging. and branding. Typically offered Spring.

AD 43400 - Professional Practice For Visual Communication Designers

Credit Hours: 2.00. Specific professional practice topics for the visual communications designer. Subjects range from contracts, professional associations, ethics, to portfolio and resume preparation, the job market and the future of the profession. Field trips may be required. Typically offered Spring.

AD 44000 - Interior Detailing And Construction

Credit Hours: 3.00. The process of designing, detailing, specifying, and constructing interior environments. Emphasis on teams, building systems, architectural drawing, and building codes. Typically offered Spring.

AD 44200 - Ceramics III

Credit Hours: 3.00. A continuation of AD 34200; according to student needs in creating ceramic forms, a variety of in-depth experiences: experimental kiln building and firing techniques, methods of ceramic construction, surface treatment, and clay and glaze formulation. Typically offered Fall Spring.

AD 45100 - Italian Renaissance Art

Credit Hours: 3.00. A study of the development of the major and minor themes and forms in Italy from 1300 A.D. until 1525 A.D., emphasizing the achievements of masters and analyzing the theories of contemporaries. Typically offered Fall Spring.

AD 45200 - Northern Renaissance Art

Credit Hours: 3.00. The development of a mature North European art originating in the International Gothic tradition and culminating in the works of Albrecht Durer, Jerome Bosch, and Pieter Bruegel, the Elder. Typically offered Fall Spring.

AD 45400 - Modern Architecture

Credit Hours: 3.00. A study of nineteenth- and twentieth-century architecture. Typically offered Fall Spring.

AD 46200 - Metalsmithing

Credit Hours: 3.00. Metal forming and metalsmithing processes for small metal objects and jewlery. Typically offered Spring.

AD 46500 - Professional Practice

Credit Hours: 3.00. The study of professional office and business procedures for the practice of interior design. Includes project administration, contracts, forms, and documents as used in the marketplace. Typically offered Spring.

AD 46800 - Printmaking III

Credit Hours: 3.00. Study of the techniques of photo plate lithography and photo etching, with continued advanced studies in lithography and etching/intaglio. Emphasis on color printmaking, fine art conceptual issues, creativity, matting and framing art, and professional practices. Typically offered Fall Spring.

AD 47000 - Advanced Studies In Textiles

Credit Hours: 3.00. A textile seminar and studio course in advanced textile design, with the purpose of developing a personal direction and competence in textiles as fiber art. Typically offered Fall Spring.

AD 47800 - Internship In Art And Design

Credit Hours: 1.00 to 8.00. Intensive exposure to professional experience through supervised internship in art-and-design-related firms, departments, or studios. Consent to enroll, amount of credit, placement, and evaluation to be approved and coordinated by department. Permission of instructor required. Typically offered Fall Spring.

AD 48500 - History Of Contemporary Interiors

Credit Hours: 3.00. The development of modern movements in design, with emphasis placed on new processes and use of materials in relation to architectural and interior design innovations. Movements from the Industrial Revolution to the present will be studied. Typically offered Fall.

AD 49000 - Special Problems In Art And Design

Credit Hours: 1.00 to 6.00. Individual problems in art and design. Permission of instructor required. Typically offered Fall Spring Summer.

AD 49200 - Advanced Seminar In Art History

Credit Hours: 3.00. A study in depth of a period or movement in the history of art. Typically offered Fall Spring.

AD 49300 - Variable Topics In The History Of Art I

Credit Hours: 3.00. Examination of thematic or specialized topics in the study of the History of Art, Design and Architecture. Typically offered Fall Spring.

AD 49400 - Variable Topics In The History Of Art II

Credit Hours: 3.00. Examination of thematic or specialized topics in the study of the History of Art, Art Theory, Criticism, or Museum Studies. Typically offered Fall Spring.

AD 49900 - Studio Arts Professional Practice/Senior Exhibition

Credit Hours: 3.00. Study of professional practice in the contemporary art world: ethics, gallery, exhibition, studio practice, writing, visual documentation, and business of art. Seniors meet throughout spring semester to organize, install, and de-install Fine Arts Senior Exhibition. Typically offered Spring.

AD 50200 - Curriculum Studies In Art Education

Credit Hours: 3.00. (EDCI 52000) Study of selected theories of curriculum conception as they apply to constructing arts education curricula in the schools. Permission of instructor required. Typically offered Fall Spring.

AD 50400 - Philosophical Studies In Art Education

Credit Hours: 3.00. (EDCI 52100) To introduce students to philosophy as a mode of disciplined inquiry in art education. Students will critically examine the literature of art education and identify problems requiring philosophical resolution. Permission of instructor required. Typically offered Fall Spring.

AD 51200 - Interaction Design Studies

Credit Hours: 3.00. This course examines concepts and methods for interaction design (IXD). It emphasizes a human-centered perspective and explores fundamental components involved in IXD research. Students will explore a wide range of literature and implement IXD theories in multi-disciplinary collaborative projects. Typically offered Fall.

AD 52000 - Student Visual Design Service

Credit Hours: 2.00. The course will simulate the operation of a professional design studio affording the opportunity for hands-on experience in the development of a total graphic product from concept to finish and will include contact with clients, typesetters, and printers. Permission of instructor required. Typically offered Fall Spring.

AD 52200 - Interaction Design Evaluation

Credit Hours: 3.00. This course builds a foundation for interaction designers to conduct evaluation research. Students start from analyzing evaluation cases on interactive designs and systems to employing evaluation in design projects using quantitative, qualitative, or mixed methods of inquiry. Typically offered Spring.

AD 53200 - Cognition In Design

Credit Hours: 3.00. This course focuses on understanding cognitive issues and theories in design. Students are exposed to different cognitive models and phases while they are designing interactive systems. They will develop the cognitive perspective, analyze user experience, and develop an interaction design. Typically offered Fall.

AD 53500 - Furniture Design

Credit Hours: 3.00. Examination of furniture design trends and designers. Explore materials and manufacturing processes. Design and build a full-size seating unit. Shop skills required. Permission of instructor required. Typically offered Fall Spring.

AD 54200 - Information Visualization Design

Credit Hours: 3.00. This course starts from exploring visual perception and attention theories, studying modern visualization technologies and toolkits, and reviewing evolving visualization research. Students work on small exercises, and then accomplish complicated virtual and physical visualization projects for information representation and communication. Typically offered Spring.

AD 55000 - Research Methods In Art And Design

Credit Hours: 3.00. An intensive course in research methods to assist students in developing a topic for directed study. Introduction to various research tools; exercises exploring issues of style, content, and organization; research methods and how they pertain to art and design. Permission of department required. Typically offered Spring.

AD 55800 - Directed Project Research In Studio Arts

Credit Hours: 1.00 to 3.00. Initial M.F.A. project research and production in studio arts. Permission of instructor required. Typically offered Summer Fall Spring.

AD 56800 - Directed Project Research In Design

Credit Hours: 1.00 to 3.00. Initial M.F.A. project research and production in design. Permission of instructor required. Typically offered Summer Fall Spring.

AD 59000 - Special Art Problems

Credit Hours: 1.00 to 6.00. Individual problems in art history, appreciation, design, crafts, drawing, and painting. Credit dependent upon amount of work done. Permission of instructor required. Typically offered Fall Spring.

AD 59100 - Practicum For Art And Design Teaching Assistants

Credit Hours: 0.00. Seminar to train new Art and Design teaching assistants in the content, policies, and format of the courses they teach. Topics include problem/project presentation, critique techniques, grading, and discipline. Subsequent semesters focus on improving and refining teaching skills. Open only to Art Design teaching assistants each semester they teach. Permission of instructor required. Typically offered Fall Spring.

AD 60000 - Painting

Credit Hours: 3.00 to 6.00. Painting. Permission of department required. Typically offered Fall Spring Summer.

AD 60100 - MFA Orientation

Credit Hours: 0.00. Required for and open only to M.F.A graduate students in art and design. An introduction to the M.F.A. graduate degree program in art and design: policies, procedures, and requirements for successful completion of the M.F.A. degree. Permission of department required. Typically offered Fall.

AD 60300 - Theory In Art Seminar

Credit Hours: 3.00. Study of critical issues in modern and postmodern art and relevant methodologies: formalism, iconography, biography and autobiography. Marxism (cultural studies), semiotics, and psychoanalyses. Elements of contemporary professional art practice discussed, including writing of artists' and designers' statements, biographies, and resumes. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of department required. Typically offered Spring.

AD 60500 - Problems In Industrial Design

Credit Hours: 3.00. Problems in product innovation, product design, product development, and environmental design. Emphasis is placed on the development of working prototypes. Typically offered Fall Spring Summer.

AD 60600 - Problems In Visual Design

Credit Hours: 3.00. Problems relating to printing technology, videotape, film design, computer graphics, perception, and the development of visual communications prototypes. Typically offered Fall Spring Summer.

AD 60700 - Graduate Seminar In Photography And Related Media

Credit Hours: 3.00 to 6.00. Study and discussion of the aesthetics, theory, and criticism of photography and related media. Applications include historical and contemporary research and/or the development and critical analysis of a body of work. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of department required. Typically offered Spring Fall Summer.

AD 60800 - Advanced Typography

Credit Hours: 3.00. Explores the communicative and structural aspects of traditional and nontraditional typography, its current and past practitioners, and its evolving presence in the computer age. Independent research and group projects will supplement lectures, assigned readings, and field trips. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of department required. Typically offered Fall Spring.

AD 60900 - Information Design

Credit Hours: 3.00. This course aims to teach specific principles and methods pertaining to information design, an emerging discipline within visual communications design (graphic design) involving the selection, organization and presentation of information to a given audience, covering a wide and varied group of delivery mediums. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of department required. Typically offered Fall Spring.

AD 61000 - Advanced Poster Design

Credit Hours: 3.00. Specific principles and methods pertaining to poster design. Explores the historical and social implications of poster design. Practical and theoretical exercise will aid students in creative thinking and concept generation. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of department required. Typically offered Spring Fall.

AD 61100 - Advanced Web Design For Visual Communications Design

Credit Hours: 3.00. Explores experimental interface design issues and surveys emerging and advanced theories of interface design for the Web. Application of motion graphics design principles and design experimentation is part of the curriculum. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of department required. Typically offered Fall Spring.

AD 61200 - Color Aesthetic And Research

Credit Hours: 3.00. Explores color aesthetic based on the works of color masters (e.g., Albers, Itten, Chevreul, Birren, Munsell, and Ostwald) and contemporary color research issues applied to art and design. Color research methodology will be addressed. Typically offered Fall Spring.

AD 61300 - Drawing

Credit Hours: 3.00 to 6.00. Drawing. Permission of department required. Typically offered Fall Spring Summer.

AD 61400 - Graduate Installation And Critique

Credit Hours: 3.00. A seminar for all graduate students in the studio arts incorporating the process of installation art to facilitate the exchange of ideas and professional criticism. Typically offered Fall Spring.

AD 61500 - Social Issues In Industrial Design

Credit Hours: 3.00. A study of mass-production materials and processes used by designers. Students will focus on the limitations and benefits of various manufacturing methods. Special attention will be given to injection molding, casting, and stamping. Prerequisite: Admission to the M.F.A. program in Art and Design. Typically offered Fall Spring.

AD 61600 - Electronic And Time-Based Art

Credit Hours: 3.00 to 6.00. This seminar explores contemporary artistic practices in Electronic and Time-Based Art, including emerging fields such as: generative and interactive art, audio-visual installation, and new media performance. The format of the course is a mixture of critique, workshops, research, presentations, and discussion. Permission of department required. Typically offered Fall Spring.

AD 62500 - Applied Ornamental Design

Credit Hours: 3.00. Examination of past and present ornamental design applications and of the cultures that created them. Students will generate their own individual visual iconography to be transformed into designs for consumer products,

architectural elements, or furniture. Prerequisite: Admission to the M.F.A. program in Art and Design. . Typically offered Fall Spring.

AD 63500 - Advanced Materials And Processes

Credit Hours: 3.00. A study of mass-production materials and processes used by designers. Students will focus on the limitations and benefits of various manufacturing methods. Special attention will be given to injection molding, casting, and stamping. Prerequisite: Admission to the M.F.A. program in Art and Design. Typically offered Fall Spring.

AD 64000 - Special Topics In Interior Design

Credit Hours: 1.00 to 6.00. Special topics and theoretical approaches to individual projects within the built environment will be investigated, such as urban environments, existing and new structures, and interior environments. Topics could include either residential or non-residential projects. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of instructor required. Typically offered Summer Fall Spring.

AD 65800 - MFA Project Research In Studio Arts

Credit Hours: 1.00 to 6.00. Intensive M.F.A. project production and thesis research in studio arts. Prerequisite: Three credit hours of AD 55800 with a minimum B- grade. Permission of instructor required. Typically offered Summer Fall Spring.

AD 66100 - Jewelry and Metalsmithing

Credit Hours: 3.00 to 6.00. Jewelry and Metalsmithing. Permission of department required. Typically offered Fall Spring Summer.

AD 66500 - Printmaking

Credit Hours: 3.00 to 6.00. Printmaking. Permission of department required. Typically offered Fall Spring Summer.

AD 66800 - MFA Project Research In Design

Credit Hours: 1.00 to 6.00. Intensive M.F.A. project production and thesis research in design. Prerequisite: Three credit hours of AD 56800 with a minimum B- grade. Permission of instructor required. Typically offered Summer Fall Spring.

AD 66900 - Ceramics

Credit Hours: 3.00 to 6.00. Ceramics. Permission of department required. Typically offered Fall Spring Summer.

AD 67000 - Textile Art

Credit Hours: 3.00 to 6.00. Textile Art. Permission of department required. Typically offered Fall Spring Summer.

AD 67500 - Sculpture

Credit Hours: 3.00 to 6.00. Sculpture. Permission of department required. Typically offered Fall Spring Summer.

AD 67800 - Graduate Internship

Credit Hours: 1.00 to 6.00. Intensive exposure to professional experience through supervised internship in art or design firms, departments, or studios. The internship will consist of work to enhance the development of future professionals. The internship experience will help students integrate theory and practice and confirm career choices. Prerequisite: Admission to the M.F.A. program in Art and Design. Permission of instructor required. Typically offered Summer Fall Spring.

AD 69000 - Advanced Problems In Art And Design

Arrange Hours and Credit. Credit and hours to be arranged. Permission of instructor required. Typically offered Fall Spring Summer.

AD 69100 - Directed Readings In Art History

Credit Hours: 3.00. A survey of specialized publications for in-depth study in an area of special interest. Permission of instructor required. Typically offered Fall Spring Summer.

AD 69300 - Historical Problems In Art Education

Credit Hours: 3.00. (EDCI 63000) Examination of methods used to investigate art education's history, past theory, and practices. Class work will include readings and discussion and will culminate in guided research and a short historical study. Permission of instructor required. Prerequisite: BA in art education. Typically offered Spring.

AD 69600 - Aesthetic Development In Children

Credit Hours: 3.00. (EDCI 63100) Examination of historical and contemporary theory and research in children's aesthetic development (response and production) and analysis of the influences of such development on art education curricula and methodology. Permission of Instructor required. Prerequisite: BA in Art Education or an equvalent area. Typically offered Fall Spring.

AD 69700 - MFA Graduate Exhibition

Credit Hours: 3.00. Completion of M.F.A. thesis, oral defense, gallery installation of M.F.A. exhibition, public presentation, and documentation of exhibition. Prerequisite: Admission to the M.F.A. program in Art and Design. Concurrent Prerequisite: Must complete 12 credit hours of AD 65800 or AD 66800 during the same or prior session. Only open to M.F.A. graduate students in Art and Design. Permission of instructor required. Typically offered Summer Fall Spring.

AD 69800 - Research MA Or MFA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Asian American Studies

ASAM 24000 - Introduction To Asian American Studies

Credit Hours: 3.00. A general introduction to Asian American history and culture, with a focus on the diverse and multifaceted experiences of peoples of Asian descent in America and their contributions to U.S. culture and society. Typically offered Spring.

ASAM 34000 - Contemporary Issues In Asian American Studies

Credit Hours: 3.00. Overviews various issues in contemporary Asian American Studies through theoretical and literary readings combined with examinations of popular media. Topics examine the multiple intersections of race, ethnicity, class, gender, and sexuality. Typically offered Spring.

ASAM 34200 - Special Topics In Asian American Studies

Credit Hours: 3.00. This course will focus on specific issues and themes in Asian American Studies. Typically offered Fall Spring.

Astronomy

ASTR 26300 - Descriptive Astronomy: The Solar System

Credit Hours: 3.00. A descriptive, nonmathematical course in astronomy intended for non-physics majors. Topics include: description of the sky; historical development of astronomy; motion of the sun and the moon; solar and lunar eclipses; the seasons and the calendar; the sun and the planetary system; comets, meteoroids, and asteroids. Includes required observing sessions. Not available to students with credit in ASTR 36300. Typically offered Fall.

ASTR 26400 - Descriptive Astronomy: Stars And Galaxies

ASTR 36300 - The Solar System

Credit Hours: 3.00. This course is intended for students in science or engineering. The components of the course consist of an overview of solar system objects and an overview of the physical processes that control the evolution of solar system objects since formation. The overview of solar system includes observations of the Sun, planets, asteroids and Kuiper-belt objects, comets, and interplanetary dust. Specific processes that are discussed include hydrostatic equilibrium, orbital dynamics, radioactive decay, and heat flow. The role of these processes in shaping planetary surfaces and atmosphere is explored. Typically offered Fall.

ASTR 36400 - Stars And Galaxies

Credit Hours: 3.00. This course is intended for students in Science or Engineering. This is the second of a two-semester introductory sequence on astronomy and astrophysics, although it is designed to be a standalone course. It is intended mainly for Science and Engineering majors who are comfortable with calculus-based contents. The course provides an overview on the formation and evolution of stars, galaxies, and clusters of galaxies. Selected topics that are covered in more detail include stellar structure and atmosphere, properties of black holes, neutron stars, and white dwarfs, galactic dynamics, and dark matter in galaxies and clusters of galaxies. Typically offered Spring.

ASTR 37000 - Cosmology

Credit Hours: 3.00. Intended for science and engineering majors. Basic physics and math knowledge will be assumed. The picture of how the Universe came to be and how it has evolved has recently come into sharp focus. This progress is the result of improved observational techniques that have resulted in high resolution images of very distant galaxies, a more accurate mapping of the Large Scale Structure of the Universe or the high resolution picture of the young universe provided by Cosmic Microwave Background observations. We will present a historical perspective of how ideas and data have shaped Cosmology through the centuries. In addition, we will review the theoretical models that are in agreement with the current observations. Our goal will be to provide the students with a broad overview of the current research in Cosmology with an eye toward stimulating the students curiosity about the many questions still awaiting answers in this field. Typically offered Fall.

ASTR 56000 - Stellar Evolution

Credit Hours: 3.00. (PHYS 56000) Observational basis of astrophysics; formation of galaxies and stars; evolution of stars; white dwarfs, supernovae and neutron stars, pulsars, quasars, black holes; cosmic rays, their origin and acceleration; radio astronomy, radio galaxies; the H-21 cm line and the 3mK blackbody radiation; gravitational radiation; X-ray and g-ray astronomy; cosmology; space physics, magnetosphere, and solar wind. Typically offered Spring.

ASTR 56100 - Galaxies And Large Scale Structure

Credit Hours: 3.00. (PHYS 56100) Covers basic observed properties and models of galactic structure, dynamics of stars, physics of interstellar medium, formation of galaxies, properties of clusters of galaxies, and dark matter. Typically offered Fall Spring.

ASTR 56200 - Introduction To High Energy Astrophysics

Credit Hours: 3.00. (PHYS 56200) An overview of important physical processes in a variety of astronomical settings and of the experimental techniques employed in the field of high energy astrophysics. Covered in more detail are individual systems that include black holes, neutron stars, white dwarfs, supernova remnants, active galactic nuclei, clusters of galaxies, gamma-ray bursts, and cosmic rays, with special emphasis on several research frontiers. Typically offered Fall Spring.

ASTR 56300 - Astroparticle Physics

Credit Hours: 3.00. (PHYS 56300) An overview of an emerging research frontier in modern physics that lies at the interface of particle physics and astrophysics. Emphasis is on topics that are particularly relevant to both fields, including cosmology, cosmic ray physics, very-high-energy gamma ray astrophysics, neutrino astrophysics, and gravitational wave physics. Typically offered Fall Spring.

ASTR 56700 - Observational Techniques In Astronomy

Credit Hours: 3.00. (PHYS 56700) Fundamental concepts in observational astronomy, including coordinate and time systems, telescopes and detectors, radiation and optics, and methods of statistical data analysis. Typically offered Fall.

Aviation Technology

AT 10000 - Introduction To Aviation Technology

Credit Hours: 1.00. An introduction to the Department of Aviation Technology and its curricula as well as an overview of the aviation industry and associated careers. Aviation safety practices and human factors issues are discussed. An overview of aviation regulations and the regulatory process is included. Typically offered Fall Spring Summer.

AT 10100 - Gateway To Aviation Technology

Credit Hours: 3.00. An introduction to Aviation Technology as well as fundamentals of the aviation industry. Course topics include basic aircraft science, aircraft nomenclature, theory of flight, and aviation regulations and the regulatory process. Aviation safety practices and human factors issues are discussed as well as the subject areas and information needed to operate as a private pilot in the aviation environment. As part of this course, every student will gain flight experience in a turbine powered aircraft. A special fee is charged for this experience. Permission of department required. Typically offered Fall Spring Summer.

AT 10200 - Aviation Business

Credit Hours: 3.00. A discussion of the financial structure and operation of the aviation industry including aircraft and aerospace design parameters, as well as aviation financial and industrial processes. The course will cover material relevant to the overall structure of the aviation industry including history, current status of aerospace manufacturers, commercial airlines, and general aviation as well as governmental aviation agencies and international aviation. Commercialization of space and current issues in aviation will also be covered. Typically offered Fall Spring Summer.

AT 10300 - Aerospace Vehicle Propulsion And Tracking Systems

Credit Hours: 3.00. This course is an introduction to propulsion systems used in aerospace vehicles. The student will learn terminology, component parts, and operational theory of propulsion systems. Course topics covered are reciprocating and turbine engine operation theory as well as rocket propulsion systems. including electrical, fuel, fire, ignition and lubrication. Operational

and regulatory fuel requirements are discussed. Emerging technologies and environmental practices will be explored. Typically offered Fall Spring Summer.

AT 10500 - Basic Aircraft Electrical Theory

Credit Hours: 3.00. A study of aircraft DC electrical circuits, Ohm's Law, Kirchoff's Law, series and parallel circuits, magnetism, electromagnetism, DC power systems along with aircraft schematics and aircraft wiring practices. Laboratory experiments cover installation of aircraft electrical systems along with basic system analysis. Permission of department required. Typically offered Fall Spring.

AT 10600 - Basic Aircraft Science

Credit Hours: 3.00. An introduction to federal regulatory systems and associated publications. Includes aircraft nomenclature, theory of flight, and fundamentals of the aviation industry. Introduces weight and balance procedures. Permission of department required. Typically offered Fall Spring.

AT 10800 - Aircraft Materials

Credit Hours: 4.00. A study of the materials and their properties utilized in aircraft structures and powerplants. Laboratory content will consist of basic processes involved in the design, testing, and utilization of such materials. Permission of department required. Typically offered Fall Spring.

AT 12100 - Aircraft Powerplants For Flight Crews

Credit Hours: 3.00. Fundamental principles of aircraft powerplants and accessories, including theory of operation. Topics include fuel and related systems, lubrication, carburetion, induction, ignition, propellers, and technical publications. Emphasizes reciprocating engines, with an introduction to gas turbine propulsion. Permission of department required. Typically offered Fall Spring.

AT 14400 - Private Pilot Lectures

Credit Hours: 4.00. A study of the subject areas and information needed to operate as a private pilot in the aviation environment. The FAA private pilot written exam will be offered to those who qualify. Typically offered Fall Spring.

AT 14500 - Private Pilot Flight

Credit Hours: 2.00. In this course, the student will receive the necessary dual flight instruction and solo flight time to qualify for the FAA Private Pilot Certificate. Permission of department required. Typically offered Spring Fall Summer.

AT 14502 - Private Pilot Flight Under Federal Aviation Regulations Part 141

Credit Hours: 2.00. In this course, the student will receive the necessary dual flight instruction and solo flight time to qualify for the FAA Private Pilot Certificate under Part 141 of the Federal Aviation Regulations. Permission of department required. Typically offered Fall Spring Summer.

AT 14700 - Aircraft Propulsion Systems

Credit Hours: 3.00. The theory of operation, design, and construction of modern aircraft propulsion systems. This includes familiarization with fuel, electrical, ignition, instrument, and control systems for both reciprocating and gas turbine powerplants on large transport aircraft. Typically offered Spring.

AT 18700 - Aircraft Propulsion And Operating Systems

Credit Hours: 4.00. An overview of propulsion and operation systems theory of operation, design, and construction. This includes fuel, electrical, ignition, instrument, powerplant control, environmental, flight control, and navigation systems found on modern aircraft. Typically offered Summer Fall Spring.

AT 20100 - Aircraft Design And Structures

Credit Hours: 3.00. A study of aerospace materials and their properties utilized in aircraft structures and powerplants. This includes introduction to computer aided design, engineering drawings, aircraft structural concepts, aircraft design concepts, metallic and composite materials, aircraft loads and stresses, and aerodynamics. Typically offered Fall Spring Summer.

AT 20200 - Aerospace Vehicle Systems Design, Analysis And Operations

Credit Hours: 3.00. Introduction to the design and engineering analysis of various systems found on modern aircraft and aerospace vehicles. Operational theory will also be presented for specific aircraft. Systems include electric power distribution, digital data, instrumentation, hydraulic, pneumatic, environmental, flight management, and autoflight. Typically offered Fall Spring Summer.

AT 20300 - Aviation Operations Management

Credit Hours: 3.00. This course provides a forum for investigating contemporary issues facing the aviation and aerospace industries. Major topics include aviation operation, human resources, fiscal, and technology management. Typically offered Fall Spring Summer.

AT 20501 - Statics For Aerostructures

Credit Hours: 3.00. This course provides an introduction to the static analysis of aerostructures. Force systems, resultants and equilibrium, moments, distributed loads, and centroids as they relate to aeronautical structures are studied. CAD software is introduced. Typically offered Fall Spring Summer.

AT 20700 - Introduction To Aircraft Systems

Credit Hours: 3.00. Principles and design concepts of aircraft operating systems are covered. Emphasis is given to flight control, electrical, environmental, hydraulic, pneumatic, pressurization, oxygen, heating, cooling, fire protection, and ice and rain protection systems. Also included are theory of operation and design of aircraft instruments and associate systems. Typically offered Fall Spring.

AT 20800 - Aircraft Materials II

Credit Hours: 3.00. This course includes final assembly and finishing procedures for fabric and metallic aircraft structures. Repairs to such components are included. Typically offered Fall Spring.

AT 20802 - Aircraft Materials

Credit Hours: 3.00. In this course students study aluminum and composite materials used in aircraft. The course covers elements of design, fabrication, final assembly, and testing. Students also study the practical application of statics for airframe loads. Typically offered Fall Spring Summer.

AT 21000 - Ground Trainer I

Credit Hours: 1.00. Included in this course are maneuvers to develop basic attitude instrument flying skills. The student then proceeds into VOR, ADF, and ILS tracking, holding, and approaches. Intersection holding and DME arc flying will also be covered. Permission of department required. Typically offered Fall Spring Summer.

AT 21100 - Ground Trainer II

Credit Hours: 1.00. This course is a continuation of Ground Trainer I. The student will continue work on VOR, ADF, and ILS holding and approaches. Additionally, there will be a minimum of three instrument cross-countries flown in the ground trainer. The final portion of the course will be to increase the proficiency level of instrument flying in preparation for the Instrument Rating Flight test. Permission of department required. Typically offered Fall Spring Summer.

AT 22300 - Human Factors For Flight Crews

Credit Hours: 3.00. This course explores the fundamental concepts of single pilot and multi-crew human factors issues. The first part of the course focuses on the physiological factors that affect single pilot aeronautical decision-making. The second part examines human error, threat and error management, and domains of crew resources management. The third segment utilizes team-building exercises, case study presentations, and a formal assignment to emphasis course learning outcomes. Typically offered Fall Spring Summer.

AT 23100 - Human Factors For Flight

Credit Hours: 2.00. An overview of physiological and psychological factors affecting the decision-making process for pilots is presented. Prerequisite: FAA Private Pilot Certificate. Typically offered Fall Spring Summer.

AT 23300 - Ethics And Aviation

Credit Hours: 3.00. This discussion-oriented class is an introduction to the principles of ethical theory and the application of that theory to practical problems associated with the aviation industry. Actual aviation case studies are used to illustrate major concepts. Typically offered Fall Spring.

AT 24100 - Aircraft Systems For Flight Crews

Credit Hours: 3.00. This course will introduce the student to the basic aircraft systems. Includes electrical, fuel, hydraulic, pneumatic, environmental, and flight control systems. Permission of department required. Typically offered Fall Spring Summer.

AT 24200 - Mountain Flying

Credit Hours: 1.00. Selection of this course is determined by the AFT faculty. Mountain Flying includes dual and solo flight training in the mountains of Wyoming, Colorado, and surrounding states. Weather and performance problems associated with high-altitude operations are experienced. Typically offered Summer.

AT 24300 - Commercial Flight I

Credit Hours: 2.00. The course is designed to develop a higher degree of coordination and judgment through additional experience in more advanced flight maneuvers and cross-country flying. Permission of department required. Typically offered Fall Spring Summer.

AT 24302 - Commercial Flight I Under Federal Aviation Regulations Part 141

Credit Hours: 2.00. This course is designed to develop a higher degree of coordination and judgment through additional experience in more advanced flight maneuvers and cross-country flying under part 141 of the Federal Aviation Regulations. Permission of department required. Typically offered Fall Spring Summer.

AT 24500 - Cross-Country Flight

Credit Hours: 1.00. The course consists of solo cross-country flying required to help meet the minimum flight times and proficiency for the FAA Commercial Pilot Certificate. Permission of department required. Typically offered Fall Spring Summer.

AT 24700 - Aircraft Operating Systems

Credit Hours: 3.00. The theory of operation of environmental, flight control, and navigation systems found on modern aircraft. This includes avionics, flight management, flight control, and instrumentation systems. Typically offered Fall.

AT 24800 - Commercial Flight II

Credit Hours: 2.00. The course is a continuation of the flight training received in AT 24300. Basic instrument flying techniques will be introduced to further enhance and refine the development of precision flying skills. Permission of department required. Typically offered Fall Spring Summer.

AT 24802 - Commercial Flight II Under Federal Aviation Regulations Part 141

Credit Hours: 2.00. This course is a continuation of the flight training received in FAR 141 Commercial Flight I. Basic instrument flying techniques will be introduced to further enhance and refine the development of precision flying skills. Permission of department required. Typically offered Fall Spring Summer.

AT 24900 - Instrument Flight Lectures

Credit Hours: 3.00. A study of the operation of flight instruments and radio navigation aids, federal aviation regulations pertinent to instrument flight, meteorology, instrument charts, instrument flight planning, and air traffic control procedures. Preparation for the FAA Instrument Rating written examination. Typically offered Fall Spring Summer.

AT 25200 - Aviation Projects

Credit Hours: 3.00. This course will introduce the students to group projects in collaboration with industrial partners in aviation. A new project will be conducted each semester. Students will participate in the development of project goals, conducting field research, and developing a final course document and presentation. Travel outside of the normal assigned classroom time might be required. Typically offered Fall Spring Summer.

AT 25300 - Instrument Flight

Credit Hours: 2.00. The course is designed to prepare the student for the FAA Commercial Pilot Certificate and Instrument Rating. Flight, ground pilot trainer, and ground instruction are included. Permission of department required. Typically offered Fall Spring Summer.

AT 25302 - Instrument Flight Under Federal Aviation Regulations Part 141

Credit Hours: 2.00. This course is designed to prepare the student for the FAA Commercial Pilot Certificate and Instrument Rating under Part 141 of the Federal Aviation Regualtions. Permission of department required. Typically offered Fall Spring Summer.

AT 25400 - Commercial Flight Lectures

Credit Hours: 3.00. The course is designed to review the principles of flight, aircraft systems, pertinent federal aviation regulations, and airman publications and service in order to prepare the student for the FAA Commercial Pilot written examination. Typically offered Fall Spring Summer.

AT 25800 - Air Transportation

Credit Hours: 3.00. This course provides a framework to understand the aviation industry. Students study the industry's history and the current status of aerospace manufacturers, commercial airlines, and general aviation. Governmental aviation agencies and international aviation are also discussed. Typically offered Fall Spring.

AT 26200 - Basic Aircraft Powerplant Technology

Credit Hours: 4.00. A study of the design, construction, and operating practices of aircraft reciprocating and small gas turbine engines. Laboratory exercises emphasize airworthiness evaluation, fault-isolation techniques, and standard service/maintenance practices. Typically offered Fall Spring Summer.

AT 26300 - Fluid Power Systems

Credit Hours: 3.00. An analysis of design, construction, and operation of the fluid power systems. Topics range from fluids and hardware through individual component analysis to diagnosis and repair of complex systems. Typically offered Summer Fall Spring.

AT 26500 - Aircraft Electrical Systems

Credit Hours: 4.00. An overview of both AC and DC aircraft electrical systems, dealing specifically with components and their relationship to the aircraft. Aircraft charging systems, main power distribution, solid state electronics, batteries, and motors are discussed. Laboratory emphasis is placed specifically on volt/ohmmeter usage for the analysis of various aircraft electrical systems. Typically offered Fall Spring.

AT 26502 - Aircraft Electrical Systems

Credit Hours: 3.00. An in-depth study of aircraft electrical components, both individually and as systems in the aircraft. DC electrical circuits, series and parallel circuits, magnetism, and electromagnetism are covered, as are DC power systems, schematics, and aircraft wiring practices. Aircraft charging systems, main power distribution, solid state electronics, batteries, and motors are also discussed. Typically offered Fall Spring Summer.

AT 26700 - Fixed And Rotary Wing Assemblies

Credit Hours: 3.00. An overview of various fixed and rotary wing components and systems. Flight control systems, landing gear, fuel systems, wheels, brakes, and rotor systems are among the subjects studied. Typically offered Fall Spring.

AT 26800 - Aircraft Material Processes

Credit Hours: 4.00. A study of the processes by which aircraft materials are converted into usable components. Laboratory activities include machining, welding and analysis of material properties. Typically offered Fall Spring.

AT 26900 - Air Traffic Control I

Credit Hours: 4.00. An introduction to the principles of air traffic control, including tower, approach control and enroute separation. Navigation theory as it relates to the ATC system will be explained, as well as the theory of operation of ATC radar and computer systems. Typically offered Summer Fall Spring.

AT 27100 - Powerplant Propulsion Systems

Credit Hours: 3.00. Theory, design, and operation of propellers and propeller systems are emphasized. Use of technical data, application of operating principles, parts modifications, and airworthiness evaluations are stressed. Typically offered Fall Spring.

AT 27200 - Introduction To Composite Technology

Credit Hours: 3.00. An introduction to basic composite materials, processes, construction, testing, and repair. Students will work with a variety of wet and pre-impregnated fiber and matrix systems including glass, aramid fiber, and carbon-graphite. Typically offered Fall Spring.

AT 27800 - Nondestructive Testing For Aircraft

Credit Hours: 3.00. A study of nondestructive testing methods used to evaluate the structural integrity of airframes, engines, and components. Magnetic particle, liquid penetrant, electromagnetic, ultrasonic, and radiographic inspection are covered. Typically offered Fall Spring.

AT 28100 - Traffic Control II

Credit Hours: 4.00. An intensive review of air traffic control procedures and aviation regulations for students interested in seeking employment as air traffic controllers. Typically offered Summer Fall Spring.

AT 28500 - ATC Procedures and Weather

Credit Hours: 3.00. An introduction to the technical procedures involved in the development and operation of the air traffic control system. Instrument procedures and design will be covered. Weather theory as pertaining to ATC will be discussed, along with observation and dissemination systems used by the FAA and NWS. Typically offered Fall Spring.

AT 29000 - Aviation Project

Credit Hours: 1.00 to 4.00. Independent study primarily for sophomore students who wish to pursue study and development work in special areas. Subject material must be arranged with the instructor before enrolling in the course. Permission of instructor required. Typically offered Fall Spring Summer.

AT 29300 - Industrial Practice I

Credit Hours: 1.00. Industrial practice and experience in participating industry. Requires written report of the experience. Permission of department required. Typically offered Fall Spring Summer.

AT 29400 - Industrial Practice II

Credit Hours: 1.00. Industrial practice and experience in participating industry. Requires written report of the experience. Permission of department required. Typically offered Fall Spring Summer.

AT 29900 - Aviation Technology

Credit Hours: 1.00 to 4.00. Hours, credit, and subject matter to be arranged by staff. Permission of department required. Typically offered Summer Fall Spring.

AT 30000 - Global Aviation Systems

Credit Hours: 3.00. A survey of airspace and airfield needs for aircraft operation. Also included are the effects of international, national, state, and local laws and regulations upon the operation of these facilities. Typically offered Summer Fall Spring.

AT 30100 - Crew Resource Management

Credit Hours: 2.00. This course explores the fundamental concepts affecting decision-making, communications, leadership styles, and crew coordination in the cockpit. Topics include stress management, situational awareness, and conflict resolution. Case study presentations and team-building will be emphasized. Permission of department required. Typically offered Fall Spring.

AT 30300 - Aircraft Service

Credit Hours: 2.00. This course involves the student in the maintenance of aircraft in daily operation. Powerplant inspection is stressed. Permission of department required. Typically offered Fall Spring Summer.

AT 30700 - Advanced Aircraft Systems

Credit Hours: 3.00. An in-depth study of aircraft components and operation with an emphasis on transport-category aircraft. Systems covered include fuel, environmental (air-conditioning, pressurization, and oxygen), fluid-power, flight control, fire protection, ice-control, warning, and auxiliary power. Practical projects utilize small and transport category aircraft. Typically offered Fall Spring.

AT 30702 - Advanced Aircraft Systems

Credit Hours: 3.00. An in-depth study of aircraft components and operation with an emphasis on transport-category aircraft. Systems covered include fuel, environmental, fluid-power, flight control, fire protection, ice-control, warning, and auxiliary power. Practical projects utilize small ad transport-category aircraft. Typically offered Fall Spring Summer.

AT 30800 - Aircraft Materials Processes

Credit Hours: 3.00. A study of the processes by which aircraft materials are converted into usable components. Laboratory activities include machining, welding, and analysis of material properties. Typically offered Fall Spring.

AT 30802 - Aircraft Materials Processes

Credit Hours: 3.00. A study of the processes by which aircraft materials are converted into usable components. Laboratory activities include machining, welding, and analysis of material properties. Typically offered Fall Spring Summer.

AT 32100 - Transport Aircraft Operations Lectures I

AT 32200 - Transport Aircraft Operations Lectures II

Credit Hours: 2.00. A continuation of AT 32100. This course places emphasis on cockpit resource management, abnormal procedures, and advanced emergency and instrument procedures that may be encountered in transport category aircraft operations. Typically offered Summer Fall Spring.

AT 32300 - Transport Aircraft Operations Lab I

AT 32400 - Transport Aircraft Operations Lab II

Credit Hours: 1.00. A continuation of AT 32300. This laboratory emphasizes abnormal and emergency flight procedures that may be encountered in a transport category aircraft. Permission of department required. Typically offered Summer Fall Spring.

AT 32501 - Advanced Aviation Meteorology

Credit Hours: 3.00. This course is designed for students who are preparing for careers as professional pilots or dispatchers and require an advanced knowledge of the impact of weather on aviation operations. Typically offered Fall Spring Summer.

AT 32700 - Advanced Transport Flight Operations

Credit Hours: 3.00. This course addresses advanced aviation topics to include high speed aerodynamics, automated cockpit instrumentation, domestic/international flight operations, and global navigation. Typically offered Summer Fall Spring.

AT 33100 - Introduction To Transport Aircraft Systems And Procedures Lecture

Credit Hours: 1.00. This course is for students not majoring in Professional flight technology. Students will be introduced to the systems and operating procedures of a jet transport aircraft. Typically offered Fall Spring Summer.

AT 33200 - Advanced Transport Aircraft Systems And Procedures Lecture

Credit Hours: 1.00. This course is for students not majoring in Professional Flight Technology. Advanced systems knowledge and operating procedures will be discussed. Automated cockpit technology will be explored. Typically offered Fall Spring Summer.

AT 33300 - Introduction To Transport Aircraft Systems And Procedures Lab

Credit Hours: 1.00. This course is for students not majoring in Professional Flight Technology. Flight officer duties, instrument procedures, crew resource management, and line-oriented flight training will occur in a transport category aircraft simulator. Private Pilot Certificate with Instrument Rating required. Permission of department required. Typically offered Fall Spring Summer.

AT 33400 - Advanced Transport Aircraft Systems And Procedures Lab

Credit Hours: 1.00. This course is for students not majoring in Professional Flight Technology. Advanced training maneuvers and systems trouble-shooting in a transport category simulator will be emphasized. Students gain proficiency with automation, crew resource management, decision making, and performance planning. Typically offered Fall Spring Summer.

AT 33500 - Avionics Systems

Credit Hours: 4.00. The components and operation of aircraft communication and navigation systems are studied to a functional block diagram level. Included in the course are microwave and pulse navigation systems. Installation requirements and system inspections are emphasized in the laboratory. Typically offered Fall Spring.

AT 33502 - Avionics Systems

Credit Hours: 3.00. This course covers the theory of operation and applications of common electrical components used in various aircraft circuits. The theory and mathematical relationships of alternating current, reactance, impedance, and phase shift are examined. Operational theory, installation practices, and troubleshooting concepts of common aircraft communication and navigation systems are investigated. Typically offered Fall Spring Summer.

AT 33800 - Airline Management

Credit Hours: 3.00. This course is a detailed study of airline management principles and processes. Topics include airline,

economics, organization, forecasting, marketing, alliances,pricing, scheduling, finance, fleet planning, labor relations and air freight. Business ethics pertaining to airlines are introduced. Typically offered Fall Spring.

AT 34100 - Aircraft Electrical And Electronic Systems

Credit Hours: 4.00. Orientation and system description of primary DC power supply and distribution, starter, ignition, alternator, accessory, utility, and lighting circuits. Introduction to flight instruments, electrical load analysis, and weight and balance procedures. Operative procedures and specifications for avionics equipment are discussed. Typically offered Fall Spring Summer.

AT 34200 - Aircraft Communication And Navigation Systems

Credit Hours: 4.00. A study of characteristics and operation of typical aircraft communication and navigation equipment. Emphasis is on installation and maintenance of avionics systems. Typically offered Fall Spring Summer.

AT 34300 - Aircraft Pulse And Microwave Systems

Credit Hours: 3.00. A study of characteristics and operation of weather radar, distance measuring equipment, transponders, and encoding altimeters. Typically offered Fall Spring Summer.

AT 34400 - Integrated Flight Control Systems

Credit Hours: 3.00. A study of flight control equipment and integrated systems. This course includes slaved gyro compass systems, horizontal situation indicators (HSI), flight director systems, autopilots, and radio altimeter equipment. Typically offered Fall Spring.

AT 34500 - Aviation Marketing

Credit Hours: 3.00. This course is an introduction to the principles of marketing with emphasis on aviation-related industries. It demonstrates the practical and managerial applications of balancing an organization's objectives and resources against needs and opportunities in the marketplace. Typically offered Fall Spring.

AT 34600 - Transport Category Aircraft Systems

Credit Hours: 2.00. A study of the components and operation of systems found on current transport-category aircraft. Systems covered include fuel, environmental (air-conditioning, pressurization, and oxygen), fluid-power, flight control, fire protection, ice-control, warning, and auxiliary power. Airframe and Powerplant Certificate required. Typically offered Fall Spring Summer.

AT 34700 - Avionics Troubleshooting

Credit Hours: 3.00. This course presents the materials, techniques, and procedures to correctly troubleshoot the various communication and navigation systems found on modern aircraft. The main focus of the course is flightline troubleshooting techniques used to determine which avionics component or system within the aircraft is defective. Flight line repairs of these systems are addressed. Typically offered Fall Spring.

AT 34800 - Aircraft Power and Flight Management Systems

Credit Hours: 4.00. Power system components are discussed with respect to generation, distribution, protection, and control of electrical power. Electrical load profiles are mapped for various phases of flight. Flight management systems are introduced along with their supporting subsystems. Autopilot/Flight Director, Inertial Reference, Air Data, Navigation sensors, and Display elements are included. Typically offered Fall Spring.

AT 35100 - Flight Instructor Flight

Credit Hours: 2.00. Flight training in preparation for flight instructor certification. Instructional techniques are demonstrated and practiced by the student. Heavy emphasis is placed on student practice teaching of all maneuvers. FAA Commercial Pilot Certificate with Instrument Airplane Rating required. Permission of department required. Typically offered Fall Spring Summer.

AT 35200 - Flight Instructor Lectures

Credit Hours: 4.00. The course teaches techniques of flight and ground instruction, analysis of maneuvers, aircraft performance, and federal aviation regulations applicable to flight instructors. Some practice teaching will be required. Preparation for the FAA written exam is included. Typically offered Fall Spring Summer.

AT 35300 - Multi-Engine Flight

Credit Hours: 1.00. This course prepares the student for the FAA multi-engine rating. Dual flight instruction is conducted in a multi-engine aircraft. Individual ground instruction will be arranged. Typically offered Fall Spring Summer.

AT 35400 - Turbine Flight Operations Lecture

Credit Hours: 2.00. A study of corporate aircraft systems and operations and an orientation to operational procedures. Typically offered Fall Spring Summer.

AT 35500 - Transport Aircraft Systems And Operations I

AT 35600 - Turbine Flight Operations Laboratory

Credit Hours: 2.00. Provides students with flight experience/instruction in passenger-carrying operations using turbine-powered aircraft. Emphasis is on safe and efficient practices and techniques. Permission of department required. Typically offered Fall Spring.

AT 35700 - High-Altitude Operation

Credit Hours: 1.00. This course is designed to acquaint and orient the student to the operation of, and effects on, light aircraft at high elevation airports during an intensive, two-week instructional session. In addition, the course is intended to familiarize the student with mountain flying techniques during cross-country flights. FAA Private Pilot Certificate required. Permission of department required. Typically offered Fall Spring Summer.

AT 35800 - History Of Flight

Credit Hours: 3.00. This course is designed to trace the effort to achieve and sustain flight from early mythology to the present. Special emphasis is given to the evolution of the airplane. Typically offered Fall Spring Summer.

AT 35900 - Airport Management

Credit Hours: 3.00. This course is a study of the history and development of contemporary airport facilities. Areas of study will include FAA airport design requirements, master plans, and airport operations. Field trips may be required. Typically offered Summer Fall Spring.

AT 36201 - Aviation Operations

Credit Hours: 3.00. This course introduces students to the principles of managing a complex aviation operation. Students will be assigned active roles in monitoring and reporting on aircraft flight and maintenance practices. Every student will be assigned a role as part of a small group whose responsibility is to gather appropriate information, develop reports, and conduct practical research tasks as assigned. Weekly and monthly group meetings will be conducted similar to those found in the airline industry with students playing an active role in these meetings. Typically offered Fall Spring Summer.

AT 36300 - Fundamentals Of Powerplant Systems

Credit Hours: 3.00. Theory, design, operation, and overhaul of ignition and fuel metering systems are emphasized. The use of technical data, applications of operating principles, parts modifications, and airworthiness decisions are stressed. Typically offered Fall Spring.

AT 36302 - Fundamentals Of Powerplant Systems

Credit Hours: 3.00. This course covers powerplant systems, including fuel metering devices, ignition systems, and propeller and propeller-related systems. Students learn to use the special tools required for these systems, and the processes for inspection, repair, and overhaul. Airworthiness evaluation and determination is stressed, as are testing and fault diagnosis procedures. The properties and operating characteristics of aircraft fuels are also covered. Typically offered Fall Spring Summer.

AT 36500 - Instrument Flight Instructor Flight

Credit Hours: 1.00. Flight and ground training in preparation for the Instrument Flight Instructor Flight Test is given. Instructional techniques are demonstrated and practiced by the student. Analysis of maneuvers and common student errors also included. FAA Flight Instructor Airplane Pilot Certificate and Flight Instructor Instrument written exam passed. Permission of department required. Typically offered Fall Spring Summer.

AT 36600 - Multi-Engine Flight Instructor Flight

Credit Hours: 1.00. Flight and ground training in preparation for the Flight Instructor Multi-engine Flight Test is given. Instructional techniques are demonstrated and practiced by the student. Analysis of maneuvers and common student errors also included. FAA Flight Instructor Airplane, Instrument Airplane, Commercial Pilot Certificate with Airplane Multi-engine Land Rating, 15 hours pilot in-command in multi-engine airplanes. Permission of department required. Typically offered Fall Spring Summer.

AT 36700 - Light Sport Aircraft Glider Instructor

Credit Hours: 2.00. This course provides flight and ground instruction in preparation for the Light Sport Aircraft Glider Instructor endorsement. Emphasis is placed on glider education, glider transition course development, and safe operation of the Light Sport Aircraft Glider category aircraft. Typically offered Fall Spring Summer.

AT 36800 - Aerobatic Flight

Credit Hours: 1.00. Course provides instruction in basic aerobatic maneuvers and recovery from unusual attitudes. Students must develop proficiency in the aircraft before beginning aerobatic training. Course also includes classroom discussion of relevant supporting material. FAA Commercial Pilot Certificate with Instrument Airplane Rating required. Permission of department required. Typically offered Fall Spring Summer.

AT 36900 - Air Traffic Control

Credit Hours: 3.00. An introduction to the principles of air traffic control, including tower and enroute separation. Navigation theory as it relates to the ATC system will be explained, as will the theory of operation of ATC radar and computer systems. Typically offered Fall Spring.

AT 37000 - Advanced Aircraft Powerplants

Credit Hours: 3.00. This course consists of the disassembly, visual inspection, cleaning, structural inspection, dimensional inspection, serviceability, reassembly, installation, testing, and preservation of reciprocating aircraft powerplants. Use of technical data, airworthiness evaluations, and laboratory records is stressed. Typically offered Fall Spring.

AT 37002 - Advanced Aircraft Powerplants

Credit Hours: 3.00. This course covers the design, construction, operation, and overhaul practices of aircraft reciprocating and small gas-turbine engines. Airworthiness evaluation, fault-isolation techniques, and standard service and maintenance practices are emphasized. Dimensional and visual inspection and testing of engines following overhaul are stressed, as well. Typically offered Fall Spring Summer.

AT 37100 - Powerplant Propulsion Systems

Credit Hours: 3.00. Theory, design, and operation of propellers and propeller systems are emphasized. Use of technical data, application of operating principles, parts modifications, and airworthiness evaluations are stressed. Typically offered Fall Spring.

AT 37200 - Aircraft Maintenance Practices

Credit Hours: 3.00. An in-depth study of practices and procedures used to ensure that an aircraft is maintained in an airworthy state. Aircraft publications and maintenance methodology are emphasized. Typically offered Fall Spring.

AT 37600 - Aircraft Gas Turbine Engine Technology I

Credit Hours: 3.00. Basic aircraft gas turbine engine theory, nomenclature, component design, turbine engine systems, operation, and fault isolation techniques are emphasized. Turbine engine maintenance, overhaul, operation, and inspection procedures are studied in detail. Typically offered Fall Spring.

AT 38000 - Helicopter Design, Inspection, And Maintenance

Credit Hours: 4.00. The design, construction, and maintenance of type-certificated helicopters. Areas of study include rotary wing aerodynamics, structural components and materials, main and tail rotor systems, rotor blades, primary and secondary controls, and general inspection and maintenance practices. Typically offered Fall Spring.

AT 38100 - Aviation Security

Credit Hours: 3.00. This course introduces the challenges and complexity of aviation security faced by aviation professionals across the industry. It traces the evolution of current security approaches and explores technologies and processes targeting threat mitigation and improved operational efficiency. Typically offered Summer Fall Spring.

AT 38400 - Transport Aircraft Systems And Operations II

Credit Hours: 2.00. Turbojet transport aircraft anti-ice, autoflight, auxiliary power unit, fire protection, oxygen, and fuel systems are studied. Aircraft operations and systems discussed in AT 35500 are also reviewed. Typically offered Summer Fall Spring.

AT 38500 - Design Support Analysis

Credit Hours: 3.00. This course is designed to teach students interested in engineering design, design support, customer support, or aerospace manufacturing, the elements of product support and the analysis of design as related to the manufacturability, maintainability, and supportability of aerospace products. The students will be expected to complete a life cycle cost analysis and logistics plan for a design. Typically offered Summer Fall Spring.

AT 38502 - Design Support Analysis

Credit Hours: 2.00. This course covers the elements of product support and the analysis of design as related to the manufacturability, maintainability, and supportability of aerospace products. The students will be expected to complete a life-cycle cost analysis and logistics plan for a design. Typically offered Fall Spring Summer.

AT 38800 - Large Aircraft Systems

Credit Hours: 3.00. This course introduces transport aircraft limitations, systems, and systems operation. Topics include turbojet aircraft powerplants, flight instruments, electrical power, air-conditioning, pressurization, hydraulic, and flight control systems. Emphasis is aircraft and systems manufacturer's design and operational philosophies. Typically offered Fall Spring Summer.

AT 39300 - Industrial Practice III

Credit Hours: 1.00. Industrial practice and experience in participating industry. Requires written report of the experience. Typically offered Fall Spring Summer.

AT 39400 - Industrial Practice IV

Credit Hours: 1.00. Industrial practice and experience in participating industry. Requires written report of the experience. Typically offered Fall Spring Summer.

AT 39500 - Turbine Aircraft Simulation Laboratory

Credit Hours: 1.00. This course is a laboratory flight experience in a turbine aircraft flight simulator, emphasizing normal and abnormal aircraft operations. Emphasis is on FAA-required flight procedures for certification and safe operation of turbine-powered aircraft. Students seeking a type rating must receive a grade of at least a B- in AT 35300. Permission of department required. Typically offered Fall Spring Summer.

AT 39600 - Turbine Aircraft Flight Laboratory

Credit Hours: 1.00. This course is a laboratory flight experience in a turbine-powered aircraft, emphasizing normal and abnormal aircraft operations. Emphasis is on FAA-required flight procedures for certification and safe operation of turbine-powered aircraft. Permission of department required. Typically offered Fall Spring Summer.

AT 40000 - Aviation Professional Issues

Credit Hours: 1.00. A study of professional issues related to employment in the aviation industry. Topics discussed include attributes of an aviation professional, certification, and career planning. A review of the information and tools necessary for the student's job search is included. Typically offered Fall Spring Summer.

AT 40200 - Aircraft Airworthiness Assurance

Credit Hours: 3.00. Practicum in performing aircraft maintenance and inspection to airworthiness standards for large aircraft, incorporating Quality and Safety Management Systems into maintenance operations, planning and executing maintenance on large aircraft and managing technical teams. Typically offered Fall Spring.

AT 40300 - Airman Certification Procedures

Credit Hours: 1.00. A survey of the procedures for obtaining federal certification as an Aircraft Maintenance Technician. Typically offered Fall Spring.

AT 40400 - Turbojet Copilot Operations

Credit Hours: 1.00. Provides students who are selected to participate in the turbojet copilot program with classroom, simulator, and flight instruction in turbojet systems and operation. Permission of instructor required. Typically offered Fall Spring Summer.

AT 40500 - Turbojet Copilot Practicum I

Credit Hours: 1.00. This course provides students with copilot flight experience in a corporate-type turbojet aircraft. Student copilots gain experience in turbojet systems and operation, high-speed/high altitude ATC procedures, advanced navigation, and high-altitude meteorology. Permission of instructor required. Typically offered Fall Spring Summer.

AT 40800 - Advanced Aircraft Manufacturing Processes

Credit Hours: 3.00. This course introduces students to NC and CAD/CAM applications. Laboratory projects include manual NC program, a CAD/CAM program, and a design/build/test/analysis of an aviation-oriented project working in teams with aeronautical engineering students. Typically offered Fall Spring.

AT 41200 - Aviation Finance

Credit Hours: 3.00. The course will focus on the financial knowledge needed to operate and evaluate aviation businesses. Content will cover the impact of financial decisions on operational outcomes that add/decrease value to an aviation company's bottom line. Case studies will be utilized to demonstrate practical aspects of financial decisions as they relate to organizational performance and profitability. Typically offered Fall Spring Summer.

AT 41600 - Airline Indoctrination

Credit Hours: 2.00. This course provides a forum for investigating contemporary issues facing the airline industry. Case studies are utilized to analyze the many perspectives involved in decision-making and how they affect the stakeholders. Typically offered Fall Spring Summer.

AT 42001 - General Aviation Operations

Credit Hours: 3.00. An overview of corporate and business operations that occur at general aviation fixed-base operations. Emphasis will be placed on financial and operational considerations as well as on regulatory requirements and constraints. Typically offered Fall Spring Summer.

AT 42101 - Managerial Economics In Aviation

Credit Hours: 3.00. This course explores the process of making managerial decisions based on modern economic principles and concepts, and provides the student with a set of tools that can be used to make those decisions. Marginal analysis, forecasting, and cost analysis concepts are introduced, as are game-theoretic and probabilistic decision-making models. Bargaining strategies and linear programming tools are covered, as well. Typically offered Fall Spring Summer.

AT 42700 - Transport Aircraft Maintenance Practices

Credit Hours: 1.00. This course provides the student with experience performing inspection and maintenance practices on transport category aircraft. Typically offered Fall Spring Summer.

AT 43300 - Supervised Aviation Experience

Credit Hours: 1.00 to 3.00. Supervised aviation experience directed toward providing orientation, background, and insight into flight or ground operations. Permission of department required. Typically offered Fall Spring Summer.

AT 43400 - Supervised Flight Instructional Experience

Credit Hours: 1.00 to 3.00. Supervised internship experience as a flight instructor. Permission of department required. Typically offered Fall Spring Summer.

AT 43500 - Supervised Instructional Experience

Credit Hours: 1.00 to 4.00. This course provides students with experience as instructors in an aviation classroom or laboratory environment under the supervision of faculty. In addition to the supervisory skills gained, students will become knowledgeable in task planning and communication techniques. Permission of department required. Typically offered Fall Spring.

AT 43700 - Airline Maintenance Management

Credit Hours: 3.00. An orientation to basic business disciplines for the airline maintenance industry. Documentation development and control, work scheduling, and reliability analysis are stressed. Basic statistical reliability control techniques will be applied and the results analyzed. A 10-hour practicum involving aircraft maintenance activities is a required part of this course. Typically offered Fall Spring.

AT 43800 - Airline Operations

Credit Hours: 3.00. Students in this course study airline operations in depth. Topics include marketing, route analysis, aircraft selection, financial analysis, federal regulations, and scheduling. Currently industry problems are discussed as well. Typically offered Fall Spring Summer.

AT 44000 - Turbojet Flight Engineer Procedures Laboratory I

Credit Hours: 1.00. This is an introduction into normal, irregular, and emergency procedures in a transport aircraft, with emphasis on flight engineer duties. Permission of department required. Typically offered Fall Spring Summer.

AT 44100 - Turbojet Flight Engineer Procedures Laboratory II

Credit Hours: 1.00. This course reviews normal, irregular, and emergency procedures in preparation for the FAA turbojet flight engineer oral and practical examinations. Typically offered Fall Spring Summer.

AT 44200 - Turbojet Flight Engine Procedures Laboratory III

Credit Hours: 1.00. Turbojet Flight Engine Procedures Laboratory III. Permission of department required. Typically offered Fall Spring Summer.

AT 44500 - Aircraft Electronics

Credit Hours: 4.00. A study of the computer-based electronic systems used to control both flight and engine parameters on modern aircraft. The course examines the various systems with an emphasis on how each component integrates into the electronic structure of the aircraft. Typically offered Fall Spring.

AT 44502 - Aircraft Electronics

Credit Hours: 3.00. A study of the computer-based electronic systems used to control both flight and engine parameters on modern aircraft. The course examines the various systems with an emphasis on how each component integrates into the electronic structure of the aircraft. Typically offered Fall Spring Summer.

AT 44700 - Advanced Aircraft Electronics

Credit Hours: 3.00. Line maintenance techniques for the various computer-based airframe and powerplant electronic systems are studied. The course emphasizes return-to-service repair of the system with troubleshooting techniques taught to a component level. Typically offered Fall Spring.

AT 44900 - Airline Transport Lectures

Credit Hours: 2.00. Review of appropriate regulations and radio, navigational, meteorological, and operations principles and procedures applicable to airline transport piloting. Permission of department required. Typically offered Fall Spring Summer.

AT 45000 - Airline Transport Flight

Credit Hours: 1.00. Course provides flight and academic preparation for the airline transport pilot certificate flight check. Applicant must have successfully completed the Airline Transport Pilot written examination meet federal aviation regulation requirements for the flight check. Permission of department required. Typically offered Fall Spring Summer.

AT 45100 - Airport Operations

Credit Hours: 3.00. This course is an in-depth examination of airport operations for air carrier and general aviation airports, with a strong emphasis on practical problem solving of current operational issues facing local and area airports. Typically offered Summer Fall Spring.

AT 45200 - Aviation Global Experience Seminar

Credit Hours: 1.00. This course prepares students for faculty-led study trips and similar international experiences for which direct course credit is not available. Typically offered Fall Spring Summer.

AT 45300 - Aviation Global Experience

Credit Hours: 0.00 to 3.00. Supervised international study experience for AT students for which direct course credit not available. Specific objectives, requirements, and credit determined by the Aviation Technology department. Typically offered Fall Spring Summer.

AT 45400 - Human Factors In Aviation

Credit Hours: 3.00. Students investigate the disciplines known as human factors and ergonomics and how they apply to various aviation career areas from a management perspective. Common industry models and error management strategies will be studied and evaluated. Typically offered Fall Spring.

AT 45500 - Introduction To Data Acquisition

Credit Hours: 3.00. This course explores fundamental concepts of data acquisition and provides the student with an understanding of the implementation of those concepts through theoretical development and practical application. Analog-to-digital conversion, electrical measurements, signal conditioning, and physical parameter measurements are introduced. The course culminates with a project that encapsulates the core concepts of data acquisition. Typically offered Fall Spring Summer.

AT 45900 - Airport Manager Certification

Credit Hours: 3.00. This course prepares students for the certified manager exam offered by the American Association of Airport

Executives (AAAE). This certificate is the first step toward industry accreditation as an airport manager and director. Typically offered Spring.

AT 46200 - Occupational Certification And Licensure

Credit Hours: 1.00 to 15.00. Industrial, technical, and professional experience will be evaluated, and a maximum of 18 hours of credit may be granted. After evaluation and possible examination by the faculty, credit may be granted based upon the type and number of ratings and certifications held by the applicant. Credit may only be utilized to fulfill aviation technology selective and elective course requirements. Typically offered Fall Spring Summer.

AT 46500 - Transport Aircraft Operations Lecture III

Credit Hours: 1.00. Instrument flight techniques, trouble-shooting, emergency procedures, advanced maneuvers, and systems operations in transport aircraft in preparation for AT 46700. Typically offered Fall Spring Summer.

AT 46600 - Transport Aircraft Operations Lecture IV

Credit Hours: 1.00. This is a continuation of AT 46500, which emphasizes line-oriented flight training (LOFT) in aircraft equipped with electronic flight instrumentation systems, satellite navigation, and flight management systems. Typically offered Fall Spring Summer.

AT 46700 - Transport Aircraft Operations Lab III

Credit Hours: 1.00. This lab provides a practical application of instrument flight techniques in a flight training device or transport category flight simulator having electronic flight instrumentation systems, satellite navigation, and flight management systems. Typically offered Fall Spring Summer.

AT 46800 - Transport Aircraft Operations Lab IV

Credit Hours: 1.00. Unique flight scenarios emphasizing line-oriented flight training (LOFT) and crew operations in aircraft equipped with electronic flight instrumentation systems, satellite navigation, and flight management systems will be encountered. Typically offered Fall Spring Summer.

AT 46900 - Airline Copilot Operations

Credit Hours: 2.00. This is an intensive training experience emphasizing systems management and line-oriented flight training (LOFT) in a transport category flight simulator. Students may be required to pass an FAA checkride. Permission of instructor required. Typically offered Fall Spring Summer.

AT 47000 - Aircraft Powerplant Research And Technology

Credit Hours: 0.00 to 18.00. Aircraft powerplant research and test data analysis, including advanced engine operations, instrumentation, propulsion system design, and the design and analysis of computer data acquisition systems for aircraft powerplants are studied. Typically offered Fall Spring Summer.

AT 47200 - Advanced Composite Technology

Credit Hours: 3.00. Students will perform a variety of fabrication, testing, and repair tasks using specialized composite fibers, matrices, and core materials. Typically offered Fall Spring.

AT 47500 - Aviation Law

Credit Hours: 3.00. A study of the fundamental legal and aviation law principles as they apply to the various participants in the aviation industry. Special emphasis is placed on contemporary aviation law issues such as pilot, flight instructor, and mechanic liability; product liability; and aviation insurance. Typically offered Fall Spring.

AT 47600 - Aircraft Gas Turbine Engine Technology II

Credit Hours: 3.00. This is a study of turbofan engines and systems. Engine installation, testing, and operational procedures are stressed. Emphasis is placed on performance evaluation, data calculations, and predictions of operational properties. Turbofan design theory, operational efficiencies, and fault isolation are discussed. Typically offered Fall Spring.

AT 47700 - Aircraft Maintenance Practicum

Credit Hours: 1.00. This course provides the knowledge, information and experience required for aviation professionals to interact safely in a general aviation environment. Typically offered Fall Spring Summer.

AT 47800 - Advanced Nondestructive Testing

Credit Hours: 3.00. A study of advanced magnetic particle, liquid penetrant, and eddy current testing, and evaluation theory and indication interpretation. Instruction in ultrasonic testing emphasizes the performance of ultrasonic testing techniques. Instruction in radiographic inspection requires students to make radiographic exposures, process film, and interpret radiographs. Typically offered Fall Spring.

AT 47900 - Control Tower Operator

Credit Hours: 3.00. This course includes a review of air traffic control procedures, federal aviation regulations, and aviation weather observation and reporting. It is designed to prepare students to pass the FAA Control Tower Operators Examination. Typically offered Spring.

AT 48100 - Aviation Safety Problems

Credit Hours: 3.00. This course provides the opportunity for students to study problems associated with aviation safety. Particular attention will be given to the formulation of specific recommendations for improvements in aviation safety. Typically offered Fall Spring.

AT 48200 - Advanced Composite Tooling Technology

Credit Hours: 3.00. Students will study the theory, design, fabrication, and testing of tooling for open and closed molding operations. Students will construct a tool by fabricating a master model, a master mold, and a laminated mold. The tooling process will include fabrication, mold testing, and mold repair. Typically offered Fall Spring.

AT 48500 - Corporate Operations Lecture I

Credit Hours: 2.00. An examination of the evolution of, and justification for, corporate aviation. Discussion of issues related to personnel management, financial management, and equipment acquisition and operation within a corporate flight operation. High performance flight planning and navigation, hazardous materials handling, and security will also be discussed. Typically offered Fall Spring.

AT 48600 - Corporate Operations Lecture II

Credit Hours: 2.00. A discussion of drug testing regulations and company procedures, operating manuals (company operations manual, MEL's, performance charts, airport analysis); further discussion of the management of the corporate flight department. Typically offered Fall Spring.

AT 48700 - Transport Aircraft Simulation Laboratory

Credit Hours: 2.0. This is a laboratory course conducted in a turbine-type aircraft simulator. This course emphasizes normal instrument and aircraft procedures as well as aircraft systems and cockpit resource management. Permission of department required. Typically offered Fall Spring Summer.

AT 48800 - Flight Testing

Credit Hours: 1.00. This course presents experimental methods for determining aircraft performance and flight qualities. Case studies utilizing either a flight training device or aircraft are assigned for data collection and analysis. Permission of department required. Typically offered Summer Fall Spring.

AT 49000 - Aviation Project

Credit Hours: 1.00 to 4.00. Independent study for junior and senior students who wish to pursue study and developmental work in special areas. Subject matter must be arranged with the instructor before enrolling in the course. Permission of instructor required. Typically offered Spring Summer Fall.

AT 49300 - Industrial Practice V

Credit Hours: 1.00. Industrial practice and experience in participating industry. Requires written report of the experience. Typically offered Fall Spring Summer.

AT 49600 - Applied Research Proposal

Credit Hours: 1.00. Students will study all aspects of performing a product or process design review and life-cycle management analysis. Topics include reliability, supportability, life cycle management, and performance analysis. Each student will select their capstone research area and development a proposal for conducting a product or process analysis for their applied research project. Typically offered Summer Fall Spring.

AT 49700 - Applied Research Project

Credit Hours: 3.00. This capstone course requires students to conduct an in-depth product or process evaluation. The evaluation

includes analyzing product or process performance against design criteria to complete their applied research project. Typically offered Summer Fall Spring.

AT 49800 - Aviation Technology Capstone

Credit Hours: 3.00. The Aviation Technology Capstone course encourages teamwork in small groups on a substantial project. The intent of this course is to provide a capstone experience that integrates the material and previous experience of the student's curriculum. It also provides an opportunity for students to recognize and evaluate the interrelationship of their general education courses with the courses taken for their major. Typically offered Fall Spring Summer.

AT 49900 - Aviation Technology

Credit Hours: 1.00 to 4.00. Hours, credit, and subject matter to be arranged by staff. Permission of department required. Typically offered Fall Spring Summer.

AT 50500 - Research Methods In Aviation

Credit Hours: 3.00. This course explores the practical approach to research as it applies to identifying and exploring pragmatic problems in aviation industry settings. Industry based problems and issues often require a diversity of research skills, both quantitative and qualitative, in order to effectively address dynamic problems in complex and often high-risk work environments. This course offers an overview of mixed research methods which lends itself well to practical problem solving in industry. This course may also be offered in an online format. Permission of instructor required. Typically offered Fall Spring Summer.

AT 50600 - MS Capstone Research Project

Credit Hours: 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of instructor required. Typically offered Summer Fall Spring.

AT 50800 - Quality And Productivity In Industry And Technology

Credit Hours: 3.00. (IT 50800) Examines the contemporary issues of continuous improvement in quality and productivity in manufacturing and service industries. Includes a close examination of the evolving philosophies bearing on the scope, improvement, and costs of quality assurance programs in industry and technology. Typically offered Summer Fall Spring.

AT 52000 - Operational Assessment And Improvement

Credit Hours: 3.00. This course focuses on developing the skills to analyze, formulate, and apply techniques for work task improvement. Concepts to be studied include workflow enhancement, critical element streamlining, and value added analysis. Students will explore process map construction, process ownership, measurement system validation, standards creation, and decision factors. An industry project will be assigned and used to facilitate course objectives. Permission of instructor required. Typically offered Fall.

AT 52100 - Resource Analysis And Optimization

Credit Hours: 3.00. This course provides the student with insight to develop and apply business models that adjust and adapt to the changing climate of daily operations in support of aviation customers and product movement. The course uses a combination of lecture and group discussion, as well as project activity to address resource analysis topics, such as queuing fundamentals, swarm theory, and forecasting models. Permission of instructor required. Typically offered Spring.

AT 52400 - Managerial Economic Decision Making

Credit Hours: 3.00. This course explores managerial decision making, using economic and strategic impacts of new technology and transformation methodologies on the enterprise system. Management planning and decision making, process costing and allocation, operational control, management control, activity-based costing, and multi-attribute decision-making models are covered. Theory of constraints and lean implementations in aviation are studied to understand the short and long-term effects on financial measures. Typically offered Fall Spring Summer.

AT 52500 - Process Improvement And Simulation

Credit Hours: 3.00. This course explores process modeling and simulation as applied to decision-making for process design and improvement. Emphasis is placed on understanding the application of process simulations to business problems including using fundamental statistical methods in the solution of an industry relevant problem. By planning and executing a computer-based simulation supporting an aviation or aerospace process design and improvement project, students improve analysis and project management skills. In addition to simulation, preparing visualizations of the process is also included for increased understanding of process interactions. Tyically offered Fall Spring Summer.

AT 52600 - Aviation Leadership

Credit Hours: 3.00. This course is intended for future aviation and aerospace managers. Using foundational readings, case studies, and critical analysis techniques, the contribution of past and contemporary aviation leaders will be reviewed. This course is designed for online delivery. Typically offered Fall Spring Summer.

AT 52800 - Management And Design Of Training Systems

Credit Hours: 3.00. This course will examine the practical applications of managing the training process in industry and educational settings, including the development of instructional materials from an adult learner perspective. Curriculum design using various forms of media and delivery strategies will be emphasized. This course may also be delivered in an online format. Permission of department required. Typically offered Fall Spring Summer.

AT 53000 - Multi-Cultural Issues In Team Operations

Credit Hours: 3.00. This course explores the nature and origins of professional, national, and organizational culture and their role in multi-disciplinary team activities. Power distance, individualism/collectivism, gender differences, and uncertainty avoidance are examined in terms of research by Hofstede. Management studies of several international air carriers will be utilized to highlight how cultural differences can affect perceptions. Permission of department required. Typically offered Spring.

AT 53100 - International Civil Aviation Regulatory Systems

Credit Hours: 3.00. This course provides extensive multi-modal transportation security experience. Students will receive detailed information on air, maritime, rail, mass transit, trucking and oil pipeline security programs, as well as applicable threat mitigation processes. Completion of an undergraduate course in either aviation law or aviation security is recommended. This course may be applicable to undergraduates with appropriate experience and background in aviation or other transportation systems. There are no citizenship or security clearance requirements for this course. Typically offered Fall.

AT 53200 - Contemporary Issues In Transportation Security

Credit Hours: 3.00. This course provides extensive multi-modal transportation security experience. Students will receive detailed information on air, maritime, rail, mass transit, trucking and oil pipeline security programs, as well as applicable threat mitigation processes. Completion of an undergraduate course in either aviation law or aviation security is recommended. This course may be applicable to undergraduates with appropriate experience and background in aviation or other transportation systems. There are no citizenship or security clearance requirements for this course. Typically offered Spring.

AT 54000 - Aviation And Aerospace Sustainability

Credit Hours: 3.00. This course explores sustainability as applied to aviation and aerospace industries and agencies, both in the private sector and public sector. Students improve analysis skills, and knowledge of the reasoning and application of sustainability. Emphasis is placed on understanding the global and national policies that lead to the regulations and practices in aviation and aerospace. Using a balanced scorecard and a triple bottom line approach, students will develop a project using aviation and aerospace publications to analyze an industry-relevant project using sustainability in the analysis. Typically offered Fall Spring Summer.

AT 54200 - Aviation Fuels And Exhaust Emissions

Credit Hours: 3.00. This course focuses on aviation fuels, including engine operation with fuel, combustion principles, chemistry, exhaust emissions, and fuel testing procedures. Additionally, the topics of greenhouse gases, global warming, oil reserves, fuel costs, and other factors driving the development of alternative aviation fuels will be covered. Current research in these areas will be discussed and testing procedures will be studied. Students will research new fuels in development, and will analyze the sustainability and potential for success promised by the new technologies in comparison with existing fuels. Typically offered Fall Spring Summer.

AT 54400 - Aircraft Lifecycle Management Innovations

Credit Hours: 3.00. This course explores sustainability as applied to aviation and aerospace industries and agencies, both in the private sector and public sector. Students improve analysis skills, and knowledge of the reasoning and application of sustainability. Emphasis is placed on understanding the global and national policies that lead to the regulations and practices in aviation and aerospace. Using a balanced scorecard and a triple bottom line approach, students will develop a project using aviation and aerospace publications to analyze an industry-relevant project using sustainability in the analysis. Typically offered Fall Spring Summer.

AT 54600 - Aviation Financial Instruments And Operations

Credit Hours: 3.00. The course concentrates on increasing the understanding of financial expertise in analyzing trading and hedging programs for application in reducing aviation operational risk exposure. The studies include research into the development and use of operational indexes and their possible relation to hedging with commodity and security instruments. Emphasis will be placed on the understanding of current operational measurements and correlations to trading and hedging financial instruments in providing improved risk management in operational environments. Typically offered Fall Spring Summer.

AT 55000 - Critical Systems Thinking

Credit Hours: 3.00. This course explores the application of critical systems thinking to complex problems. Using systems theory and case studies developed by technology visionaries, students will investigate alternative solutions to difficult industrial problems with global impact. Outcomes for this course include written assignments, oral presentations, and a final project that addresses a major industrial problem. Typically offered Fall Spring Summer.

AT 55100 - Graduate Aviation Research Seminar

Credit Hours: 1.00. This course provides graduate students with an opportunity to present and develop ongoing research activity

in a seminar setting. Individual student research designs, report/thesis structures, and project issues are developed in open forum. Permission of instructor required. Typically offered Fall Spring.

AT 57200 - Human Error And Safety

Credit Hours: 3.00. Explores the definition and nature of human error, error chains, and causal factors in error generation. Error taxonomies are reviewed in order to provide a classification scheme for grouping errors and assessing error criticality. Methods for assessing risk and predicting error generation potentials are learned, as well as strategies for controlling or eliminating errors. Case studies are utilized throughout the course to illustrate course concepts. Permission of instructor required. Typically offered Fall Spring.

AT 57300 - Managing The Risk Of Organizational Accidents

Credit Hours: 3.00. Examines strategies various industries use to assess the risk of organizational accidents and to develop safety management programs to prevent, capture, and recover from conditions that lead to disastrous outcomes. Strategies such as High Reliability Organizations, Operational Risk Management, Behavioral Based Safety, Tripod Delta, and Safety Cultures are explored as successful methods for improving organizational safety in high-risk environments and endeavors. Permission of instructor required. Typically offered Fall Spring Summer.

AT 57400 - Exploratory Studies In Aviation Human Factors

Credit Hours: 3.00. Exploration of contemporary issues and research related to human factors theory and program strategies as they relate to the aviation industry. The course ventures beyond ergonomic issues into more diverse human factors considerations, while discussing an industry-wide and organizational perspective. The course utilizes a combination of lecture, group discussion, and independent study into issues relevant to student interests and career goals. . Permission of instructor required. Typically offered Fall Spring.

AT 57500 - Aviation Safety Program Development

Credit Hours: 3.00. The goals of this course are to create a working safety office that allows students to work as a safety officer reacting to real-life aviation safety problems. In so doing, students will achieve the following objectives and will be able to: (1) describe the regulatory and risk environment in which airline safety offices exist; (2) describe safety theories and models; (3) describe human factors and accident causation; (4) collect and analyze safety related data; (5) prepare documentations for references and trainings; (6) manage an airline safety office and implement safety precedents; (7) process and disseminate information related to accident prevention and risk minimization; (8) audit safety plans for air careers, airports, or FBOs. Permission of instructor required. Typically offered Fall Spring Summer.

AT 58100 - Workshop In Aviation Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Summer Fall Spring.

AT 59000 - Special Problems In Aviation Technology

Credit Hours: 1.00 to 6.00. Independent study of a special problem under the guidance of a member of the staff. Does not substitute for either M.S. thesis or M.S. project credit. Permission of instructor required. Typically offered Summer Fall Spring.

AT 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Bands

BAND 11000 - Marching Band

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Mandatory participation required in Marching Band Workshop one week prior to start of fall classes which conflicts with Boilermaker Gold Rush. Workshop covers similar orientation to Gold Rush. Do enroll in BAND 11000 during summer registration prior to the workship and audition process. Typically offered Fall Spring.

BAND 11100 - Symphony Orchestra

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Typically offered Fall Spring.

BAND 11200 - American Music Review

Credit Hours: 2.00. Singers and pianists only. American Music Review is a jazz big band plus 4-5 singers open through audition. Additional lab and activity fees involved. Typically offered Fall Spring.

BAND 11300 - Jazz Ensemble

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Permission of instructor required. Typically offered Fall Spring.

BAND 11400 - Basic Jazz

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Typically offered Fall Spring.

BAND 11500 - String Orchestra

Credit Hours: 2.00. The rehearsal, study, and performance of string orchestra music from the classical, romantic and contemporary areas of composition. Typically offered Fall Spring.

BAND 11600 - Symphonic Band

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Typically offered Fall Spring.

BAND 11700 - Concert Band

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Typically offered Fall Spring.

BAND 11800 - Collegiate Band

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Typically offered Spring.

BAND 11900 - Varsity Band

Credit Hours: 2.00. Open through audition. Additional lab and activity fees involved. Typically offered Spring.

BAND 12000 - Applied Music Studies

Credit Hours: 1.00. Private study on individual wind, string, and percussion instruments. Additional fees involved. Permission of instructor required. Typically offered Fall Spring.

BAND 12100 - Symphony Orchestra

Credit Hours: 2.00. Symphony Orchestra. Typically offered Fall Spring.

BAND 12200 - American Music Review

Credit Hours: 2.00. American Music Review. Typically offered Fall Spring.

BAND 33000 - Summer Concert Bands

Credit Hours: 2.00. Continuation of BAND 32000. Typically offered Summer.

BAND 33100 - Summer Jazz Bands

Credit Hours: 2.00. Continuation of BAND 33000. Typically offered Summer.

BAND 34000 - Renaissance Ensemble

Credit Hours: 2.00. A survey of renaissance and baroque ensemble literature to be played on appropriate instruments. Reproductions of renaissance and baoque wind, stringed, and brass instruments are available for use in the Department of Bands. Typically offered Fall Spring Summer.

BAND 34100 - Renaissance Ensemble

Credit Hours: 2.00. A survey of renaissance and baroque ensemble literature to be played on appropriate instruments. Reproductions of renaissance and baoque wind, stringed, and brass instruments are available for use in the Department of Bands. Typically offered Fall Spring Summer.

BAND 35000 - Wind Ensemble I

Credit Hours: 2.00. The University Wind Ensemble is an organization composed of 42 instrumentalists selected by audition from staff, graduate students, and symphony band members. Concentrating on the rehearsal and performance of contemporary wind music of a highly virtuoso and concertante nature, it offers its members extensive opportunities to rehearse and study works of considerable difficulty from the contemporary area of composition as well as some aspects of the baroque and classical fields. This organization meets once a week throughout the academic year. Permission of instructor required. Typically offered Fall Spring Summer.

BAND 35100 - Instrument Ensemble Colloquium

Credit Hours: 2.00. Instrument Ensemble Colloquium. Typically offered Fall Spring Summer.

BAND 36000 - Wind Ensemble II

Credit Hours: 2.00. The University Wind Ensemble is an organization composed of 42 instrumentalists selected by audition from staff, graduate students, and symphony band members. Concentrating on the rehearsal and performance of contemporary wind music of a highly virtuoso and concertante nature, it offers its members extensive opportunities to rehearse and study works of considerable difficulty from the contemporary area of composition as well as some aspects of the baroque and classical fields. This organization meets once a week throughout the academic year. Typically offered Fall Spring Summer.

BAND 36100 - Instrument Ensemble Colloquium

Credit Hours: 2.00. Instrument Ensemble Colloquium. Typically offered Fall Spring Summer.

BAND 43000 - Summer Concert Bands

Credit Hours: 2.00. Summer Concert Bands. Typically offered Summer.

BAND 43100 - Summer Jazz Bands

Credit Hours: 2.00. Summer Jazz Bands. Typically offered Summer.

BAND 44000 - Renaissance Ensemble

Credit Hours: 2.00. A survey of renaissance and baroque ensemble literature to be played on appropriate instruments. Reproductions of renaissance and baroque wind, stringed, and brass instruments are available for use in the Department of Bands. Typically offered Fall Spring Summer.

BAND 44100 - Renaissance Ensemble

Credit Hours: 2.00. A survey of renaissance and baroque ensemble literature to be played on appropriate instruments. Reproductions of renaissance and baroque wind, stringed, and brass instruments are available for use in the Department of Bands. Typically offered Fall Spring Summer.

BAND 47000 - Wind Ensemble III

Credit Hours: 2.00. The University Wind Ensemble is an organization composed of 42 instrumentalists selected by audition from staff, graduate students, and symphony band members. Concentrating on the rehearsal and performance of contemporary wind music of a highly virtuoso and concertante nature, it offers its members extensive opportunities to rehearse and study works of considerable difficulty from the contemporary area of composition as well as some aspects of the baroque and classical fields. This organization meets once a week throughout the academic year. Typically offered Fall Spring.

BAND 47100 - Ensemble Colloquium

Credit Hours: 2.00. Ensemble Colloquium. Typically offered Fall Spring.

BAND 48000 - Wind Ensemble IV

Credit Hours: 2.00. The University Wind Ensemble is an organization composed of 42 instrumentalists selected by audition from staff, graduate students, and symphony band members. Concentrating on the rehearsal and performance of contemporary wind music of a highly virtuoso and concertante nature, it offers its members extensive opportunities to rehearse and study works of considerable difficulty from the contemporary area of composition as well as some aspects of the baroque and classical fields. This organization meets once a week throughout the academic year. Typically offered Fall Spring.

BAND 48100 - Ensemble Colloquium

Credit Hours: 2.00. Ensemble Colloquium. Typically offered Fall Spring.

Basic Medical Sciences

BMS 11500 - Anatomy For VT-DL

Credit Hours: 1.50. This course is the first of two courses in the distance learning program that presents an introduction to the study of the major body systems and topographic relationships of the major domesticated species, with emphasis on the carnivore. Typically offered Fall Spring.

BMS 11600 - Anatomy II VT-DL

Credit Hours: 1.50. This course is the second of two courses in the distance learning program that presents an introduction to the study of the major body systems and topographic relationships of the major domesticated species, with emphasis on the carnivore. Typically offered Fall Spring Summer.

BMS 13500 - Physiology For VT-DL

Credit Hours: 1.00. This course is the first of two courses in the distance learning program that presents an introduction to general physiology of the mammalian body systems and the general physiological process with emphasis on domestic animals. This course will address the functions of the different systems and homeostasis; the functions of the cell; the different compartments and solute transport; blood and defense; general functions of the nervous system, reflexes and special senses; the function of the nerve and muscle; cardiovascular system; and digestive system. Typically offered Fall Spring Summer.

BMS 13600 - Physiology For Vet Tech II - DL

Credit Hours: 1.00. This course is the second of two courses in the distance learning program that addresses the functions of the kidney and its role in regulation of extracellular volume and acid-base; respiration, mechanics of respiration and its control, transport of gases and hypoxia; physiology of the endocrine system, functions of the gonads, fertilization, pregnancy, parturition and lactation. Typically offered Fall Spring Summer.

BMS 23100 - Anatomy For Veterinary Technicians

Credit Hours: 4.00. Gross and microscopic study of body systems and topographic relationships in major animal species. Laboratory consists of dissection as well as study of living animals. Typically offered Fall.

BMS 23200 - Physiology For Veeterinary Technicians

Credit Hours: 2.00. Basic mammalian physiology, which covers general physiological processes with emphasis on domestic animals. Laboratory experiences and demonstrations form a major part of the laboratory instruction. Typically offered Fall.

BMS 23300 - Introduction To Pharmacology For Veterinary Technicians

Credit Hours: 0.50. This course introduces the concepts and terminology of pharmacology including basic terminology, pharmacokinetics, and pharmacodynamics. Typically offered Spring.

BMS 23400 - Clinical Physiology For Veterinary Technicians

Credit Hours: 1.00. This course will provide the physiological basis for clinical functions and medical interventions of the animal. The course is designed to: 1. Complement and expand students' understanding of concepts taught in the general physiology course (BMS 23200); 2. Emphasize how understanding basic physiological concepts can help in solving clinical cases; 3. Promote critical thinking, team work, communication skills and problem solving. Typically offered Spring.

BMS 23500 - Pharmacology VT-DL

Credit Hours: 1.00. This course is the first of two courses in the distance learning program that presents an introduction to the principles of pharmacy and pharmacology for the veterinary technician. Emphasis will be placed upon key concepts of how drugs work, terminology commonly used with therapeutic agents, important mechanisms and side effects of commonly used veterinary drugs, and dosage calculations. Typically offered Fall Spring Summer.

BMS 23600 - Pharmacology II VT-DL

Credit Hours: 1.00. This course is the second of two courses in the distance learning program that presents an introduction to the principles of therapeutics and pharmacology for the veterinary technician. Emphasis will be placed upon key concepts of how drugs work, terminology commonly used with therapeutic agents, important mechanisms and side effects of commonly used veterinary drugs. Typically offered Fall Spring Summer.

BMS 24100 - Pharmacology For Veterinary Technicians

Credit Hours: 2.00. An introduction to the principles of pharmacy and pharmacology. Emphasis will be placed on pharmaceutical calculations, acquisition of a working vocabulary, classification of drugs, general indications for classes of drugs, and the major types of adverse reactions that may occur. Permission of department required. Typically offered Spring.

BMS 30000 - Physiology Of Domestic Animals

Credit Hours: 3.00. The functions of the various systems and organs of the body will be studied, with emphasis being placed on those most pertinent to domestic animals. Typically offered Spring.

BMS 33100 - Pharmacology For Veterinary Technicians

Credit Hours: 1.50. This course introduces the concepts of drugs used in the different body systems. Mechanisms of action, side effects, and therapeutic applications are presented. Typically offered Fall.

BMS 46400 - Clinical Pharmacology And Toxicology For Veterinary Technologists

Credit Hours: 2.00. The common toxicants and advanced topics on the drugs most commonly encountered in veterinary medicine. Emphasis is on mechanisms, indications, contraindications, and proper applications and handling of these drugs. Permission of department required. Typically offered Spring.

BMS 51000 - Human Anatomy For Biomedical Scientists And Engineers

Credit Hours: 4.00. Introduction to the regional study of the human body (lower limb, upper limb, abdomen, pelvis, thorax, head, and neck). Supplemented by observations and demonstrations of prosected cadaver materials, radiographs, osteology, and surface anatomy. Offered in alternate years. Typically offered Summer.

BMS 51700 - Problems In Basic Medical Sciences

Credit Hours: 0.50 to 8.00. Studies or investigations in the various disciplines of the basic medical sciences of man and domestic animals for advanced undergraduate and beginning graduate students. Permission of instructor required. Typically offered Fall Spring Summer.

BMS 52000 - Systemic Mammalian Physiology

Credit Hours: 3.00. The first of two courses offered to graduate students and advanced undergraduate students. It covers the general physiological processes of mammals with special emphasis on domestic animals. These processes are presented as interactions between large populations of cells, organs, organ systems, and the integrated functions of an entire animal. This

course covers the nervous system, musculoskeletal system, circulatory system, and the regulation of body fluids. Typically offered Fall.

BMS 52100 - Systemic Mammalian Physiology II

Credit Hours: 4.00. Comparative mammalian (domesticated and human) physiology, with emphasis upon principles, concepts, and mechansims of the cardiovascular, respiratory, renal, endocrine, and reproductive systems. Typically offered Spring.

BMS 52400 - Introduction To Confocal Microscopy And Image Analysis

Credit Hours: 1.00. Introduction to the principles of confocal microscopy and rudiments of image analysis. Confocal microscopy can be used in biological and nonbiological systems and is, therefore, an interdisciplinary tool in the modern research laboratory. The three-dimensional reconstruction of images allows discovery of complex structures. Deals with fluorescence excitation and emission, optical design, basic image analysis principles, and application areas for which the technology has been targeted. The student will have a good understanding of the application and use of the technology by the end of the course. Typically offered Spring.

BMS 52500 - Principles Of Neuroanatomy

Credit Hours: 3.00. Provides an introduction to neuroanatomy. Topics cover fundamental aspects of mammalian nervous system structure at gross and microscopic levels. Logical principles of neural circuits and their specificity will be examined by example, and their overall functionality will be explored within the context of respective systems. Offered in alternate years. Typically offered Summer.

BMS 52700 - Practical Laboratory For Confocal Microscopy And Image Analysis

Credit Hours: 1.00. Laboratory will complement lecture course. Students will learn to operate image collections software on two different confocal microscopes. They will learn single-color fluorescence collection and observe dual- and three-color collection. They will perform Z-axis collections and create reconstructed 3-D images, rotations, and displays. They will perform rudimentary image analysis of 2-D images and will learn how to prepare basic fluorescence samples and collect fluorescent images on two different confocal systems. Permission of instructor required. Typically offered Summer.

BMS 52800 - Avian Physiology

Credit Hours: 2.00. (ANSC 53500) A study of the basic principles of physiology and functional anatomy of birds. Topics include the following systems: muscular, nervous, cardiovascular, respiratory, digestive, lymphoid, endocrine, and reproductive. Typically offered Spring.

BMS 59800 - Introduction To Research In Basic Medical Sciences

Credit Hours: 1.00 to 3.00. Introduction to research in pharmacology and physiology under the direction of a member of the departmental graduate faculty. Permission of instructor required. Typically offered Fall Spring Summer.

BMS 60200 - Special Topics In Basic Medical Sciences

Credit Hours: 0.50 to 8.00. Advanced studies of organismic, cellular, and molecular processes in the basic medical sciences of man and domestic animals. Permission of instructor required. Typically offered Fall Spring Summer.

BMS 63100 - Flow Cytometry: Theory

Credit Hours: 2.00. A thorough excursion into the theory of flow cytometry. An understanding of what the technology is, how it operates, and where the applications exist. Covers optical systems, including filters, light excitation and emissions, fluorescent dyes and fluorescent molecules, electronics including detection systems, signal processing, data analysis, and computer applications. A discussion of lasers and other light sources, as well as quality control. Overview of the application areas in medical sciences, biological research, and other possible areas of use. Typically offered Spring.

BMS 63500 - Cell And Tissue Culture: Techniques And Application Module

Credit Hours: 2.00. This intensive laboratory module is designed to provide students from various disciplines (e.g., life science and engineering) with practical, hands-on experiences in the area of cell and tissue culture. Students are taught the principles of culturing cells and tissues in vitro and have the opportunity to apply state-of-the-art culturing techniques to both 2-dimensional and 3-dimensional culture systems. Specific methodologies focus on both qualitative and quantitative analysis of fundamental cell behavior, including proliferation, differentiation, migration, and adhesion. Typically offered Spring.

BMS 69200 - Seminar In Basic Medical Sciences

Credit Hours: 0.00 or 1.00. Oral presentation of assigned or selected topics pertaining to physiology and pharmacology. Typically offered Fall Spring Summer.

BMS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

BMS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

BMS 80100 - Comparative Anatomy I

Credit Hours: 3.50. Mammalian body systems and topographic relationships of carnivores using the canine and feline species as the basic model for dissection. Typically offered Fall Summer.

BMS 80200 - Comparative Anatomy II

Credit Hours: 3.00. Body systems and the topographic relationships of the major domestic species using the basic canine model as the basic model for dissection. Typically offered Spring Summer.

BMS 80300 - Topographical Anatomy Of The Dog And Cat

Credit Hours: 1.00. Consists of seven one-hour lectures and/or discussion periods and seven three-hour laboratory sessions. Course material is based upon clinical conditions of dogs and/or cats that have an anatomical basis or emphasis. Laboratory sessions include topographical anatomy, multimedia learning aids and dissection of the head, neck, viscera, and legs. Typically offered Fall.

BMS 80400 - Topographical Anatomy Of The Horse

Credit Hours: 1.00. Consists of seven one-hour lectures and/or discussion periods and seven two-hour laboratory sessions. Course material is based upon clinical conditions of the horse that have an anatomical basis or emphasis. Laboratory sessions include topographical anatomy, multimedia learning aids and dissection of the head, neck, viscera, and legs. Typically offered Fall.

BMS 80500 - Topographical Anatomy Of Production Animals

Credit Hours: 1.00. Consists of seven one-hour lectures and/or discussion periods and seven three-hour laboratory sessions. Course material is based upon clinical conditions of production animals (pigs, cows, or sheep) that have an anatomical basis or

emphasis. Laboratory sessions include topographical anatomy, multimedia learning aids, and dissection of the head, neck, viscera, and legs. Typically offered Spring.

BMS 80600 - Clinical Anatomy Of Exotic Pets

Credit Hours: 1.00. Consists of seven one-hour lectures and/or discussion periods and seven three-hour laboratory sessions. Course material is based upon clinical conditions of rats, mice, hamsters, guinea pigs, fish, etc., that have an anatomical basis or emphasis. Laboratory sessions include dissection, anatomical models, radiographs, and live animal examination. Typically offered Spring.

BMS 80700 - Principles Of Cell And Tissue Design I

Credit Hours: 3.00. Structural and molecular basis of cellular processes, which are the foundation of fertilization, embryogenesis, histogenesis, and basic tissue specialization in domesticated animals. Structure and function of macromolecules and organelles, which mediate signal transduction and differentiation. The principles and concepts derived are applied to the study of the musculoskeletal, defense, respiratory, and circulatory systems, as models of signal transduction, differentiation, and integration within a whole animal. Typically offered Fall Summer.

BMS 80800 - Principles Of Cell And Tissue Design II

Credit Hours: 3.00. Continuation of BMS 80700. Structural and molecular basis of cellular processes that are the foundation of fertilization, embryogenesis, histogenesis, and basic tissue specialization in domesticated animals. Structure and function of macromolecules and organelles that mediate signal transduction, differentiation, and integration within a whole animal. Typically offered Spring Summer.

BMS 81100 - Systemic Mammalian Physiology I

Credit Hours: 3.00. General physiological processes of mammals with special emphasis on domestic animals; normal interactions between large populations of cells, organs, organ systems, and integrated functions of an entire animal. Homeostatic mechanisms, physiology of body fluids and blood formed elements, muscle, and digestive systems. Typically offered Fall Summer.

BMS 81200 - Systemic Mammalian Physiology II

Credit Hours: 4.00. Comparative mammalian (domesticated and human) physiology, with emphasis upon principles, concepts, and mechanisms of the cardiovascular, respiratory, renal, endocrine, and reproductive systems. Typically offered Spring Summer.

BMS 81300 - Principles Of Pharmacology

Credit Hours: 1.50. Introduction to pharmacokinetics and pharmacodynamics, ethical dimensions of drug use in veterinary medicine, and drug categories that integrate well with other first-year subjects (e.g., drugs that alter endocrine/reproductive function). Emphasis is placed on general principles and prototypical drugs. Typically offered Spring Summer.

BMS 81400 - Basic And Applied Pharmacology I

Credit Hours: 3.00. BMS 81400 follows BMS 81300 and includes the study of drugs with actions related to the nervous system and the immune system at large, anticancer drugs, antiviral drugs, and drugs targeted to organ specific pathologies - e.g. cardiac, intestinal, pulmonary, and renal pathologies. Typically offered Fall Summer.

BMS 81500 - Veterinary Neuroscience

Credit Hours: 2.00. Provides an introduction to neuroscience and its diagnostic application in veterinary medicine. Students will acquire terminology describing the anatomy and basic physiology that characterize neural systems. Integration of function/structure relationships are introduced in lectures, laboratories, by reference to case studies, and by problem solving. Typically offered Fall Summer.

BMS 81800 - Basic And Applied Pharmacology II And Principles Of Toxicology

Credit Hours: 2.00. A continuation of BMS 81400. Includes the study of drugs with actions related to the nervous system, and chemotherapeutic agents (including antibacterial, antifungal, and antiparasitic drugs). Principles of toxicology are introduced. Typically offered Spring Summer.

BMS 81900 - Endocrine And Neural Basis Of Seasonal Activities Of Birds And Mammals In The Wild

Credit Hours: 1.00. This one-credit elective course will be offered to first and second year veterinary students annually (third year students may also take it). The course will explore the physiological basis of seasonal activities of mammals and birds in the wild. An emphasis will be placed on the neural and endocrine changes that are associated with the seasonal and cyclical activities including breeding, hibernation, migration, etc. Typically offered Spring Summer.

Biochemistry

BCHM 10000 - Introduction To Biochemistry

Credit Hours: 2.00. A survey of modern biochemistry using case studies that highlight general theories and unifying concepts. This course is open to all students and does not require any college science courses as background or prerequisite. Typically offered Fall.

BCHM 22100 - Analytical Biochemistry

Credit Hours: 3.00. Discussion of qualitative and quantitative analysis of biological compounds including pH measurement and control, spectrophotometry, measurement of radioactivity; theoretical basis of various separation techniques, including chromatography and electrophoresis; application of these methods to separation and analysis of biological compounds. Laboratory sessions will provide practical experience in the use of these methods. This course is designed for biochemistry majors. Typically offered Fall Spring.

BCHM 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first and second-year students. Courses offered must be approved by departmental faculty and College of Agriculture Honors Committee. Restriction: Enrollment in an honors program. Permission of instructor required. Typically offered Fall Spring.

BCHM 29000 - Experimental Design Seminar

Credit Hours: 2.00. Introduction to fundamentals of scientific principles and practice in biochemistry. Students will learn how to develop hypotheses, design experiments, and critically analyze results to create new knowledge. Intended for sophomores. Typically offered Spring.

BCHM 29800 - Introduction To Biochemistry Research

Credit Hours: 1.00 or 2.00. Supervised individual research. This course is intended to provide an introduction to independent undergraduate research. The primary goal of this experience is to learn the mechanics of laboratory science. Students will learn to work in a real laboratory situation where experiments are not preassembled for them. Students will record their data in laboratory notebooks, and gain experience in trouble-shooting and critically analyzing the results of their experiments. Permission of instructor required. Typically offered Fall Spring Summer.

BCHM 29801 - Head Start To Introductory Biochemistry Research

Credit Hours: 0.50 to 1.00. Supervised individual research. Weeks 9-16. This course is intended to provide a brief introduction to independent undergraduate research. Students should plan on continuing their research in the same laboratory in the following semester. The primary goal of this course is to gain experience working side-by-side with researchers in a real laboratory setting. Students will begin to learn how to best record their data in laboratory notebooks, and gain experience in trouble-shooting and critically analyzing the results of their experiments. Permission of instructor required. Typically offered Fall Spring.

BCHM 30700 - Biochemistry

Credit Hours: 3.00. Students will have an understanding of the following content areas: structure/function of amino acids, carbohydrates, lipids and nucleic acids; protein structure, function and purification; basic enzymology; replication, transcription and translation; intermediary metabolism including glycolysis, the citric acid cycle, oxidative phosphorylation, photosynthesis. Students will also develop an appreciation for some of the contributions that have been made by biochemistry to society, including improvements to medicine, agriculture, and the economy. Typically offered Fall Spring Summer.

BCHM 30900 - Biochemistry Laboratory

Credit Hours: 1.00. Experiments that introduce methods for analysis and separation of biological molecules and that illustrate the biochemical and metabolic concepts covered in BCHM 30700. Typically offered Fall Spring.

BCHM 32200 - Analytical Biochemistry II

Credit Hours: 2.00. Modern biochemical techniques for the purification and characterization of biological macromolecules, with a focus on proteins and nucleic acids. This is a project-oriented course where students begin by purifying an enzyme by chromatography and then characterizing various aspects of the enzyme and its gene throughout the semester. Emphasis will be placed on quantitative analysis of properties such as enzymatic activity, molecular interactions, and gene expression as well as the principles of designing assays to measure biochemical phenomena. Use of bioinformatics tools and common computer software for data mining and to facilitate data analysis will be integrated. The course will culminate with preparation of a manuscript-style report describing the enzyme/gene characterization. Typically offered Fall Spring.

BCHM 36100 - Molecules

Credit Hours: 3.00. A lecture course that relates biochemistry to organic chemistry. Chemical principles relevant to the assembly and function of macromolecules, the logic of biological free energy conversion, and enzyme catalysis are emphasized, all of which provide a foundation for the study of metabolism. Typically offered Spring.

BCHM 39000 - Professional Development Seminar

Credit Hours: 1.00. The objective of this course is to help biochemistry students with professional development and career planning. Students will learn about career possibilities, interview skills, job search strategies, graduate and professional school applications, resume construction and industrial practices. Intended for juniors. Typically offered Fall.

BCHM 40000 - Biochemistry Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

BCHM 46200 - Metabolism

Credit Hours: 3.00. A lecture course to provide students with a broad and thorough understanding of core metabolic pathways and how they are resulted. Anabolic and catabolic processes of metabolic pathways will be studied at the biochemical, structural, genetic and molecular levels. Students will learn to appreciate how the various metabolic pathways are integrated and how the fundamental metabolic pathways relate to medicine, agriculture and human disease. Typically offered Fall.

BCHM 46300 - Macromolecular Machines

Credit Hours: 3.00. A tour of the cell from the perspective of the macromolecules. This course examines how the three-dimensional structures of biological molecules confer cellular function. Typically offered Fall.

BCHM 46500 - Biochemistry Of Life Processes

Credit Hours: 2.00. Major questions in biochemistry and contemporary approaches to these problems. Material covered in class will primarily be derived from primary literature. Students will continue to develop the skills needed to critically read, evaluate, and assimilate the primary scientific literature. Typically offered Spring.

BCHM 47500 - Honors Course - Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third- and fourth-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

BCHM 49000 - Undergraduate Seminar

Credit Hours: 1.00. Discussion of individual student's research projects peformed in BCHM 49800, BCHM 49900 or BCHM 57200. Preparation of posters and public seminars based upon research results obtained in BCHM 49800, BCHM 49900 or BCHM 57200. Permission of instructor required. Typically offered Spring.

BCHM 49500 - Special Assignments

Credit Hours: 1.00 to 3.00. Special work in biochemistry not included in other courses. Permission of instructor required. Typically offered Fall Spring Summer.

BCHM 49800 - Research In Biochemistry

Credit Hours: 1.00 to 4.00. Supervised individual research. This course is intended to provide the opportunity for in-depth, independent undergraduate research. The students enrolled in this course will learn how to devise hypotheses, design experiments that test their hypotheses, record their data in laboratory notebooks, critically analyze the results of their analyses, and present their findings to others in written form. Permission of instructor required. Typically offered Fall Spring Summer.

BCHM 49801 - Head Start To Biochemistry Research

Credit Hours: 0.50 to 2.00. Supervised individual research. Weeks 9-16. This course is intended to provide a brief research experience in preparation for in-depth, independent undergraduate research the following semester. The students enrolled in this course will begin to learn how to devise hypotheses, design experiments that test their hypotheses, record their data in laboratory notebooks, critically analyze the results of their analyses, and present their findings to others in written form. Permission of instructor required. Typically offered Fall Spring.

BCHM 49900 - Honors Thesis In Biochemistry

Credit Hours: 3.00. This course is intended to provide the opportunity for in-depth, independent undergraduate research. The students enrolled in this course will learn how to devise hypotheses, design experiments that test their hypotheses, record their data in laboratory notebooks, critically analyze the results of their analyses, and present their findings to others in the form of a written thesis. Permission of instructor required. Typically offered Fall Spring Summer.

BCHM 56100 - General Biochemistry I

Credit Hours: 3.00. This course provides upper-division undergraduate and graduate students with basic understanding of

biochemical and structural properties of amino acids, nucleic acids, lipids, and carbohydrates. This course allows students to connect the relationship between structure and function of biomolecules. In addition, students learn to understand enzyme properties, enzyme mechanism of action, and enzyme regulation. Typically offered Fall.

BCHM 56200 - General Biochemistry II

Credit Hours: 3.00. This course provides upper-division undergraduate and graduate students with an understanding of core metabolic pathways. Anabolic and catabolic processes of metabolic pathways are studied. Biochemical and structural knowledge is used to determine how enzymes and coenzymes are needed to regulate and control metabolic pathways. Typically offered Spring.

BCHM 57200 - Advanced Biochemical Techniques

Credit Hours: 3.00. Students are strongly encouraged to consult with the instructor before registering for the course. Modern techniques for the isolation, purification, and characterization of biological macromolecules. Advanced techniques of protein and nucleic acid chemistry. Emphasis will be placed on recombinant DNA technology, including the isolation, cloning, and characterization of genes. Specific projects will be designed to meet individual student interests. Permission of department required. Typically offered Fall.

BCHM 59300 - Chemistry Of Metabolism

Credit Hours: 1.00. The course objective is to provide beginning graduate students with an understanding of the organic chemical basis of metabolic transformations. Pathways are not emphasized, but the chemical principles that govern some of the reactions are emphasized. Special emphasis is placed on carbon-carbon bond formation, nitrogen insertion, and the formation of structures with aromatic rings. Typically offered Fall.

BCHM 59500 - Current Topics In Biochemistry

Credit Hours: 1.00 to 4.00. Critical examination of developments in specialized fields of biochemistry not taught in other courses. Some topics include lecture, lab, directed reading or independent study. Permission of Instructor required. Typically offered Fall Spring Summer.

BCHM 60100 - Critical Analysis Of Biochemical Research Literature I

Credit Hours: 2.00. The objective of this course is to assist students in acquiring the skills needed to read critically, evaluate, and assimilate the primary scientific literature. This objective will be accomplished by instructor-guided discussions of the hypotheses, experimental data, conclusions, and scientific merit of assigned manuscript(s) taken from the fields of biochemistry

and molecular biology. Topics for discussion initially will focus on the structure, organization, review process, and ethical issues related to scientific manuscripts. As the semester progresses, discussions will focus on the hypotheses being tested, quality of the data, and validity of the conclusions. Permission of instructor required. Typically offered Fall.

BCHM 60200 - Critical Analysis Of Biochemical Research Literature II

Credit Hours: 2.00. Builds on the skills developed in BCHM 60100. Students will continue to enhance their analytical skills, and class discussions will be conducted at a more sophisticated level and will go into greater depth. Class discussions will focus more on the analysis and evaluation of current methodologies and hypotheses in the biochemical and molecular biological literature. Students will be evaluated primarily on their preparation and participation in each class discussion. Prerequisite: BCHM 60100. Permission of instructor required. Typically offered Spring.

BCHM 60501 - Macromolecules

Credit Hours: 3.00. This course will provide students with an understanding of the basic principles that underlie the secondary and tertiary structure of proteins and nucleic acids which contribute to their function. It will inform students of current efforts to engineer macromolecules with novel functions. Students will become familiar with methods used to determine the three-dimensional structures of macromolecules, and they will learn to critically evaluate the accuracy of structural models. Special topics in the current literature, including membrane proteins, drug design and ribozymes, will be covered. The class will typically include students from a variety of departments, graduate programs, and scientific backgrounds. The course will be taught primarily from various textbook and from the primary literature. A biochemistry course designated for majors is a prerequisite of the course. Lack of the prerequisite will require approval of the instructor. Permission of Department required. Typically offered Fall.

BCHM 61100 - Chromatin Biology And Chromosome Dynamics

Credit Hours: 2.00. An exploration of current models and recent discoveries in chromatin biology and the relationship between chromatin and gene expression, as well as other aspects of chromosome structure and function. Prerequisites: BCHM 56100 and BCHM 56200 or BCHM 60501. Typically offered Fall.

BCHM 63000 - Analytical Biochemistry

Credit Hours: 2.00. Theoretical and practical aspects of techniques used in the qualitative and quantitative analysis of biological materials. Techniques to be discussed include gas chromatography, combination gas chromatography-mass spectrometry, high speed liquid chromatography, affinity chromatography, electrophoresis, centrifugation, radiochemical procedures, absorption spectroscopy, and fluorescence spectroscopy. Emphasis will be placed on the application of these techniques to the solution of current biochemical problems. Offered in alternate years. Prerequisite: BCHM 56200. Typically offered Fall.

BCHM 64000 - Metabolic Plant Physiology

Credit Hours: 3.00. (AGRY 64000, BIOL 64000, BTNY 64000, HORT 64000) Topics include photosynthesis, respiration, carbohydrate and lipid metabolism, and nitrogen, sulfur, and secondary metabolism. This course is the third in a series of core courses in the Purdue Plant Biology Program graduate curriculum. Prerequisite: BCHM 56100, BCHM 56200; BTNY 55300 or HORT 55300, Prerequisite: BIOL 55100 or HORT 55100. Typically offered Fall.

BCHM 64500 - Biochemistry Of Nucleic Acids

Credit Hours: 1.00. Structure-function relationships in RNA and DNA with emphasis on bacteriophage. Punctuation sequences recognized during transcription and translation; palindromes as substrates for restriction endonucleases and sites of repressor binding. General and site-specific recombination, replication. Molecular cloning in plasmid, cosmid, and phage vectors. Offered in alternate summers. Prerequisite: BCHM 56100 and BCHM 56200. Typically offered Summer.

BCHM 65900 - Structure, Function Of Proteins

Credit Hours: 1.00. A critical treatment of structure-function relationships of proteins. Protein purification, amino acid sequence analysis, chemical modifications of proteins, protein folding, active sites, and protein-protein interactions will be discussed. The ways in which the chemical properties of the individual amino acid side chains influence the structures, chemical properties, and enzymatic reactivities of proteins will be emphasized throughout the course. Prerequisite: BCHM 56100 and BCHM 56200. Typically offered Fall.

BCHM 66000 - Structure, Function Of Nucleic Acids

Credit Hours: 1.00. A critical treatment of structure-function relationships of nucleic acids. Prerequisite: BCHM 56100 or BCHM 56200. Typically offered Fall.

BCHM 66300 - Membranes Structure, Function, Control

Credit Hours: 1.00. A critical introduction to structure and function of biological membranes. Topics include mobilities of membrane constituents, properties of membrane proteins, mechanisms of membrane transport, membrane synthesis and flow, secretion, receptors, and signal transduction. Prerequisite: BCHM 56100 and BCHM 56200. Typically offered Fall.

BCHM 66400 - Bioenergetics

Credit Hours: 2.00. (BIOL 60000) Energy transduction in biological membranes: physical chemical foundations; electron

transfer, proton translocation; and active transport. Atomic structures of integral membrane protein complexes responsible for respiratory, photosynthetic generation of electrochemical potential; ATPase motor, and structure-based mechanisms. A full year of general biochemistry and at least one semester of physical chemistry are strongly recommended before taking this course. Typically offered Fall.

BCHM 66500 - Enzyme Mechanisms

Credit Hours: 1.00. This course will build upon the foundations of BCHM 65900. Topics include mechanisms of binding, catalysis, and inhibition. Examples used are from the literature to discuss biochemical and molecular biological approaches to studying protein function. Prerequisite: BCHM 65900. Typically offered Fall.

BCHM 69000 - Seminar In Biochemistry

Credit Hours: 1.00. Seminary In Biochemistry. Permission of instructor required. Typically offered Fall Spring Summer.

BCHM 69300 - Molecular Mechanisms Of Signal Transduction

Credit Hours: 2.00. The molecular basis for the major intracellular signaling pathways of eukaryotes will be covered. Lectures will emphasize the structure, function, and regulation of key proteins involved in reversible protein phosphorylation, calcium mobilization, phospholipid turnover, cyclic nucleotide metabolism, and transmembrane signaling in response to hormone and growth factors. Prerequisite: BCHM 65900 and BCHM 66300. Typically offered Fall.

BCHM 69500 - Special Topics In Biochemistry

Credit Hours: 1.00 to 4.00. Critical examination of developments in specialized fields of biochemistry. Open to candidates for the Ph.D. degree in biochemistry; others by special permission of the professor in charge. Permission of instructor required. Typically offered Fall Spring.

BCHM 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

BCHM 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Biological Sciences

BIOL 11000 - Fundamentals Of Biology I

Credit Hours: 4.00. This course is designed primarily to provide an introduction to the principles of biology for students in agriculture and health sciences. Principles of biology, focusing on diversity, ecology, evolution, and the development, structure, and function of organisms. Typically offered Summer Fall Spring.

BIOL 11100 - Fundamentals Of Biology II

Credit Hours: 4.00. This course is designed primarily to provide an introduction to the principles of biology for students in agriculture and health sciences. Continuation of BIOL 11000. Principles of biology, focusing on cell structure and function, molecular biology, and genetics. Typically offered Fall Spring.

BIOL 11200 - Fundamentals Of Biology

Credit Hours: 2.00. This course is designed primarily to provide an introduction to the principles of biology for students pursuing a biotechnology minor. BIOL 11200, BIOL 11300 is a two-semester principles of biology sequence that introduces students to the major concepts of the discipline, with emphasis on the experimental and logical basis of the information presented. Biol 11200/BIOL 11300 includes lectures on diversity and evolution, and on the development, structure, and function of organisms, cell structure, cell function, ecology, genetics, biochemistry, and molecular biology. Typically offered Fall.

BIOL 11300 - Fundamentals Of Biology

Credit Hours: 2.00. This course is designed primarily to provide an introduction to the principles of biology for students pursuing a biotechnology minor. BIOL 11200, 11300 is a two-semester principles of biology sequence that introduces students to the major concepts of the discipline, with emphasis on the experimental and logical basis of the information presented. BIOL 11200/11300 includes lectures on diversity and evolution, and on the development, structure, and function of organisms, cell structure, cell function, ecology, genetics, biochemistry, and molecular biology. Typically offered Spring.

BIOL 11500 - Biology Resource Seminar

Credit Hours: 1.00. This course is designed to help integrate new biology students into the Department of Biological Sciences, to help them adjust to university life, and to assist them in developing academic and intellectual survival skills using the medium of introductory Biology courses. The course meets twice a week in groups of 20-25 students. Each section is led by an academic advisor and an undergraduate teaching intern. The class periods have an on-going emphasis on connecting students to one another as resources while learning information, critical thinking skills and problem-solving strategies. Topics include bioethics, time management, available academic resources, biology majors and curricula and career development. Students are exposed to opportunities in undergraduate research, summer internships, the study abroad program, and teaching internships. Throughout the course, students are encouraged to plan their college education rather than merely choose their courses. Permission of department required. Typically offered Fall.

BIOL 12100 - Biology I: Diversity, Ecology, And Behavior

Credit Hours: 2.00. Creates a framework for ordering biology by examining the unity and diversity of life on earth with an emphasis on ecology, genetics, population biology, evolution, and behavior. Typically offered Fall.

BIOL 12200 - Laboratory In Biology I: Diversity, Ecology, And Behavior

Credit Hours: 2.00. Laboratory exercises focusing on the diversity of organisms on earth, the evolutionary mechanisms by which they arose; their ecology, behavior, and genetics. Typically offered Fall.

BIOL 13100 - Biology II: Development, Structure, And Function Of Organisms

Credit Hours: 3.00. Principles of development of plants and animals and the relationship between the structure and function of selected systems of these organisms. Typically offered Spring.

BIOL 13200 - Laboratory In Biology II: Development, Structure, And Function Of Organisms

Credit Hours: 2.00. Descriptive and experimental aspects of early plant and animal development, gross anatomy, histology, and physiology of selected plant and animal systems. Typically offered Spring.

BIOL 13500 - First year Biology Laboratory

Credit Hours: 2.00. Laboratory exercises emphasizing student mastery of basic laboratory skills needed to succeed in the biological sciences; intended for beginning (first-year) biology majors. Typically offered Fall Spring.

BIOL 13600 - Quantitative And Problem Solving Skills

Credit Hours: 1.00. Laboratory exercises emphasizing student mastery of quantitative problem-solving skills needed to succeed in the biological sciences. Intended for beginning (first year) students. Typically offered Fall Spring.

BIOL 13700 - Handling Cells And Tissues, Microscopy

Credit Hours: 1.00. Laboratory exercises emphasizing student mastery handling cells and tissue, and using light microscope needed to succeed in the biological sciences. Intended for beginning (first year) students. Typically offered Fall Spring.

BIOL 13800 - Information And Communication Skills

Credit Hours: 1.00. Laboratory exercises emphasizing student mastery of information and communication skills needed to succeed in the biological sciences. Intended for beginning (first year) students. Typically offered Fall Spring.

BIOL 13900 - Measurements And Basic Solution Chemistry

Credit Hours: 1.00. Laboratory exercises emphasizing student mastery making and recording measurements, as well as, basic solution chemistry needed to succeed in the biological sciences. Intended for beginning (first year) students. Typically offered Fall Spring.

BIOL 14501 - First Year Biology Laboratory With Neuro Research Project

Credit Hours: 2.00. This laboratory course has been designed under the goals of the Center for Authentic Science Practice in Education (CASPiE) which aims to expose students to novel research as a means to teach them laboratory science. This course is designed to engage students in authentic research while acquiring necessary skills and concepts to be successful as a biology major. Our topic is Neuroanatomy of Auditory Pathways. We will begin with a series of skills and knowledge building weeks and then transition into independent research projects that culminate in a public presentation of the data in a poster session. In this course, students will learn the fundamentals in neurobiology as well as use sophisticated analysis and instrumentation to answer a research question. Critical thinking in experimental design as well as interpretation and communication of data will be stressed. The goals for this course are to gain a foundation in basic biological measurements and techniques, hone the analytical skills, appreciate the excitement of scientific discovery, and have fun along the way. Permission of department required. Typically offered Fall.

BIOL 14502 - First Year Biology Laboratory With Micro Research Project

Credit Hours: 2.00. This laboratory course has been designed under the goals of the Center for Authentic Science Practice in Education (CASPiE) which aims to expose students to novel research as a means to teach them laboratory science. The course is designed to engage students in authentic research while acquiring the necessary skills and concepts to be successful as a biology major. Our topic is Bacterial Adaptations to Osmotic Stress. In this course, students will learn the fundamentals in bacterial genetics as well as use sophisticated analysis and instrumentation to answer a research question. Critical thinking in experimental design as well as interpretation and communication of data will be stressed. The goal for this course is to gain a foundation in basic biological measurements and techniques, hone the analytical skills, appreciate the excitement of scientific discovery, and have fun along the way. Permission of department required. Typically offered Spring.

BIOL 14600 - Introduction To Biology

Credit Hours: 3.00. This course is designed to introduce non-majors to basic concepts in biology including hypothesis testing, biomolecules, cell structure and function, molecular biology and evolution. Emphasis will be placed on how these topics relate to human health and disease and to the health of the environment. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Fall.

BIOL 14700 - The Ins And Outs Of The Human Body

Credit Hours: 3.00. This course will provide an overview of the body and discuss various problems that can occur during and after development. We will explore the body when everything works as it should (the ins) and when things do not work (the outs). We will begin with development and work our way through various systems of the body and end with death. During the semester, we will explore the effects of drugs and alcohol on the developing fetus, growth, addictions, mental health topics, cancer, heart problems, blood pressure changes, clues related to death, and many other topics. We will introduce the students to current biological topics and provide some background information on the science related to the topics presented. Our intent is to help the students understand how various treatments and cures bring about a change in the body. In addition, groups will be assigned a topic to research and write a detailed report which will be presented in small group sections. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Spring.

BIOL 19500 - Special Assignments

Arrange Hours and Credit. Reading, discussions, written reports, seminar presentations, and field or laboratory work provided for enrichment in special areas of the biological sciences. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 19700 - Biology Freshman Honors Seminar

Credit Hours: 1.00. Discussion meetings with Freshman Honors students to cover various aspects of freshman biology, research opportunities in biology, and career choices in biology. Open only to students in the Biological Sciences Honors Program. The credit may be used only toward free electives. Permission of department required. Typically offered Summer Fall.

BIOL 20100 - Human Anatomy And Physiology

Credit Hours: 2.00. A survey of normal structure and function of the human organism. The human is treated as an open system with the capacity to transport material, transform energy, and maintain a homeostatic state. The capacities and limitations of the human to cope with changes in the environment are emphasized. All major systems of the human body and their functions are examined in relation to the living organism. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Fall.

BIOL 20200 - Human Anatomy And Physiology

Credit Hours: 2.00. BIOL 20200 is the second semester of a two-semester course that includes two 50-minute lectures designed to give the student a basic understanding of the anatomy, organization and function of the human body. To assist the student in mastering the subject matter, there will be introductory lectures on the basic concepts of biochemistry and cell biology before the major topics of the course are dealt with. These topics include the organization of the human body; muscle and bone; the nervous system (including the special senses); the cardiovascular system, respiration; digestion; metabolism; excretion; fluid, electrolyte, and acid-base balance; the endocrine system; reproduction and genetics. The subject matter will be related to relevant questions of clinical or health-related importance. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Spring.

BIOL 20300 - Human Anatomy And Physiology

Credit Hours: 4.00. A survey of normal structure and function of the human organism. The human is treated as an open system with the capacity to transport material, transform energy, and maintain a homeostatic state. The capacities and limitations of the human to cope with changes in the environment are emphasized. All major systems of the human body and their functions are examined in relation to the living organism. Integrated into the study of the human organism are laboratory exercises that emphasize the essentials of human anatomy and physiology. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Fall.

BIOL 20400 - Human Anatomy And Physiology

Credit Hours: 4.00. Continuation of BIOL 20300. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Spring.

BIOL 20500 - Biology For Elementary School Teachers

Credit Hours: 3.00. Unifying concepts of biology taught with materials appropriate for future elementary school teachers. Does not satisfy requirements for College of Science Majors. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Fall.

BIOL 20600 - Biology For Elementary School Teachers

Credit Hours: 3.00. Continuation of BIOL 20500. Does not satisfy requirements for College of Science Majors. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Spring.

BIOL 21100 - The Social Impact Of The Biological Sciences

Credit Hours: 3.00. An introduction to basic concepts, experimentation, and information found within the biological sciences. Emphasis is placed upon the role of biology within the social framework. Relationships between this discipline and common social problems are explored, including those that deal with conservation ecology. Does not satisfy requirements for College of Science Majors. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Fall Spring Summer.

BIOL 21200 - The Social Impact Of The Biological Sciences

Credit Hours: 3.00. A continuation of BIOL 21100. (It is not necessary for this course to be preceded by BIOL 21100.) Does not satisfy requirements for College of Science Majors. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Fall Spring Summer.

BIOL 22100 - Introduction To Microbiology

Credit Hours: 4.00. The isolation, growth, structure, function, heredity, identification, classification, and ecology of microorganisms; their role in nature; and significance to man. Not available for credit toward graduation for majors in the Department of Biological Sciences. Typically offered Fall Spring. CTL: Microbiology for the Health Sciences

BIOL 23000 - Biology Of The Living Cell

Credit Hours: 3.00. An introduction to modern cell biology for students who may not have taken a previous college course in biology. All students with the appropriate prerequisites are welcome, and this course will be of special interest to students from engineering, chemistry, physics and computer science. This course will provide a solid foundation in modern cell biology concepts for engineers and students from other disciplines. Typically offered Fall.

BIOL 23100 - Biology III: Cell Structure And Function

Credit Hours: 3.00. An introduction to modern cell biology through an examination of the physical and chemical properties that lead to an understanding of the molecular basis for cell function. Typically offered Fall.

BIOL 23200 - Laboratory In Biology III: Cell Structure And Function

Credit Hours: 2.00. Laboratory exercises designed to illustrate the properties, functions, and growth of prokaryotic and eukaryotic cells and to introduce the student to modern experimental methods used to study cells and their separated components. Typically offered Fall.

BIOL 24100 - Biology IV: Genetics And Molecular Biology

Credit Hours: 3.00. An introduction to the principles of classical genetics and to molecular genetics. Topics covered are transmission of the genetic material (both in eukaryotes and prokaryotes); changes in the genetic material, structure, and function of the genetic material; and the manipulation of genetic material (recombinant DNA technology). Typically offered Spring.

BIOL 24200 - Laboratory In Biology IV: Genetics And Molecular Biology

Credit Hours: 2.00. Experiments in classical and modern genetics and exercises to acquaint the students with basic techniques in molecular biology. Typically offered Spring.

BIOL 27000 - Cell Structure And Function

Credit Hours: 2.00. The underlying principle of BIOL 27000 is that an accurate understanding of cells relies on the ability to describe the workings of the cell's components in quantitative, spatial or systems terms. The course begins with a treatment of the physical properties of eukaryotic cells and their components. We then proceed to how these components and the rules that govern them give rise to more complex cellular systems. The course is divided into three main subject areas: 1) First Principles, a review of relevant physical principles of thermodynamics and descriptions of the major classes of macromolecules of the cell; 2) Synthesis and bioenergetics, a treatment of how cells synthesize macromolecules and construct organelles, how they harvest energy from the environment, and how they couple energetically favorable to unfavorable events; 3) Cellular systems, which includes signal transduction, the cell cycle, the cytoskeleton and cell motility, and cell-cell interaction. An extensive course web site provides support for lectures, study aids, and updated course information. Typically offered Fall.

BIOL 27100 - Laboratory In Cell Structure And Function

Credit Hours: 2.00. Students are introduced to the molecular biology of the eukaryotic cell. In the first section students study topics in protein biology and biochemistry such as protein structure, function, isolation, molecular evolution, and the detection

and molecular basis of human disease. Techniques used for these experiments include electrophoresis, chromatography, and the Western blot procedure. In the second section students localize enzymes in plant and animal cells, perform cell fractionation procedures, and study the properties of specific cell-surface receptor. Experiments of the properties and structure of DNA are presented in the final section of the course. These exercises stress the organization and complexity of the genome, gene function and regulation, and the structure of the eukaryotic chromosome. Techniques include restriction nuclease mapping and basic DNA cloning techniques. Students also carry out an independent research project of their own design. Typically offered Fall.

BIOL 28000 - Genetics And Molecular Biology

Credit Hours: 2.00. Course covers basic principles of molecular and classical genetics and introduces topics in current genetics research. Molecular genetics includes DNA structure and function, the organization of chromosomes, RNA function, the genetic code, mutations on the molecular level including transposable genetic elements. Coverage of genetic engineering DNA technology, cloning techniques and applications of recombinant technology both in diagnostic and industry. Basic regulatory mechanisms in eukaryotes and prokaryotes, as well as current developments (cancer genes, imprinting, etc.) are also discussed. Topics in classical genetics include: Mendelian transmission genetics, independent segregation, linkage and gene mapping, pedigree analysis, sex linkage, sex determination, and gross chromosome abnormalities. Typically offered Spring.

BIOL 28100 - Laboratory In Genetics And Molecular Biology

Credit Hours: 2.00. Experiments performed range from exercises in classical transmission genetics to molecular genetics and recombinant DNA techniques. Typically offered Spring.

BIOL 28600 - Introduction To Ecology And Evolution

Credit Hours: 2.00. Evolutionary processes and ecological principles associated with individuals, populations, communities, and ecosystems. Topics include genetic drift, natural selection, adaptation, life tables, population dynamics, competition, predation, biodiversity, and ecological stability, with emphasis on natural systems. Typically offered Spring.

BIOL 28700 - Organisms And Populations

Credit Hours: 2.00. Laboratory and field exercises focused on organismal biology. After two one-week labs on organismal diversity, the lab is structured as a series of three-week modules each incorporating literature review, hypothesis design and testing, and statistical methods in data analysis and interpretation. The modules cover physiology, behavior, population dynamics and community interactions. Designed for biology majors and well qualified non-majors. Typically offered Spring.

BIOL 28900 - Honors Laboratory In Organisms And Population

Credit Hours: 2.00. Laboratory and field exercises focused on organismal biology. The course consists of three five-week modules, each incorporating literature review, hypothesis design and testing, data analysis and interpretation. The modules cover population genetics, physiology and animal behavior. Designed for honors biology majors and well qualified non-majors. Typically offered Spring.

BIOL 29000 - Methods In Biological Research

Credit Hours: 2.00. Introduction to research-oriented techniques; pH, spectrophotometry, microbiological techniques, microscopy, chromatographic techniques, and electrophoresis. Typically offered Fall.

BIOL 29300 - Sophomore Seminar: Planning Your Future In Biology

Credit Hours: 1.00. Biology 29300 is a one-credit course designed for sophomores in the Department of Biological Sciences. This course will help students maximum the remainder of their undergraduate career. The course will cover biology career information and suggestions for professional development. Students will learn about the various disciplines that make up modern Biological Sciences. Students will learn about opportunities in undergraduate research and tour a research laboratory. In-depth presentations from biology alumni from a variety of fields are featured. Assignments include a Plan of Study, a resume, and a written paper evaluating the career path of one alumni speaker and describing the student¿s response to the presentation. Typically offered Spring.

BIOL 29400 - Biology Research

Credit Hours: 1.00 to 4.00. Supervised individual research performed by freshman and sophomores. Project must be approved by the Honors Committee, Department of Biological Sciences. Honors Research Program students should register for BIOL 49900. Permission of department required. Typically offered Fall Spring Summer.

BIOL 29500 - Special Assignments

Arrange Hours and Credit. Reading, discussions, written reports, or laboratory work selected for enrichment in special areas of the biological sciences. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 30100 - Human Design: Anatomy And Physiology

Credit Hours: 3.00. A study of human function, emphasizing physiology of body tissues and systems. Relevant aspects of anatomy and histology are also included. Use of examples from current medical practice encourages application of knowledge to

predict symptoms of disease and rationale for treatment. Topics covered include histophysiology of cells and tissues, nerve and muscle physiology, the nervous system, and cardiovascular dynamics. Typically offered Fall.

BIOL 30200 - Human Design: Anatomy And Physiology

Credit Hours: 3.00. A continuation of BIOL 30100. (It is helpful but not essential for this course to be preceded by BIOL 30100.) Topics covered include body fluids and renal function, respiration, endocrine systems, the gastro-intestinal system, exercise physiology, reproduction, and immunity. Typically offered Spring.

BIOL 31200 - Great Issues Genomics And Society

Credit Hours: 3.00. The course will revolve around genomics, the science and technology involved in determining the sequence of the entire DNA complement in an organism. Almost everyone has heard of the human genome project, but fewer are aware of the spectacular technical progress in this field and the fact that many thousands of genomes have been sequenced. Until recently, most of these have been microorganisms, but technological and computational progress has made it progressively easier and cheaper to sequence the genomes of higher organisms. This field may have more of an impact on your future lives than almost any other field of the life sciences - mostly because it touches on all areas of study. The course will focus on the impact that genomes will have in selected areas. It will begin with a basic understanding of the science and technology that gave rise to our current capabilities in sequencing and the fact that technology continues to provide greater capacity and cheaper prices. You will soon see that every field in the College of Science is well represented in the science and technology. We will then go on to see how genomics influences many topics that affect our daily lives and can possibly provide answers to some critical questions (or at least pose better questions): What is the basis of personalized medicine? What does genomics tell us about the genealogy of mankind? What impact will genomics have on our future food supply and our ability to feed a population of 9 billion people? What is the human microbiome and what does that mean to me? Similarly, what is the gut microbiome, the mouthmicrobiome, etc? What impact will genomics have on the development of alternative energy sources, especially biofuels? In every area, we will discuss the scientific challenges, but also the ethical and societal implications. In most cases, there is no one right answer, but a series of choices that can be guided by ethical considerations. Typically offered Fall Spring Summer.

BIOL 32800 - Principles Of Physiology

Credit Hours: 4.00. This course is designed to provide students with an introduction to physiology with an emphasis on cellular mechanisms that underlie anatomical and physiological adaptations used by animals to survive in their habitat. Topics covered will range from cellular respiration to the physical limits of animal performance as we deconstruct and then reconstruct the body to examine how animals can live in extreme environments. Goals for this course are for students to gain a foundation in basic physiological principles, to learn about the integrative nature of the systems of animals, and to appreciate how and why animals have evolved and strategies to help them survive in their unique environment. Typically offered Spring.

BIOL 35000 - Introduction To Plant Physiology

Credit Hours: 4.00. Basic physiological processes and their relationship to plant structure and function. Laboratory experiments provide personal experience with a broad range of physiological phenomena. Typically offered Fall.

BIOL 36700 - Principles Of Development

Credit Hours: 2.00. This course deals with the process by which genes in a fertilized egg control cell behavior in the embryo and so determine the nature of the animal or plant. The emphasis is on early development and the laying down of body plan and organ systems in various model systems (Drosophila, nematode, Arabidopsis, zebrafish, mouse, chick, and frog). Typically offered Fall Spring.

BIOL 36701 - Principles Of Development Lab

Credit Hours: 1.00. This laboratory will offer students the experience working with different model systems to observe developmental processes, examine key regulatory gene expression, and manipulate gene functions used in different biochemical, molecular and genetic approaches. Typically offered Fall Spring.

BIOL 38199 - Professional Practice 3-Session Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Typically offered Fall Spring Summer.

BIOL 38299 - Professional Practice 3-Session Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Typically offered Fall Spring Summer.

BIOL 38399 - Professional Practice 3-Session Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Typically offered Fall Spring Summer.

BIOL 39000 - Research Methods In Biology

Credit Hours: 3.00. Independent laboratory work with a variety of research-oriented techniques, with emphasis on quantitative results consistent with the precision of the method, ph, buffer preparation and properties, radiation measurement and properties, quantitative and qualitative chromatography on paper and ion exchange resins, colorimetric analysis of individual components and mixtures, differential centrifuging, microscopy, electrophoresis, cell and particle counting. (Credit will not be given for both BIOL 29000 and 390.). Typically offered Summer Fall.

BIOL 39300 - Preparing For Your Future In Biology

Credit Hours: 1.00. Biology 39300 is a one-credit course for junior and seniors in the Department of Biological Sciences. This course will help students begin to prepare for life after Purdue. Students will learn about interviewing, job searching, graduate and professional school searching, resumes, industrial practices, and how to evaluate job/school offers. Construct a polished image on top of your solid biology foundation! Get the job or get admitted to the school you want. Typically offered Spring.

BIOL 39500 - Special Assignments

Arrange Hours and Credit. Reading, discussions, written reports, seminar presentations, and field or laboratory work provided for enrichment in special areas of the biological sciences. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 39600 - Premedical Planning Seminar

Credit Hours: 0.00. This course is designed for sophomore and junior students who are planning to attend medical school. The course offers information and advice on the MCAT, the application process, the personal statement, the interview, and letters of recommendation. Students in the course will also formulate an alternative career plan. The course meets the first 10 weeks of the semester. Typically offered Spring.

BIOL 39699 - Professional Practice Internship

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

BIOL 39700 - Introduction To Research

Credit Hours: 1.00. Intended to provide an understanding of research at both a theoretical and practical level so that students may evaluate whether they might wish to conduct research themselves and whether they might wish to pursue a career related to research. Lectures, discussions, tours of research laboratories, and the writing of a paper that critically evaluates an original research paper. Typically offered Fall.

BIOL 39800 - Biology Teaching

Credit Hours: 3.00. Supervised teaching experience for juniors. Must have approval of course instructor in advance. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 40300 - Social Implications In Natural Sciences

Credit Hours: 3.00. Fundamental concepts of the various sciences, their interrelatedness; differences between science and other disciplines; concepts relating to the physical environment, social environment, food and nutrition; physiological and psychological effects of drugs, etc. Value-clarification methods and classroom materials appropriate for use in science teaching. Typically offered Fall.

BIOL 41100 - Laboratory In Molecular Biology

Credit Hours: 3.00. This course is divided into two major sections. In the first section, students will study topics dealing with protein biology and biochemistry such as enzyme action and isolation, molecular evolution, and the detection and molecular basis of human disease. Techniques that will be used for these experiments include electrophoresis (both native and SDS denatured), chromatography (affinity and gel filtration), peptide mapping analysis, and the Western blot procedure. In the second section of the course, students will perform experiments that deal with DNA structure and function. These experiments stress the organization and complexity of the prokaryotic and eukaryotic genomes, gene function and regulation, and the structure of the eukaryotic chromosome. Techniques that will be used in this section include restriction nuclease mapping, isolation of organelles, gene cloning, and Southern blot hybridization procedures. Typically offered Fall.

BIOL 41500 - Introduction To Molecular Biology

Credit Hours: 3.00. An introduction to modern molecular biology techniques and how they are used to address current topics in gene regulation. Emphasis will be placed on experimental procedures and model systems, such as site-directed mutagenesis of isolated genes and their subsequent introduction into prokaryotic and eukaryotic cells. Topics will address the molecular control mechanisms associated with DNA replication, RNA transcription, RNA processing, and differential gene expression. Typically offered Fall.

BIOL 41600 - Viruses And Viral Disease

Credit Hours: 3.00. The objective of this course is to provide students with an introductory understanding of viruses and their impact on human health. The course will be divided into two sections. During the first section, we will discuss the cellular and organismal events that occur following virus infection, including viral entry, replication, modulation of cell biology by viral proteins, the host immune response to infection, evasion of the immune response by viruses, and resulting virus-induced disease.

The emphasis of this first section will be on the general strategies used by viruses to establish and maintain infection in a population. In the second section, we will discuss in relative detail our current understanding of select important human viruses including influenza, HIV, smallpox, the herpesviruses, and tumor-causing viruses. The objective of this section will be to understand how the unique aspects of each virus's biology affect the outcome of infection with these pathogens. In addition to virus-associated diseases, we will discuss potential ways that viruses may provide symbiotic benefits to their hosts and thereby shape the course of human evolution. Throughout the course, we will emphasize societal and political aspects of virology and virus-derived technologies, including vaccine development, the use of viruses as gene therapy vectors, and the threat of viral bioterror of bio-error. Typically offered Spring.

BIOL 42000 - Eukaryotic Cell Biology

Credit Hours: 3.00. Composition, structure, regulation, and growth of eukaryotic cells. Typically offered Fall.

BIOL 43200 - Reproductive Physiology

Credit Hours: 3.00. This course provides an integrated approach to examining how tissues interact to regulate reproductive processes. Each section begins by describing fundamental commonalities of a reproductive event in a variety of species. This is followed by an emphasis on the difference in the details of that event among species. Students will be strongly encouraged to initiate and participate in discussions related to course topics during class. To gain a deeper understanding of physiological processes, students are asked to select a current research article related to reproductive physiology. Students are then required to present an analysis of article to the class in a formal presentation. Some of the topics to be covered in lecture include ovarian and testicular function, the hypothalamic-pituitary-gonadal axis, fertilization, establishment of the placenta, maternal support of pregnancy, parturition, and lactation. Typically offered Fall.

BIOL 43600 - Neurobiology

Credit Hours: 3.00. This course will cover key aspects in molecular, cellular, and developmental neurobiology. Topics include: Cell biology of neurons and glia, electrophysiological properties of neurons, electrical and chemical signaling between neurons, synaptic integration and plasticity, development and regeneration of the nervous system, nervous system diseases. Up-to-date research findings and techniques will be included. A basic knowledge of cell biology and protein structure and function is strongly recommended. Typically offered Fall.

BIOL 43800 - General Microbiology

Credit Hours: 3.00. An examination of microbial diversity that emphasizes the interrelationship of bacteria and their environments. This includes aspects of cell composition, metabolism, and growth of microorganisms. Typically offered Fall.

BIOL 43900 - Laboratory In General Microbiology

Credit Hours: 2.00. Includes enrichment cultures to isolate microorganisms, studies of cell composition, measurements of cell growth, and examination of enzyme regulation. Typically offered Fall.

BIOL 44100 - Biology Senior Seminar In Genetics

Credit Hours: 1.00. This is a required course for genetics majors. It provides exposure to current research in genetics and molecular biology via invited faculty speakers. Students enrolled in the course who have actively participated in research also give a presentation on their own work. Other students are assigned to review current literature in one aspect of the semester's topic. The topic selected for review is in an area of current research in genetics and may vary from year to year. Typically offered Fall.

BIOL 44201 - Introductory Module: Protein Expression

Credit Hours: 2.00. This is a project-oriented course designed to give the student exposure to laboratory research through a series of five-week modules. During this five-week introductory module, the students will learn the basics of expression, isolation, and characterization of recombinant proteins in E. coli using SDS-PAGE and Western blotting. In the first half of the course, students work initially with one recombinant DNA construct and then are given a second construct to use to identify the protein expressed. *Note: additional hours as needed for particular experiments. Typically offered Fall Spring Summer.

BIOL 44202 - Animal Physiology

Credit Hours: 2.00. This is a project-oriented course designed to give the student exposure to laboratory research through a series of five-week modules. This module involves measurements of respiratory, cardiovascular, neural and renal function. When appropriate measurements are made in both rats and humans. Typically offered Spring.

BIOL 44203 - Bacterial Synthetic Biology Laboratory

Credit Hours: 1.00. This course will provide an introduction to state-of-the-art bacterial molecular genetics using the intestinal bacterium Escherichia coli as a model cell. Typically offered Fall.

BIOL 44204 - Laboratory In Animal Cell Culture

Credit Hours: 1.00. In this five-week module, students will gain experience in the basic principles of mammalian cell culture and gene transfer technologies. This is an alternate year course, offered in odd numbered years. Typically offered Fall.

BIOL 44205 - Introduction To LabVIEW

Credit Hours: 1.00.This is an introductory course for LabVIEW programming. During this five-week module students will learn proper data acquisition techniques and be introduced to the fundamentals of the LabVIEW graphical programming environment. Through LabVIEW, students will learn the tools to develop programs capable of acquiring, processing, analyzing, saving and displaying data for engineering and scientific applications. Typically offered Fall Spring.

BIOL 44207 - Exploration Of Protein Structure

Credit Hours: 1.00.This module is a hands-on exploration of the principles of enzyme structure. Students will use computers to retrieve and inspect protein structures from publicly available databases. Through the performance and analysis of sequence structural alignments, students will explore the relationship between primary, secondary and tertiary structures and the final active form of a protein. Typically offered Fall Spring.

BIOL 44208 - DNA Sequencing Laboratory

Credit Hours: 1.00. In this lab module pairs of students prepare, run, and detect DNA sequencing ladders on miniaturized fast-running sequencing gels. Sequencing reactions are prepared from single-stranded and double-stranded DNA templates. The theory of DNA sequencing is taught, and experience is gained in manually reading the sequence from the sequencing ladders consisting of A, T, G and C lanes. Students learn how to connect to the National Center for Biotechnology Information (NCBI) and do BLAST sequence comparisons of the sequences that they read with DNA sequences in the national database GenBank. Typically offered Fall.

BIOL 44209 - Exploring The Living Cell

Credit Hours: 1.00. In this five-week module, students will learn how to observe and analyze cellular structure and dynamic behavior of living cells. We will utilize live cell imaging techniques to visualize molecules, cellular structures and organelles by use of fluorescence dyes and marker proteins tagged with green fluorescent protein (GFP) and other color florescent proteins. Specimens may include whole live organisms and cultured cells, as well as live tissues and organs from animal and plant systems. Students will observe the cytoskeleton and organelles in growing cells, perform bimolecular fluorescence complementation (BiFC) analysis to see molecular interactions in the live cell and monitor protein and organelle behavior during mitosis. Live specimens will be observed under stereo-dissecting, conventional, and confocal fluorescence microscopes. Images will be acquired, digitized, and analyzed by computational programs. Typically offered Fall.

BIOL 44210 - Introduction To DNA

Credit Hours: 1.00. In this five-week module, students will learn a survey of the major web databases for accessing DNA sequences and genomes. How to search sequences, how to make alignments, and other very basic bioinformatics. Typically offered Fall.

BIOL 44211 - Laboratory In Anatomy And Physiology

Credit Hours: 1.00. This module will study various organs, and also discuss diseases associated with it. The heart, brain, kidney, stomach, liver etc. will be studied in detail using histology, dissection, and instrumentation. Emphasis will be placed on problem solving using various case studies. The students will be required to give presentation. Typically offered Spring.

BIOL 44212 - Microscopy And Cell Biology

Credit Hours: 1.00. In this five-week module, students will learn how to prepare specimens for viewing by fluorescence microscopy. Specimens include mammalian tissue culture cells and zebrafish embryos. The emphasis will be on the staining of the cytoskeleton in these preparations, utilizing antibodies and fluorescence probes. The specimens will be viewed by wide-field and confocal laser scanning fluorescence microscopy. Images will be acquired, processed and analyzed by modern computational methods. Students will learn the basics of cell culture, immunocytochemistry, fluorescence microscopy, digital image processing and data analysis. At the end of the course, students prepare a PowerPoint presentation of their images and data . Typically offered Spring.

BIOL 44214 - Microbial Pathogenesis

Credit Hours: 1.00. Successful infection by a pathogen often is mediated by the targeting of host cellular processes by virulence proteins. The identification of host pathways modulated by the pathogen is critical in the study of the pathogenic mechanisms, thus the design of any therapeutic intervention. One of the methods to identify these pathways is the use of yeast two-hybrid system. In this lab module, you will learn the principles of this powerful and widely used method. The experiments will allow you to understand the rationales of the procedures and to obtain hands-on experience in the screening process. Typically offered Spring.

BIOL 44215 - Multidisciplinary Design Of Systems And Devices For Physiology Measurements

Credit Hours: 2.00. This physiology laboratory course will provide an opportunity for undergraduates from the College of Science (Department of Biology) to collaborate with students in other colleges (Agriculture, Education, Engineering, Health and Human Science & Technology) to experience and learn how to operate effectively as part of an interdisciplinary team to address physiological problems in the cardiovascular system, respiratory system and in biological transport. Specifically it will emphasize how these teams can use information, tools, techniques and theories from their disciplines to solve problems that are beyond the scope of any single discipline. In this process, the students will develop an appreciation of both engineering design and the classic hypothesis-driven experimental science as tools to solve complex real-world problems. This course will promote effective communication, systems thinking, laboratory skills, self-management and professional ethics. Students will learn to measure and quantify biological changes, analyze data (including statistical analysis) and interpret its meaning as it applied to the larger physiological question at hand. These skills will be necessary for teams to efficiently function in an interdisciplinary setting both in future courses and more importantly when they enter the workforce. Typically offered Fall.

BIOL 44300 - Structure And Function In Bacteria

Credit Hours: 2.00. An examination of unique aspects of bacterial catabolism, mechanisms of pathogenesis, and the functions of cell structures and morphogenesis in survival. Emphasis is on the experimental approaches used to elucidate these processes. Typically offered Spring.

BIOL 44400 - Human Genetics

Credit Hours: 3.00. An intermediate-level survey course of human genetics with a balanced review of both Mendelian and molecular aspects. Review of current development and application of DNA technology emphasized. Typically offered Fall.

BIOL 44600 - Molecular Bacterial Pathogenesis

Credit Hours: 3.00. This course will focus on the interface of classical cell biology and microbiology, with emphasis on the exploitation of mammalian host cell by medically relevant pathogens, such as Yersinia, Salmonella, and Listeria. This course will cover the molecular mechanisms of infectious diseases. It will introduce modern cellular microbial strategies for studying the complex interaction between pathogens and their host cells. Topics and readings will be prepared from the most current literature. Typically offered Spring.

BIOL 45500 - Animal Physiology

Credit Hours: 3.00. Principles of physiology illustrated by invertebrate and vertebrate systems. Respiration, ion and water balance, temperature regulation, and nervous systems. Typically offered Spring.

BIOL 45600 - Laboratory In Animal Physiology

Credit Hours: 1.00. Laboratory experiments are designed to illustrate the principles of systems physiology. The course emphasizes the basic principles of physiology, the laboratory methods to study these principles, and the quantitative analysis of data. Permission of instructor required. Typically offered Spring.

BIOL 46600 - Developmental Biology

Credit Hours: 3.00. The lectures and laboratories focus on what happens during the development of an organism and how we

know what happens from experimental results. During the first half of the course, students spend time becoming familiar with the embryology of animals and plants by doing laboratory exercises in their lab manual. They also become adept working with chick embryos and Wisconsin Fast Plants because these are the two developing systems most students use to do their lab projects during the second half of the course. Typically offered Spring.

BIOL 47800 - Introduction to Bioinformatics

Credit Hours: 3.00. (CS 47800) Bioinformatics is broadly defined as the study of molecular biological information, targeting particularly the enormous volume of DNA sequence and functional complexity embedded in entire genomes. Topics will include understanding the evolutionary organization of genes (genomics), the structure and function of gene products (proteomics), and the dynamics of gene expression in biological processes (transcriptomics). Inherently, bioinformatics is interdisciplinary, melding various applications of computational science with biology. This jointly taught course introduces analytical methods from biology, statistics and computer science that are necessary for bioinformatics investigations. The course is intended for junior and senior undergraduates from various science backgrounds. Our objective is to develop the skills of both tool users and tool designers in this important new field of research. Typically offered Fall.

BIOL 48100 - Eukaryotic Genetics

Credit Hours: 3.00. This course presents the fundamental concepts of classical and modern molecular genetics in eukaryotic systems, using examples from the model genetic organisms, yeast, Drosophila, Caenorhabditis, Arabidopsis, maize, mice and humans. These concepts are applied to solving problems of genetic analysis. Recent advances in developmental, cancer, and behavioral genetics and genomics, and applications of genetic technology, are used to demonstrate the impact that modern genetics makes at the cutting edge of biological research. Typically offered Spring.

BIOL 48300 - Great Issues: Environmental And Conservation Biology

Credit Hours: 3.00. Concerned with the application of ecological principles to environmental issues, the course introduces fundamental ecology, emphasizing the interplay of theoretical models, natural history, and experimentation. New research developments are stressed, with the outlook for application to environmental management and restoration. Whole-biosphere issues, such as the loss of biological diversity, frame a focus at the population level to understand local and global extinction and community stability. In-depth case studies of endangered ecosystems (both temperate and tropical), with computer modeling, field trips, and discussions of policy formulation, demonstrate the range of tools and information necessary to accomplish coexistence of humans with the rest of nature. Typically offered Fall.

BIOL 49300 - Introduction To Ethology

Credit Hours: 3.00. (PSY 49400) Animal and human behavior is presented from an ethological perspective. Emphasis is on observation and description of natural behaviors, motivation, the behavioral aspects of ecology, the evolution of behavior, and the domestication of animals. Several representative groups of wild and domesticated species will be discussed and illustrated with slides and films with respect to individual and social behavior, predator-prey relationships, etc. Field trips will augment

classroom work. A critical examination of popular books in ethology will be made against the background of this course. Typically offered Fall.

BIOL 49400 - Biology Research

Credit Hours: 1.00 to 4.00. Supervised individual research performed by juniors and seniors. Project must be approved by the Honors Committee, Department of Biological Sciences. Honors Research Program students should register for BIOL 49900. Permission of department required. Typically offered Fall Spring Summer.

BIOL 49500 - Special Assignments

Arrange Hours and Credit. Readings, discussions, written reports, seminar presentations, and field or laboratory work provided for enrichment in special areas of the biological sciences. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 49600 - Biology Honors Tutorial

Credit Hours: 1.00 to 4.00. Selected readings, discussions, and written reports under the guidance of a faculty tutor. Submission of honors tutorial petition and consent of faculty tutor and Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 49700 - Biology Honors Seminar

Credit Hours: 1.00. Required of all students participating in honors research. Discussions and presentations of research, including seminars by those students who are completing their honors research thesis. Typically offered Spring.

BIOL 49800 - Biology Teaching

Credit Hours: 3.00. Supervised teaching experience for juniors and seniors. Must have approval of course instructor in advance. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 49900 - Biology Honors Thesis Research

Credit Hours: 1.00 to 4.00. Research under the guidance of a scientist. Submission of honors tutorial petition and consent of faculty tutor and Honors Committee. Permission of department required. Typically offered Fall Spring Summer.

BIOL 50000 - Modular Upper-Division Laboratory Course

Credit Hours: 2.00. This is a project-oriented course designed to give the student exposure to laboratory research through a series of five-week modules. The student must complete the introductory five-week module or have consent of instructor before taking the other modules. Typically offered Summer Fall Spring.

BIOL 51100 - Introduction To X-Ray Crystallography

Credit Hours: 3.00. (EAPS 51100) Analysis of two- and three-dimensionally ordered structures by optical, electron, and X-ray diffraction methods. Geometry of diffraction. Detection of diffraction. Intensity of diffracted waves. Symmetry of crystals. The phase problem. The heavy atom method. Isomorphous replacement. Direct methods. Molecular replacement. Helical diffraction. Typically offered Fall.

BIOL 51500 - Molecular Genetics

Credit Hours: 2.00 (West Lafayette) 3.00 (Fort Wayne) A molecular approach to the problems of structure, duplication, mutation, and phenotypic expression of generic material. Typically offered Spring.

BIOL 51600 - Molecular Biology Of Cancer

Credit Hours: 3.00. A detailed course examining the molecular mechanisms controlling the growth of animal cells. Emphasis will be placed on current experimental approaches to defining the molecular basis of growth regulation in developing systems and the uncontrolled proliferation of cells in metabolic disorders, such as cancer. Typically offered Spring.

BIOL 51700 - Molecular Biology: Proteins

Credit Hours: 2.00. Principles of protein three-dimensional architecture. The molecular and structural basis of protein folding, function, and evolution. Typically offered Spring.

BIOL 52900 - Bacterial Physiology

Credit Hours: 3.00. A detailed consideration of the central metabolic routes, their role in generation of energy and key intermediates, and the conversion of those intermediates to small molecule building blocks. Regulatory mechanisms will be stressed. Typically offered Fall.

BIOL 53100 - Parasitology

Credit Hours: 4.00. Arthropod, protozoan, and helminth parasites, their morphology, life histories, host-parasite relationships, and control. Typically offered Fall.

BIOL 53300 - Medical Microbiology

Credit Hours: 3.00. Host-parasite relationships. Immunology. Bacteria and viruses associated with infectious diseases. Typically offered Fall.

BIOL 53700 - Immunobiology

Credit Hours: 3.00. Readings and discussion in the structural, cellular, and genetic basis of the immune response. BIOL 42000 recommended as a pre-requisite. Typically offered Spring.

BIOL 53800 - Molecular, Cellular, And Developmental Neurobiology

Credit Hours: 3.00. Molecular mechanisms of neural cell biology and development are considered. Topics and readings are drawn from the current primary literature. BIOL 42000 recommended as a pre-requisite. Typically offered Spring.

BIOL 54100 - Molecular Genetics Of Bacteria

Credit Hours: 3.00. Advanced bacterial genetics, with emphasis on the use of genetics as a powerful and creative intellectual activity that enables us to discover biological functions and to construct new organisms by the manipulation of DNA. Major topics include: mutations, genetic selections, recombination, regulatory mechanisms, and genomic evolution. Typically offered Fall.

BIOL 54200 - Modular Upper-Division Laboratory Course

Credit Hours: 1.00 or 2.00. This is a project-oriented course designed to give the student exposure to laboratory research through a series of 5-week modules. The student must complete the introductory 5-week module or have the consent of the instructor before taking the other modules. Topics may include animal cell culture, cloning and blot analysis, DNA fingerprinting, analysis of nucleic acid sequences, animal physiology, bacterial genetics, advanced neurophysiology, chromatin structure, eukaryotic gene expression, genomics, yeast molecular biology, and molecular virology, etc. Typically offered Fall Spring.

BIOL 54601 - Topics In Infectious Diseases

Credit Hours: 1.00. The course will discuss the history and current progress in infectious diseases with a focus on the cell biology of infectious diseases. Scientific publications will be selected based on their impact in the field and how it facilitates student learning. Students will acquire up-to-date knowledge of infectious diseases and be given instructional direction on how to select, read and present scientific findings. Typically offered Spring.

BIOL 54900 - Microbial Ecology

Credit Hours: 2.00. A study of microbial interactions with other organisms and the environment. Aquatic and terrestrial ecosystems as well as interactions between nonpathogenic microbes and plants and animals will be discussed. Offered in alternate years. Typically offered Spring.

BIOL 55000 - Plant Molecular Biology

Credit Hours: 3.00. A comprehensive study of plant molecular biology and plant molecular genetics. Topics will include the structure and expression of plant nuclear, chloroplast, and mitochondrial genomes, and plant viruses. Typically offered Spring.

BIOL 55001 - Eukaryotic Molecular Biology

Credit Hours: 3.00. This is a general survey course intended for advanced undergrads and beginning grad students. The course will draw upon examples from the plant, animal, and fungal kingdoms, and will familiarize students with the basic principles of molecular biology analyses as they apply to eukaryotic organisms. By the end of the course students should have knowledge of these molecular processes and should be able to design and analyze experiments dealing with these topics. This is not a first course in molecular biology. Typically offered Spring.

BIOL 55900 - Endocrinology

Credit Hours: 3.00. The study of hormone function. Consideration will be given to the role of hormones in growth, development, metabolism, homeostasis, and reproduction. Typically offered Fall.

BIOL 56200 - Neural Systems

Credit Hours: 3.00. (SLHS 50700, PSY 51200) Overview of the structure and function of neural systems including those involved with motor, somatosensory, visual, auditory, learning, memory, and higher cortical processes. Molecular and cellular aspects of neural function are integrated with discussion of relevant neuroanatomy. Background in cell biology, psychobiology, physiology or anatomy is recommended. Typically offered Spring.

BIOL 56600 - Developmental Biology

Credit Hours: 3.00 (West Lafayette, Fort Wayne, IUPUI, North Central) 4.00 (Calumet) Principles of development with emphasis on concepts and experimental evidence for underlying mechanisms, including molecular, cellular, and supracellular approaches. Typically offered Spring.

BIOL 56700 - Laboratory In Developmental Biology

Credit Hours: 1.00. Descriptive and experimental study of the development of animals. Laboratories do not necessarily follow lecture material. Typically offered Spring.

BIOL 57300 - The Molecular Biology Of Animal Cells

Credit Hours: 3.00. Structure and organization of the genome, chromatin structure, the expression and regulation of genes. Typically offered Fall.

BIOL 58000 - Evolution

Credit Hours: 3.00. A study of evolution as a basic concept of the biological sciences; an examination of current methods of experimentation within the area, as well as evidences for the possible mechanisms of evolutionary change. Typically offered Spring.

BIOL 58010 - Teaching Evolution: Online Course

Credit Hours: 3.00. Evolution is one of the most important and most widely misunderstood concepts in science. Teaching

Evolution is an online course to help you deepen your understanding of evolutionary concepts, develop instructional strategies, and address obstacles in the teaching of evolution. Typically offered Fall Spring Summer.

BIOL 58500 - Ecology

Credit Hours: 3.00. Ecological processes and dynamics of populations, communities, and ecosystems; physical, physiological, behavioral, and population genetic factors regulating population and community structure; case studies; field studies, and simulation models of life history attributes, competition, predation, parasitism, and mutualism. Typically offered Fall.

BIOL 58705 - Animal Communication

Credit Hours: 3.00. This course will be a broad-scaled analysis of animal communication. Topics will include the physics of sound- and light-signal production, propagation and reception of signals, the use of communication as a means of information transfer, and the evolution of signaling systems. Mathematical principles are covered (e.g. in the evolution of signals), so some background in mathematics (e.g. calculus or algebra and introductory physics) is helpful. Typically offered Fall.

BIOL 59100 - Field Ecology

Credit Hours: 4.00. A field course in ecology that stresses natural history and testing ecological theory under natural conditions. Group and individual projects include observational and experimental approaches. Emphasis is on the study of plant and animal species interactions in terrestrial (including montane and coastal) and aquatic habitats. Issues in community, population, behavioral, and conservation biology are addressed. Several all-day Saturday and two weekend field trips. Offered in alternate years. Permission of instructor required. Typically offered Fall.

BIOL 59200 - The Evolution Of Behavior

Credit Hours: 3.00. An investigation of behaviors as adaptations: specializations of sensory and motor mechanisms involved in behavior; animal communication systems; behavioral ecology; patterns of social behavior as solutions to ecological problems, such as predator avoidance and resource exploitation. Emphasis will be on theoretical principles; examples will be broadly comparative, ranging from microorganisms to mammals. Offered in alternate years. Typically offered Spring.

BIOL 59500 - Special Assignments

Arrange Hours and Credit. Special work, such as directed reading, independent study or research, supervised library, laboratory, or field work, or presentation of material not available in the formal courses of the department. The field in which work is offered will be indicated in the student's record. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 59700 - Sex And Evolution

Credit Hours: 3.00. Covers various theoretical and empirical aspects of sexual reproduction from an evolutionary perspective. Topics include: Why did sexual reproduction evolve? What different modes of reproduction exist? How is the sex of an individual determined in different organisms? What sex ratio should exist in different species? What is sexual selection, and how does it influence male and female characteristics in various species? How does sexual selection influence human social behavior?. Typically offered Fall.

BIOL 59900 - Quantitative Physiology

Credit Hours: 3.00. This course is designed to give upper-division biological sciences and biomedical engineers the ability to quantitatively understand the physical and chemical factors that are responsible for living systems. Normal relationships, both empirical and theoretical, will be covered primarily. This foundation in normal physiological systems is complemented by subsequent topics on system pathologies. Typically offered Spring.

BIOL 60000 - Bioenergetics

Credit Hours: 2.00. Energy transduction in biological membranes: physical chemical foundations; electron transfer, proton translocation; and active transport. Atomic structures of integral membrane protein complexes responsible for respiratory, photosynthetic generation of electrochemical potential; ATPase motor, and structure-based mechanisms. Offered in alternate years. Prerequisite: BCHM 56100, BCHM 56200 and CHM 37300. Typically offered Fall.

BIOL 60200 - Cellular Neurobiology

Credit Hours: 3.00. This course covers principles of neurophysiology and cell, molecular and developmental neurobiology for graduate students from a wide range of disciplines. Course material will involve lectures and assigned textbook readings, homework problems and in-class discussions based on selected readings of the primary literature, and computer-based simulations of neurophysiology. Grades will be based on participation in class discussions, graded homework sets and exams (a midterm and a final exam). Typically offered Fall.

BIOL 61100 - Crystallography Of Macromolecules

Credit Hours: 3.00. The special techniques required in the structure determination of biological macromolecules. Symmetry of macromolecules. Data collection and processing. The isomorphous replacement technique. The molecular replacement technique. Use of anomalous dispersion. Restraint and constraint refinement. Computational techniques. Prerequisite: BIOL 51100. Permission of instructor required. Typically offered Fall.

BIOL 62000 - Advanced Topics In Eukaryotic Cell Biology

Credit Hours: 3.00. A study of current areas of cell biological research, including the cytoskeleton, the regulation of the cell cycle, and the functions and dynamics of membrane-bound organelles. Typically offered Spring.

BIOL 64700 - Membrane Protein Structural Biology

Credit Hours: 2.00. This course focuses on the structural basis of the functions and dysfunctions of diverse membrane proteins, analyzed by X-ray, electron microscopy, and spectroscopy. The functions include transport, biogenesis, and transmembrane signaling. Unique problems associated with the structure analysis of integral membrane proteins are discussed. Typically offered Spring.

BIOL 65001 - Techniques In Molecular Biology

Credit Hours: 1.00. Techniques in Molecular Biology will introduce graduate students to the theory and practice of many commonly used methods. Emphasis will be placed on understanding the theoretical basis for these techniques, their utility in various circumstances, and their limitations. Although taught as a lecture, students should be able to take this knowledge back to the laboratory to help them in their research efforts. The course will be as close as possible to a laboratory experience without being in an actual laboratory setting. This course is designed to prepare students for other in-depth 600-level scientific courses, for their rotations, and for future laboratory work. Exams will be "experimental" in nature (e.g., "design and experiment to do something..." or "in this type of situation, which technique/vector/etc. would best be used, and why..."). Typically offered Fall.

BIOL 65200 - Advanced Ecology Discussion

Credit Hours: 1.00. Weekly meetings to discuss and evaluate seminal papers in the fields of evolutionary, population, and community ecology. During the last week, students will critically evaluate a contemporary paper on a topic related to the "classic" papers discussed during the semester. Students will have a choice among papers submitted by participating faculty members; their critique will be assessed on content, originality, rigor, and clarity. Typically offered Fall.

BIOL 65300 - Advanced Evolution Discussion

Credit Hours: 1.00. Weekly meetings to discuss and evaluate seminal papers in the fields of evolution and population biology. During the last week, students will critically evaluate a contemporary paper on a topic related to the "classic" papers discussed during the semester. Students will have a choice among papers submitted by participating faculty members; their critique will be assessed on content, originality, rigor, and clarity. Typically offered Spring.

BIOL 66200 - Seminar Methods And Professional Development I

Credit Hours: 1.00. An introduction for incoming graduate students to methods of seminar presentation and critique and to various guidelines for professional development during their graduate school experience. Topics include research laboratory safety (REM), how to give a talk, acclimating to graduate studies (especially time management), how to select a major professor and an advisory committee, how to prepare for qualifying exams, Purdue University guidelines for responsible conduct of research, how to organize a poster presentation, how to negotiate with mentors, and expectations for success. The course also serves to socialize the incoming cohort of students among themselves and with more senior students in the broad range of research disciplines available. Typically offered Fall.

BIOL 66300 - Seminar Methods And Professional Development II

Credit Hours: 1.00. This course is a continuation of BIOL 66200 and expands the introduction for incoming graduate students to methods of seminar presentation and critique and to various guidelines for professional development during their graduate school experience. Topics include seminar topic selection and 20-minute seminar design, tutorials on electronic services at the PU Library and Citation Management programs, and evaluating classmate presentations. Using the skills learned the previous semester, each student is required to make a 20-minute PowerPoint presentation to the class, based on a pre-approved topic of their choice. The speaker is asked questions and the presentation receives written evaluations by all members of the class. Each student practices with the course instructor prior to the public presentation. The course also continues to socialize the incoming cohort of students among themselves and with more senior students in the broad range of research disciplines available. Typically offered Spring.

BIOL 68100 - Advanced Eukaryotic Genetics

Credit Hours: 3.00. This course is designed for graduate students who wish to refresh their knowledge of the fundamental principles of eukaryotic transmission and molecular genetics, to explore new and developing areas of genetic research in depth, and to learn of genetic tools that can be applied within their own research. Lecture materials will be supplemented with class discussions of primary literature. Topic areas comprise epigenetic phenomena, developmental genetics, and systems biology. Typically offered Spring.

BIOL 69100 - Biological Research Methods

Credit Hours: 1.00. Open to graduate students in the Department of Biological Sciences and designed primarily for students in their first year of graduate study. The course consists of two laboratory assignments, each of which lasts about two months. Students may take one or two of these per semester. During each laboratory assignment, the student will be exposed to methods, equipment, and experimental procedures currently in use in a particular departmental research laboratory selected by the student and through arrangement with the professor in charge of that laboratory. Admission by consent of the departmental Graduate and Advanced Studies Committee. Typically offered Fall Spring Summer.

BIOL 69500 - Special Assignments

Arrange Hours and Credit. Special work, such as directed reading; independent study or research; supervised library, laboratory, or field work; or presentation of material not available in the formal courses of the department. The field in which work is offered will be indicated in the student's record. Primarily for Ph.D. candidates. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 69600 - Seminar

Credit Hours: 1.00. Each semester there are several separate seminar offerings. They will likely be on the following topics: biochemistry, crystallography, ecology and population biology, genetics, mechanisms of development, microbiology, neurobiology, and plant physiology. The student's record will indicate the specific seminars in which he/she has participated. Oral presentations required. At least two credits are required of Ph.D. candidates. Typically offered Fall Spring.

BIOL 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

BIOL 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Biomedical Engineering

BME 19500 - Selected Topics In Biomedical Engineering

Credit Hours: 0.00 to 4.00. Specialized topic areas in BME for which there are not specific courses, workshops, or individual study plans, but having sufficient student interest to justify the formalized teaching of a course. Typically offered Fall Spring Summer.

BME 20100 - Biomolecules: Structure, Function, And Engineering Applications

Credit Hours: 3.00. Classes of molecules (biomolecules) such as sugars, lipids, proteins, and nucleic acids that form the cellular components of living organisms. Explores the chemistry behind the structure and function of these important classes of biological molecules. Hydrogen-bonding, hydrophobic forces, electrostatis interactions along with other weak interactions discussed with reference to their importance in biomolecular systems in an engineering context. Typically offered Fall.

BME 20400 - Biomechanics Of Hard And Soft Tissues

Credit Hours: 3.00. Covers the mechanics of biological materials, with applications in the musculo-skeletal system, nerves, spinal cord, and vascular tissue, down to the level of the cell. Topics include center of mass, moment of inertia, basic understanding of stresses, strains, and deformations, axial elements, pressure vessels, beams, torsion, viscoelasticity, and thermal stress. Case studies and problem solving sessions used to emphasize the unique biological criteria which must be considered when mechanically analyzing both soft and hard tissues. Typically offered Spring.

BME 20500 - Biomolecular And Cellular Systems Laboratory

Credit Hours: 1.00. Introductory laboratory experience focused on engineering concepts and practices in the analysis of biomolecules and cells. Topics include fundamental quantitative techniques of analysis, methods of isolation, identification, and quantification of biomolecules and cells, and analysis of integrated biosystems. Concludes with student-driven design project. Typically offered Fall.

BME 20600 - Biomechanics And Biomaterials Laboratory

Credit Hours: 1.00. Provides hands-on training in engineering and biological principles of biomaterials and biomechanics. Topics include evaluation and interpretation of experimental results, modeling and testing of tissue and body mechanics, and interactions of living (e.g., tissue/cell) and nonliving (e.g., biomaterial) systems. Typically offered Spring.

BME 25600 - Physiological Modeling In Human Health

Credit Hours: 3.00. Introduction to the physiology and medicine underlying practical problems in biomedical engineering, especially with respect to medical device development. Engineering skills taught and practiced within the context of human disease, injury, and illness on extended problem sets which include mathematical modeling and problem solving with appropriate documentation. Main physiological systems of focus are cardiovascular, pulmonary, and renal, and common afflictions thereof. Typically offered Spring.

BME 29000 - Frontiers In Biomedical Engineering

Credit Hours: 1.00. This course introduces the rapidly emerging field of biomedical engineering by exposing students to a wide range of research activities in the Weldon School and to a variety of experimental learning opportunities. Topics addressed include career paths, professional development opportunities, and career development skills including creating a plan of study, informational and job interviewing, writing a resume, technical writing, preparing effective oral presentations, and peer-editing. Typically offered Fall.

BME 29500 - Selected Topics In Biomedical Engineering

Credit Hours: 1.00 to 4.00. Specialized topic areas for which there are no specific courses, workshops, or individual study plans, but having sufficient interest to justify the formalized teaching of a course. Permission of instructor required. Typically offered Summer Fall Spring.

BME 29600 - Biomedical Engineering Projects

Credit Hours: 1.00 to 4.00. Individual research projects to be approved by the supervising faculty member before registering for the course. An approved written report is required. Permission of instructor required. Typically offered Summer Fall Spring.

BME 30100 - Bioelectricity

Credit Hours: 3.00. Fundamentals of bioelectricity of the mammalian nervous system and other excitable tissues. Passive and active forms of electric signals in both the single cell and cell-cell communication, tissue and systematic bioelectricity, mathematical analysis including Nernst equation, Goldman equation, linear cable theory, and Hodgkin-Huxley Model of action potential generation and propagation. Typically offered Fall.

BME 30400 - Biomedical Transport Fundamentals

Credit Hours: 3.00. Fundamental concepts and principles of momentum, heat, and mass transport phenomena in the context of biomedical applications. Integrated biological topics include transport of physiological fluids (e.g. blood), mass transport (e.g. oxygen and nutrients), forced convection (e.g. hemodialysis) and unsteady-state molecular diffusion (e.g. drug delivery mechanisms). Typically offered Fall.

BME 30500 - Bioinstrumentation Circuit And Measurement Principles

Credit Hours: 3.00. Introduction of laboratory instruments used to measure physiological events. Stimulation and conduction of electric signals within the nervous system and other excitable tissues are demonstrated. Fundamental circuit elements and concepts include resistance, capacitance, inductance, op-amps, impedance, voltage, current, power, and frequency. Fundamental analog measurement concepts include adequate bandwidth and amplitude and phase linearity. An integrative two-week design project addresses the practical aspects of quantitative physiological measurements. Typically offered Fall.

BME 30600 - Biotransport Laboratory

Credit Hours: 2.00. Practical experience with transport principles related to physiological systems is presented through inquiry-based modules. Modules contain elements of computer simulation, experimental design, implementation, and data analysis and address biomedical applications. Typically offered Spring.

BME 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of instructor required. Typically offered Fall Spring Summer.

BME 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of instructor required. Typically offered Fall Spring Summer.

BME 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of instructor required. Typically offered Fall Spring Summer.

BME 39000 - Professional Development And Design In Biomedical Engineering

Credit Hours: 1.00. Introduction to a diverse spectrum of current topics relevant to the technical, professional, and career aspects of Biomedical Engineers. The course topics will focus on the early stages of the design process (e.g. need identification, problem formulation, innovation and idea generation), professional communication skills (e.g. written and oral reporting and documentation), and ethics of biomedical design and research (e.g. ethical codes and decision making, animal care and use in research and testing, authorship and intellectual property, social and environmental impact of design). Typically offered Spring.

BME 39500 - Selected Topics In Biomedical Engineering

Credit Hours: 1.00 to 4.00. Specialized topic areas for which there are no specific courses, workshops, or individual study plans, but having sufficient student interest to justify the formalized teaching of a course. Permission of instructor required. Typically offered Summer Fall Spring.

BME 39699 - Professional Practice Internship

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

BME 40100 - Mathematical & Computational Analysis Of Complex System Dynamics In Biology, Medicine, & Healthcare

Credit Hours: 3.00. An introduction to analysis of complex system dynamics that appear in biology, medicine, and healthcare. Key topics include nonlinear dynamical concepts associated with phase plane, bifurcation, stability diagram, oscillation, and chaotic systems along with concepts from discrete systems and stochastic processes. These topics are taught within the context of mathematical and computational models related to both non-communicable diseases (i.e. cancer) and communicable diseases (i.e. HIV/AIDS). Courses projects are drawn from recent literature. Typically offered Fall Spring.

BME 40500 - Biomedical Engineering Design Project

Credit Hours: 4.00. Design and management of biomedical engineering projects. Teams design and implement a solution to a biomedical engineering problem utilizing skills gained in previous course work. Oral and written presentation of design and demonstration of function are required. Typically offered Fall Spring.

BME 48800 - Preliminary Senior Project Design

Credit Hours: 1.00. The preliminary stages of design are completed during these lab hours. Students will work with their teammates to develop a problem statement with appropriate technical specifications, complete the relevant literature and market analysis, derive and justify a preliminary design, and outline a plan to successfully complete the project. The resulting preliminary design is presented and evaluated through an oral presentation and a written report. Typically offered Fall.

BME 48900 - Senior Design Project Lab

Credit Hours: 2.00. The biomedical engineering design process is completed starting from a preliminary system design. Student will work with their teammates to implement (e.g. build, test, iterate and evaluate) a solution to address a biomedical engineering problem statement and meet the technical specifications set forth. The resulting project design is presented and evaluated through an oral presentation, laboratory demonstration, and a final written document. Typically offered Fall Spring.

BME 49000 - Professional Elements Of Design

Credit Hours: 1.00. This course advances and enhances design tools, concepts, and knowledge relevant to biomedical engineering design. Students work individually and in small teams to investigate the topic within the context of their specific senior design

project in preparation for their lab. Topics include project management, human and animal subjects, ethics, regulatory affairs, literature and patent searching, and entrepreneurship. Typically offered Fall.

BME 49500 - Selected Topics In Biomedical Engineering

Credit Hours: 1.00 to 4.00. Specialized topic areas for which there are no specific courses, workshops, or individual study plans, but having sufficient student interest to justify the formalized teaching of a course. Permission of instructor required. Typically offered Summer Fall Spring.

BME 49800 - Biomedical Engineering Projects

Credit Hours: 1.00 to 4.00. Individual research projects to be approved by the supervising faculty member before registering for the course. An approved written report is required. . Permission of instructor required. Typically offered Summer Fall Spring.

BME 52100 - Biosensors: Fundamentals And Applications

Credit Hours: 3.00. (ABE 56000) An introduction to the field of biosensors and an in-depth and quantitative view of device design and performance analysis. An overview of the current state of the art to enable continuation into advanced biosensor work and design. Topics emphasize biomedical, bioprocessing, environmental, food safety, and biosecurity applications. Typically offered Spring.

BME 52800 - Measurement And Stimulation Of The Nervous System

Credit Hours: 3.00. (ECE 52800) Engineering principles addressing questions of clinical significance in the nervous system: neuroanatomy, fundamental properties of excitable tissues, hearing, vision, motor function, electrical and magnetic stimulation, functional neuroimaging, disorders of the nervous system, development and refinement of sensory prostheses. Typically offered Spring.

BME 54000 - Biomechanics

Credit Hours: 3.00. Application of engineering mechanics to the study of normal and diseased musculoskeletal systems, including bone and soft tissue biology, musculoskeletal statics and dynamics, mechanical properties of biological tissues, and structural analysis of bone-implant systems. Permission of instructor required. Typically offered Fall.

BME 55100 - Tissue Engineering

Credit Hours: 3.00. (BMS 52300) Integrates the principles and methods of engineering and life sciences toward the fundamental understanding of structure-function relationships in normal and pathological mammalian tissues, especially as they relate to the development of biological substitutes to restore, maintain, or improve tissue/organ function. Current concepts and strategies, including drug delivery, tissue and cell transplantation, bioartificial organs, and in vivo tissue regeneration are introduced, as well as their respective clinical applications. Permission of instructor required. Typically offered Fall.

BME 55300 - Biomedical Optics

Credit Hours: 3.00. Optical methods applied to address biological and biomedical problems. The course includes two parts: fundamentals of optical microscopy and advanced techniques that are currently used to probe and/or manipulate cell and tissue samples. Permission of instructor required. Typically offered Fall.

BME 58100 - Fundamentals Of MEMS And Micro-Integrated Systems

Credit Hours: 3.00. (ECE 52600) Key topics in micro-electro-mechanical systems (MEMS) and biological micro-integrated systems; properties of materials for MEMS; microelectronic process modules for design and fabrication. Students will prepare a project report on the design of a biomedical MEMS-based micro-integrated system. Offered in alternate years. Typically offered Fall.

BME 58300 - Biomaterials

Credit Hours: 3.00. Discussion of principles of biomaterial design, synthesis, and evaluation for various tissues/organs of the body, including orthopaedic/dental, cardiovascular, kidney, liver, lung, skin, nerve, and brain. Topics include fundamentals of materials science and engineering integrated into biology for the better regeneration of tissue. Offered in alternate years. Permission of instructor required. Typically offered Fall.

BME 59500 - Selected Topics In Biomedical Engineering

Credit Hours: 1.00 to 3.00. This course is designed primarily for specialized topic areas for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of a course. Permission of instructor required. Typically offered Fall Spring Summer.

BME 60000 - Mentoring For Combined Degree (MD/PhD) Students in BME

Credit Hours: 0.00. Specialized course for M.D./Ph.D. students that is intended to maintain communication and orientation to the BME graduate program during the first two years of the combined degree program when students are completing medical school

requirements on the Indianapolis campus. Requirements include attendance at one or more BME seminars on the West Lafayette campus; at least two research planning sessions with BME faculty members, BME graduate program coordinator, or assistant head; and participation in one additional graduate program activity. Permission of department required. Prerequisite is admissions to the Combined MD/PhD Degree program. Typically offered Fall Spring Summer.

BME 62600 - Engineering Nanomedical Systems

Credit Hours: 3.00. Doctoral level course dealing with engineering design of nanomedical devices for drug/gene delivery. The course covers medical needs for nanomedicine; uses of nanomaterials, biomarkers and targeting strategies; uses of bionanotechnology instrumentation for characterization of nanomedical systems and their interactions with cells; drug/gene delivery methods; biodistribution and nantoxicity issues; FDA regulations and cGMP (current Good Manufacturing Practices) bionanomanufacturing principles. Typically offered Fall.

BME 63000 - Introduction To Biomedical Imaging Systems

Credit Hours: 3.00. (ECE 62000) Overview of biomedical imaging systems and analysis. Examination of various imaging modalities, including X-ray, ultrasound, nuclear, and MRI. Microscopy including how images are formed and what types of information they provide. Image analysis techniques, including analysis of cardiac ultrasound, mammography, and MRI functional imagery. Offered in alternate years. Prerequisite: ECE 63700 with minimum grade of D-. Typically offered Spring.

BME 65800 - Cell And Tissue Culture: Techniques And Application Module

Credit Hours: 2.00. (BMS 63500) This intensive laboratory module is designed to provide students from various disciplines (e.g., life science and engineering) with practical, hands-on experiences in the area of cell and tissue culture. Students are taught the principles of culturing cells and tissues in vitro and have the opportunity to apply state-of-the-art culturing techniques to both 2-dimensional and 3-dimensional culture systems. Specific methodologies focus on both qualitative and quantitative analysis of fundamental cell behavior, including proliferation, differentiation, migration, and adhesion. Permission of instructor required. Typically offered Spring.

BME 69000 - Seminar In Biomedical Engineering

Credit Hours: 0.00. Seminar course covering a broad range of current research topics spanning Biomedical Engineering. Seminar presentations by representatives from industry and faculty from Purdue University and other external institutions. Required of Biomedical Engineering graduate students at Purdue; M.S. and Ph.D. students must complete two and four semesters (respectively) prior to graduation. Typically offered Fall Spring.

BME 69500 - Advanced Topics In Biomedical Engineering

Credit Hours: 1.00 to 3.00. This course is designed primarily for specialized topic areas for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of an advanced course. Permission of instructor required. Typically offered Fall Spring Summer.

BME 69600 - Advanced Biomedical Engineering Projects

Credit Hours: 1.00 to 6.00. Individual research projects to be approved by the supervising faculty member before registering for the course. An approved written report is required. Permission of instructor required. Typically offered Fall Spring Summer.

BME 69700 - Directed Reading In Biomedical Engineering

Credit Hours: 1.00 to 3.00. Individualized reading course supervised by an appropriate faculty member. Approval for each reading course must be obtained from the department prior to registration. Permission of instructor required. Typically offered Fall Spring Summer.

BME 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

BME 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Botany and Plant Pathology

BTNY 11000 - Introduction To Plant Science

Credit Hours: 4.00. An introduction to the major groups in the plant kingdom, their origin, classification, and economic importance. The areas of anatomy, morphology, cytology, physiology, biochemistry, molecular biology, genetics, and ecology will be explored as they relate to plant sciences and agriculture. Course may also be offered for dual credit with cooperating Indiana high schools upon documented approval by the Department of Botany and Plant Pathology. Typically offered Fall Spring.

BTNY 20100 - Plants And Civilization

Credit Hours: 3.00. This course, intended primarily for non-majors, covers the history of agriculture, with focus on the centers of origin of our major food, fiber, and medicinal plants, and their historical, cultural, and economic relevance. The course also surveys the biology of crop plants, with respect to taxonomy, anatomy, cell structure, physiology, development, and genetics. Discussions also center on the roles plant biotechnology may play in sustainable agriculture and in helping to alleviate problems caused by overpopulation and ecological stress. Typically offered Spring.

BTNY 20400 - Crop and Weed Identification

Credit Hours: 1.00 or 2.00. (AGRY 20400) The identification by sight of plant mounts and seeds of over 200 crops and weeds is taught. The first eight weeks, which covers restricted weeds, prohibited noxious weeds, common weeds, and seed diseases, can be taken for one credit; the last eight weeks covers cereals, grass and legume forages, and legume crops. The list of species to be studied for two credits is obtained from the Intercollegiate Crops Judging Manual. The species to be covered for one credit include the above-listed weeds and additional weed specimens pertinent to the weeds contest. The use and origins of the species are discussed briefly. Suggested course in preparation for AGRY 30500 - Seed Analysis And Grain Grading. Typically offered Spring.

BTNY 20700 - The Microbial World

Credit Hours: 3.00. This course delivers a broad synthesis of microbiology, discussing all taxa of the microbial world. The course also discusses a wide range of subjects related to microbiology, including medical microbiology, but it has a strong emphasis on the botanical and environmental sciences. One particular characteristic that separates it from other microbiology courses is the reduced emphasis upon bacteriology, with discussions of the protists and viruses and, especially of the fungi, occurring in greater detail than the other general microbiology courses available. Typically offered Spring.

BTNY 20900 - Plant Diversity

Credit Hours: 3.00. Students will learn how to identify the major divisions of the plant kingdom, from green algae to flowering plants, based upon their morphological characteristics. Students will also learn how the evolutionary relationships among these divisions are determined using traditional and modern approaches. An emphasis will be placed on plants that grow in Tippecanoe County and surrounding counties. Typically offered Fall.

BTNY 21100 - Plants And The Environment

Credit Hours: 3.00. Plants are essential to environmental and human health, and the issues related to these interactions have received much public attention. This course provides the scientific basis for issues-related topics such as the impact of plants on biodiversity; how plants affect and are affected by global climate changes and pollution; the role of plants as invasive species;

ways in which plants can help solve environmental problems; and the consequences of human manipulation of plants (e.g. genetic engineering, bioremediation) on plant communities and ecosystems. . Typically offered Spring.

BTNY 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first-and second-year students. Courses offered must be approved by department or program faculty, and College of Agriculture Honors Committee. Permission of department required. Typically offered Fall, Spring, Summer.

BTNY 30100 - Introductory Plant Pathology

Credit Hours: 3.00. Basic principles of plant pathology, including etiology, symptomatology, control, and epidemiology of representative diseases of plants. Typically offered Fall Spring.

BTNY 30200 - Plant Ecology

Credit Hours: 3.00. Offered in odd-numbered years. This course will provide an introduction to the broad field of plant ecology. Through lectures and lab assignments, students will gain an in-depth understanding of ecological concepts regarding the occurrence and distribution of plant species and populations. Students will also gain insights into the application of these concepts to the conservation and management of plant species and populations. Typically offered Spring.

BTNY 30400 - Introductory Weed Science

Credit Hours: 3.00. A survey of the scientific principles underlying weed control practices; emphasis is on the ecology of weeds and control in crop associations. It is recommended that this course be followed by BTNY 50400. Typically offered Spring.

BTNY 30500 - Fundamentals Of Plant Classification

Credit Hours: 3.00. The principles of classification of seed plants, with emphasis on methods of identification in laboratory and field. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

BTNY 31600 - Plant Anatomy

Credit Hours: 4.00. The internal structure of seed plants. Description and recognition of cell and tissue types, tissue systems, and their interrelations in vegetative and reproductive structures. Developmental changes of the plant body from embryo to mature plant and from meristems to mature tissues. Experimental approaches where relevant to structure-function relationships and to development will be introduced. Typically offered Fall.

BTNY 35000 - Biotechnology In Agriculture

Credit Hours: 3.00. (HORT 35000) A study of the methods used to produce genetically modified organisms, primarily using gene transfer technology, and the application of these organisms in agriculture. The uses of microbes, plants, and animals in agricultural biotechnology are examined. Social, economic, and ethical issues related to biotechnology are discussed. Typically offered Spring.

BTNY 39000 - Selected Topics In Plant Science

Credit Hours: 1.00 to 3.00. This course deals with special topics in botany not covered in regular undergraduate coursework. Credit depends upon work done. May be repeated once for credit. Permission of instructor required. Typically offered Fall Spring Summer.

BTNY 40000 - Botany And Plant Pathology Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

BTNY 42000 - Plant Cellular And Developmental Biology

Credit Hours: 3.00. This course will focus on the fundamentals of plant cellular and developmental biology. Topics to be covered include: the structure and function of plant organelles and membranes; the cell cycle; DNA, RNA and protein synthesis; the secretory pathway, and the cellular basis of development and whole plant morphogenesis. Typically offered Spring.

BTNY 44300 - Arthropods And Diseases Of Turfgrass

Credit Hours: 3.00. (ENTM 44300) This course is designed to introduce students to the biology, ecology, and management of arthropods and diseases associated with turfgrass ecosystems. The course is divided into two discrete segments with a focus on arthropods during the first half of the semester and diseases during the second half of the semester. Typically offered Spring.

BTNY 44600 - Integrated Plant Health Management For Ornamental Plants

Credit Hours: 3.00. (ENTM 44600) Principles and practices for diagnosing and managing diseases, insects, and abiotic disorders of woody and herbaceous ornamental plants and turf. Designed for those students in urban forestry, horticulture, and turf management who want a one-semester course on integrated plant health management. A course in plant pathology is recommended, but not required. Typically offered Fall.

BTNY 47500 - Honors Course - Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third-and fourth-year students. Courses offered must be approved by department or program faculty, and College of Agriculture Honors Committee. Permission of department required. Typically offered Fall, Spring, Summer.

BTNY 49700 - Undergraduate Seminar

Credit Hours: 1.00. Problem-based seminar drawing on students' experience in undergraduate research. Preparation of seminar and poster presentations based on problem analysis relevant to careers in plant biology, environmental plant science, and crop protection. Instruction on problem analysis, scientific writing, and presentation skills are combined with career development activities, including invited speakers from industry, academia, and government. With prior approval and in consultation with the instructor, a student may substitute a problem based on study abroad, an undergraduate course project, or supervised internship or other supervised work-related experience. Typically offered Spring.

BTNY 49800 - Research In Plant Science

Credit Hours: 1.00 to 3.00. Supervised individual laboratory or field research. A written report of work accomplished will be required. May be repeated once for credit. Permission of instructor required. Typically offered Fall Spring Summer.

BTNY 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. Thesis research. Admission to the honors program. Permission of instructor required. Typically offered Fall Spring Summer.

BTNY 50400 - Advanced Weed Science

Credit Hours: 3.00. Emphasizes the mode and mechanism of herbicide action and herbicide interaction with plants, and the biology and ecology of weedy plants. Offered in odd-numbered years. Typically offered Fall.

BTNY 50500 - Advanced Biology Of Weeds

Credit Hours: 3.00. Principles of weed biology and ecology, with focus on reproduction and ecophysiology, population dynamics, community ecology, and ecosystem level phenomena. Instruction will emphasize the development and refinement of critical thinking skills. Offered in even-numbered years. Typically offered Fall.

BTNY 51700 - Diseases Of Agronomic Crops

Credit Hours: 1.00. This five-week miniclass teaches students the disease cycles and principles and practices for identifying and managing diseases of agronomic crops. The course is designed for students in plant protection, agronomy, entomology, and other areas who desire an intensive study of diseases of agronomic crops grown in Indiana. Primary emphasis is given to symptomatology, etiology, and disease management through in-depth study of major diseases affecting corn, soybeans, small grains, and forage crops. Special emphasis is placed on the practical aspects of IPM management systems. Weeks 11-15. Typically offered Fall.

BTNY 52500 - Intermediate Plant Pathology

Credit Hours: 3.00. Examines the biological and pathological characteristics of major causal agents; concepts of epidemiology and disease assessment; physiology, genetics, and molecular biology of host-pathogen interactions; disease management practices; and methods of disease diagnosis. Typically offered Fall.

BTNY 53500 - Plant Disease Management

Credit Hours: 3.00. An examination of the current principles, strategies, and technologies used in plant disease control. Emphasis is placed on the integration of various technologies and strategies for efficacious, environmentally sound management principles for specific types of plant diseases. Major topics include plant disease management through regulatory procedures, pathogen exclusion, pathogen eradication, environmental modification, host modification, host resistance, cultural practices, host protectants, plant disease forecasting, and the epidemiological basis of disease management strategies. Typically offered Spring.

BTNY 55000 - Biology Of Fungi

Credit Hours: 3.00. Lectures cover general features of fungi, unique characteristics of major fungal groups, fungal interactions

with other organisms, and principles of fungal genetics. Lab exercises include examination of representative species from major groups of fungi and classical and molecular manipulations of fungi. (Offered in odd-numbered years.). Typically offered Fall.

BTNY 55200 - Molecular Approaches In Plant Biology

Credit Hours: 3.00. This is mainly a laboratory exercise course designed to help students to be more familiar with common molecular techniques used in plant pathology studies. Techniques will include DNA/RNA isolation, hybridization, sequence analyses, various PCR reactions, library construction and screening, protein isolation, and plant transformation. Lectures will cover basic principles and applied aspects of molecular studies in plant pathology, and recent advances in genomics and proteomics techniques. Typically offered Spring.

BTNY 55300 - Plant Growth And Development

Credit Hours: 3.00. (HORT 55300) Topics include seed dormancy, cell expansion and plant growth, pattern formation, phase transition, flowering, pollination and fertilization, seed development, fruit development, and senescence. This course is the second in a series of team-taught courses in the core curriculum of the Purdue Plant Biology Program. Typically offered Spring.

BTNY 55500 - Aquatic Botany

Credit Hours: 3.00. This course has required class trips. Students will pay individual lodging or meal expenses where necessary. The study of algae and higher plants of the aquatic environment with emphasis on identification, morphology, ecology, role as pollutants, physiology, and control. Typically offered Fall.

BTNY 55600 - Aquatic Plant Management

Credit Hours: 1.00. This five-week miniclass is designed to teach students the principles and practices for identifying and managing the algae and aquatic plants that inhabit Midwestern ponds and lakes. The majority of the course involves control practices and includes the option of taking the test to become certified in aquatic pesticide application (category 5). The establishment and maintenance of aquatic plants in constructed wetlands and water gardens are also covered. (Offered in alternate years.) (Course meets during weeks 1-5.). Typically offered Fall.

BTNY 55800 - Pathogens Of Plants

Credit Hours: 3.00. Plant pathology is the science of plant diseases and of the microorganisms that cause them and of our attempts to manage plant diseases. The ultimate goal of plant pathologists is to reduce the losses caused by diseases, thereby, increasing both the quality and quantity of the world food supply. Plant diseases are caused by the same types of microorganisms that cause disease in animals and humans and, as such, many of the principles that apply to human and animal medicine apply to

plant diseases. It is the objective of this course to introduce students to the major types of plant pathogens (plant pathogenic bacteria, viruses, nematodes, and fungi), their basic biology and examples of the types of diseases they cause. It will be expected that students have knowledge in plant pathology. Typically offered Fall.

BTNY 59000 - Special Problems

Credit Hours: 1.00 to 3.00. Open to graduate students and qualified undergraduates who desire to study special problems in plant science not covered in regular coursework. Credit dependent upon work done. Permission of instructor required. Typically offered Fall Spring Summer.

BTNY 59500 - Research Methods

Credit Hours: 1.00 to 3.00. Various and current research methods, ranging from computer application packages to molecular biological techniques, are taught in modular form with each module consisting of 16 hours within a two-week period. Each module will provide an introduction to the method followed by hands-on laboratory experience. Hours will be arranged to accommodate course conflicts. Enrollment is limited to six students per module. Modules offered vary among semesters. Permission of instructor required. Typically offered Fall Spring.

BTNY 60500 - Diagnosis Of Plant Diseases

Credit Hours: 2.00. Symptomatology and diagnosis of diseases of field crop, vegetable, fruit, ornamental, and tree plants. Emphasis is on the collection and study of diseases in field, greenhouse, and storage. Prerequisite: BTNY 30100. Typically offered Fall Spring Summer.

BTNY 61300 - Advanced Plant Pathology

Credit Hours: 3.00. This course makes an exhaustive attempt to dissect the nature of plant disease and resistance mechanisms in plants. Special emphasis is placed on emerging concepts and paradigms that underlie a wide variety of plant-pathogen interactions, and how the knowledge gleaned from these studies is being used to devise effective and environmentally safe strategies of plant protection. It is expected that students have knowledge in genetics, molecular biology, biochemistry, and plant pathology. Typically offered Spring.

BTNY 64000 - Metabolic Plant Physiology

Credit Hours: 3.00. (AGRY 64000, BIOL 64000, HORT 64000) Topics include photosynthesis, respiration, carbohydrate and lipid metabolism, and nitrogen, sulfur, and secondary metabolism. This course is the third in a series of core courses in the

Purdue Plant Biology graduate curriculum. Prerequisite: (BIOL 55100 or HORT 55100), (BTNY 55300 or HORT HORT 55300), BCHM 56100, and BCHM 56200. Typically offered Fall.

BTNY 66000 - Scientific Writing

Credit Hours: 3.00. This is a course on coping with publication in professional journals. It covers the full range of activities involved in carrying a piece of original research to completion as a primary research article in a refereed journal. Emphasis is on principles of clear and concise technical reporting. Topics include: research and writing goals; journals' policies; data presentations; effective style; organizing, writing, revising, and processing manuscripts; proofreading; peer review; ethics; and grant proposals. Students will use their own data to prepare a manuscript as if for publication. Permission of instructor required. Typically offered Spring.

BTNY 69000 - Departmental Seminar

Credit Hours: 1.00. Reports and discussion of research and current topics. Typically offered Fall Spring.

BTNY 69700 - Seminar In The Plant Sciences

Credit Hours: 1.00. Advanced study of contemporary topics in plant biology, plant pathology, and weed science. Graduate students enrolled will receive training and experience in preparing and presenting seminars. Typically offered Fall Spring.

BTNY 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

BTNY 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Building Construction Management Technology

BCM 10001 - Introduction To Construction

Credit Hours: 3.00. Introduction to Construction is a survey of the construction industry. It includes the overall construction process from initial concept through start-up of the complete facility, career opportunities in the construction industry, and an introduction to the materials and management systems used in construction, with an emphasis on vocabulary building. Typically offered Fall Spring Summer.

BCM 11201 - Construction Surveying Fundamentals

Credit Hours: 2.00. Introduction to basic surveying measurement and computations. Development of the surveying skills necessary to measure distances, angles, and elevations to required construction accuracies by eliminating mistakes and reducing errors. Calculation of corrections, traverse closures, coordinates, areas and construction layout data. Emphasis is placed on proper instrument use and note-keeping techniques. Typically offered Fall Spring Summer.

BCM 13000 - Structural Systems

Credit Hours: 3.00. Not open to building construction management technology students. An introductory study of materials and systems used in structures. The study of materials includes their properties, characteristics, design parameters, and general applications. The study of structures, superstructures, special structures, and construction features. A qualitative approach is taken, with emphasis on vocabulary building. Typically offered Fall Spring Summer.

BCM 17500 - Construction Materials And Methods

Credit Hours: 4.00. Students acquire basic skills in construction methods, quantity estimating, plan reading, and project documentation through hands-on laboratory experience assembling construction materials. Computer utilization includes word processing, spreadsheets, and computer graphics. Typically offered Fall Spring Summer.

BCM 21200 - Construction Layout

Credit Hours: 3.00. Application of surveying skills relevant to the field of construction. Projects include layout of buildings, route centerlines, indirect determination of elevation and distance, referencing, establishment of grade, topographic mapping, and earthwork computations. Instruments used will include transit, theodolite, automatic level, laser, and EDM. Typically offered Fall Spring Summer.

BCM 21500 - Mechanical Construction

Credit Hours: 3.00. Principles of code, design, methods, and materials are applied to plumbing, heating, ventilation, and air

conditioning systems for buildings. The comprehension of mechanical construction plans and specifications is emphasized through exercises in mechanical estimating. Typically offered Fall Spring.

BCM 21601 - Electrical Construction

Credit Hours: 2.00. Principles of code and basic concepts in electrical theory, materials, methods, design and estimating are applied to electrical systems for buildings. Comprehension of electrical construction plans and specifications as well as installation exercises are emphasized through lab experiences. Typically offered Fall Spring Summer.

BCM 23000 - Mechanical And Electrical Systems

Credit Hours: 3.00. Not open to building construction management technology students. An introductory study of piping, HVAC, and electrical systems, and related materials used in buildings. This course is a composite of BCM 23100, 23200, and 23300.Typically offered Fall Spring.

BCM 25001 - Construction Project And Administrative Management

Credit Hours: 2.00. The study of administrative functions and project delivery methods common in the construction industry. Documentation from project startup through closeout will be covered as well as ethics and professionalism and written and oral communications in construction. Typically offered Fall Spring Summer.

BCM 27500 - Construction Plans And Measurements

Credit Hours: 3.00. Principles of graphic communication are applied to drawing and reading construction plans with emphasis on the use of computer-aided design software. Techniques for measuring items of construction work from plans and specifications are also covered. Typically offered Fall Spring Summer.

BCM 28500 - Construction Mechanics

Credit Hours: 4.00. Principles of statics and strength of materials including properties of materials, forces, equilibrium, stresses, and strains are studied. Emphasis is placed on understanding the behavior of structural components associated with the construction process. Typically offered Fall Spring.

BCM 29100 - Building Construction Practice I

Credit Hours: 1.00. Practice in industry and written reports of this practice. Admission to the Building Construction Management Technology Cooperative Education Program. Typically offered Fall Spring Summer.

BCM 29200 - Building Construction Practice II

Credit Hours: 1.00. Practice in industry and written reports of this practice. Typically offered Fall Spring Summer.

BCM 30101 - Introduction To Construction Company Financial Management

Credit Hours: 2.00. An introduction to methods for recognizing revenue for long-term construction contracts and each method's impact on financial statements. Includes introduction to analysis of financial statements and their use in developing company budgets, projecting cash needs, pricing construction projects, and forecasting the impact of business decisions on construction company profit. Typically offered Fall Spring Summer.

BCM 31500 - Mechanical Construction Estimating

Credit Hours: 3.00. Costs conditioned by the contract documents for building mechanical systems are studied. The course will focus on the methods used to estimate the cost of commercial plumbing, heating, ventilating, and air conditioning systems. The course will utilize computer estimating systems. Typically offered Fall Spring.

BCM 31600 - Electrical Construction Estimating

Credit Hours: 3.00. Costs dictated by the contract documents for the electrical systems in residential, commercial, industrial, specialty, and line construction projects are studied. The course will utilize computer estimating systems. Typically offered Fall Spring.

BCM 31700 - Mechanical And Electrical Construction Management

Credit Hours: 3.00. The principles of project management are applied to case studies of mechanical and electrical construction projects. Topics include estimating, trade coordination, labor productivity, labor relations, scheduling, management of subcontractors and general contractors, document control and administration, contract law, and subcontractor's risk. Typically offered Fall Spring Summer.

BCM 32000 - Introduction To Disaster Restoration And Reconstruction Management

Credit Hours: 3.00. Introductory topics in the DRR concentration are discussed; causes of disasters and dimensions of their effects, protocols, equipment, and techniques of restoration and reconstruction, including project and business management practices and imperatives of DRR contractors. Typically offered Fall Spring Summer.

BCM 32100 - Disaster Restoration And Reconstruction Project Management

Credit Hours: 3.00. Advanced topics include the continued development of a student¿s ability to integrate knowledge, skills, and other abilities essential for effective project management in the concentration. Coursework typically includes scenario-driven role playing with chronologically sequential project-level managerial problem-solving exercises. Typically offered Fall Spring Summer.

BCM 33000 - Introduction To Demolition And Reconstruction Management

Credit Hours: 3.00. This course introduces the opportunities and challenges in demolition and reconstruction management. Topics include: introduction to industry regulation, project planning, labor and equipment utilization, techniques and technologies, hazardous materials, issues involving historic properties, material reuse and recycling, safety and risk management, estimating and cost control, project feasibility, issues of ethics, and company management. Typically offered Fall Spring Summer.

BCM 33100 - Advanced Demolition And Reconstruction Management

Credit Hours: 3.00. A study of advanced topics in demolition and reconstruction management to further develop the students's ability to integrate knowledge, skills, and abilities essential for effective project management in the concentration. Emphasis is placed on project level planning, problem solving, and execution. Typically offered Fall Spring Summer.

BCM 34000 - Introduction To Healthcare Construction Management

Credit Hours: 3.00. This course explores the allocation and distribution of construction resources in the healthcare construction sector and an overview of current theories and research. Topics include the demand for health care, health insurance, hospitals and the services of all the possible healthcare professional stakeholders. A thorough understanding of the environment of care and all codes and standards relative to the constructors approach to this complex environment. Typically offered Fall Spring Summer.

BCM 34100 - Advanced Topics In Healthcare Construction Management

Credit Hours: 3.00. A study of all facilities used in the health-care industry, ranging from hospitals and clinics to nursing homes

and laboratories, emphasizing the interrelationship of planning, design, and construction. Topics include infectious materials control, disruption avoidance, rapid technology changes, and advanced/non-typical mechanical and electrical systems. Typically offered Fall Spring Summer.

BCM 34500 - Scheduling

Credit Hours: 3.00. A study of the planning and control of construction projects. Time schedules for materials, labor, and equipment. Emphasis is on critical path method (CPM) scheduling. Typically offered Fall Spring.

BCM 35000 - Construction Site Planning

Credit Hours: 3.00. A study of material handling principles and their application in preparing a site utilization plan. The selection and use of construction equipment are emphasized. Typically offered Fall Spring Summer.

BCM 35501 - Construction Site Supervision

Credit Hours: 2.00. A study of the required skills, duties, responsibilities, and leadership of construction on-site supervisory personnel and how they related to managing people on a jobsite. Emphasis is placed on understanding the multiple stakeholders, communication, collaboration, planning, and problem solving. This course will examine how the success of overall construction project is directly tied to the skills of key supervisors or superintendents. Typically offered fall Spring Summer.

BCM 36000 - Residential Construction

Credit Hours: 3.00. A study of the best building practices in residential construction, based upon green building standards, energy star, and other national programs. Course content includes partial fulfillment of the requirements for the certified green professional designation (CGP) from the National Association of Home Builders. Typically offered Fall Spring Summer.

BCM 36100 - Residential Field Management

Credit Hours: 3.00. A study of the field supervision practices related to the construction of a residential structure, including coordinating mechanical and electrical system installations. Course content includes partial fulfillment of the requirements for the residential construction superintendent designation (RCS), sponsored by the national Association of Home Builders/Home Builders Institute. Typically offered Fall Spring Summer.

BCM 36200 - Construction Competition

Credit Hours: 2.00. This is a multi-disciplinary course where students from several majors work together as a team, developing a proposal for a construction of development project, which is presented at a student competition. Topics include a variety of project types, including land development, design/build, residential, commercial and heavy highway. Permission of instructor required. Typically offered Fall Spring Summer.

BCM 37500 - Estimating

Credit Hours: 3.00. A study of the methods and procedures used to identify, measure, and value items of construction work. Application of computer software to estimating tasks is featured. Typically offered Fall Spring Summer.

BCM 38000 - Concrete Construction

Credit Hours: 3.00. An overview of concrete construction, including material composition, behavior and handling of concrete, formwork, and concrete reinforcement. Typically offered Fall Spring.

BCM 38501 - Soils In Construction

Credit Hours: 2.00. This course is a study of the properties of soils as related to construction. Students will be introduced to soil testing and classification, subsurface soil investigation, soil compaction and stabilization, stress distribution in soil, strength, strength of soil, soil consolidation and related structure settlement. Other topics include earth pressure on retaining structures, stability analysis of slopes, and productivity/cost of earthmoving equipment. Typically offered Fall Spring Summer.

BCM 39300 - Building Construction Practice III

Credit Hours: 1.00. Practice in industry and written reports of this practice. Typically offered Fall Spring Summer.

BCM 39400 - Building Construction Practice IV

Credit Hours: 1.00. Practice in industry and written reports of this practice. Typically offered Fall Spring Summer.

BCM 39500 - Building Construction Practice V

Credit Hours: 1.00. Practice in industry and written reports of this practice. Typically offered Fall Spring Summer.

BCM 40000 - Analysis Of Construction Management

Credit Hours: 3.00. Analysis of construction management techniques studied during a minimum of 10 weeks of work. Prior departmental approval of the type of work is required. A written and oral report to include a description, analysis, and evaluation of management techniques, systems, and controls must be presented during the following academic year to receive credit. Typically offered Fall Spring.

BCM 41200 - Field Engineering

Credit Hours: 3.00. A study of the duties of the field engineer and their applications to projects involving construction surveying techniques, site utilization, and daily scheduling. Field trips required. Typically offered Fall Spring.

BCM 41700 - Design/Build For Mep Contractors

Credit Hours: 3.00. The student will study, develop, and analyze conceptual design and conceptual estimating of mechanical, electrical, plumbing, fire protection, and specialty systems in construction. The principles of design/build construction will be applied to case studies of actual residential, commercial, industrial, and specialty construction projects. Topics include building systems, criteria and selection, economic feasibility, value engineering, customer control, and value-added construction services. Typically offered Fall Spring.

BCM 41900 - Sustainable Construction

Credit Hours: 3.00. A study of sustainable construction meeting the needs of the present without compromising the ability of future generations to meet their own needs. This includes evaluating the consumption of resources and environmental depletion and degradation; examining subsidiary issues of materials, energy, water, land use, and the integration of the natural and built environments, including an overview of emerging delivery systems for high performance green buildings. The U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) criteria are discussed in detail. Typically offered Fall Spring Summer.

BCM 42100 - Disaster Restoration And Reconstruction Industry Problem Investigation

Credit Hours: 2.00. A course that develops a student's preparation for an industrial concentration through a faculty and practitioner-guided study and analysis of a current DRR problem. The course culminates in a formal oral presentation and paper whose position is justified on the basis of the study and application of earlier coursework. In addition to faculty oversight, each student is typically guided by a practicing manager of the DRR industry who serves as a mentor to further develop student management potential. Typically offered Fall Spring Summer.

BCM 43500 - Design/Build

Credit Hours: 2.00. A study of the design/build project delivery system. Emphasis is placed on comparing and contrasting construction management functions in design/build with those in more traditional forms of project delivery such as general contracting and construction management. Typically offered Summer Fall Spring.

BCM 45100 - Computers In Construction

Credit Hours: 3.00. A study of software applications for construction management, including applications of Building Information Modeling (BIM) and Virtual Design and Construction (VDC). Typically offered Fall Spring Summer.

BCM 45500 - Construction Company Management

Credit Hours: 3.00. Business policy and management aspects of construction companies are studied. Included are ethics, public relations, business development, business plans, bonds, insurance, and human resource management considerations. Typically offered Fall Spring.

BCM 45701 - Construction Safety

Credit Hours: 3.00. This course will examine the impact of safety on the construction industry, including in-depth discussions on the application of the Occupational Safety & Health Administration (OSHA) Safety and Health Standards for the construction industry. The emphasis of this course is to provide training for job sited supervisory personnel. This course will also fulfill the requirements for the OSHA 30-Hour Card. Typically offered Fall Spring Summer.

BCM 46000 - Residential Land Development

Credit Hours: 2.00. The principles of residential land development are applied to a case study of an actual planned residential project from concept to completion. Topics include subdivision development, planning, estimating, scheduling, construction process management, customer service, cost analysis, proposal writing, and individual and team presentations. Typically offered Fall Spring Summer.

BCM 46100 - Residential Design Build

Credit Hours: 2.00. A study of the design/build project delivery system for residential construction, including home design fundamentals, construction methods, disability code requirements, building code requirements. Course content includes partial fulfillment of the requirements for the National Association of Home Builders, Certified Aging-In-Place (CAPS) designation. Typically offered Fall Spring Summer.

BCM 47500 - Construction Costs

Credit Hours: 3.00. A study of construction costs, including analysis of field records, job cost accounting, job cost control, and determination of unit prices. Typically offered Fall Spring Summer.

BCM 48100 - Highway Construction And Quality Control

Credit Hours: 3.00. A study of methods, materials, equipment, and processes used in constructing, maintaining, repairing, and rehabilitating roadways. Typically offered Summer Fall Spring.

BCM 48200 - Steel Construction

Credit Hours: 3.00. A study of the steel construction process emphasizing how structural members are fabricated, delivered, and erected into buildings and bridges. Field trips required. Typically offered Fall Spring.

BCM 48701 - Construction Capstone

Credit Hours: 3.00. This course provides a comprehensive summary of the construction industry. Emphasis is placed on the "big picture" and how the stakeholders, processes, and tasks come together to complete a complex construction project. Skills attained in previous coursework and internships will be used in industry simulations and comprehensive projects. Industry participants will provide real world coursework challenges. Typically offered Fall Spring Summer.

BCM 49000 - Construction Experience IV

Credit Hours: 1.00 to 6.00. Credit for extensive work experience in the construction industry. The quantity, quality, and variety of the experience are used as a basis for evaluating the amount of credit. Permission of instructor required. Typically offered Fall Spring Summer.

BCM 49200 - Construction Career Seminar

Credit Hours: 1.00. Discussion of current career opportunities and career planning in the construction industry. Typically offered Fall Spring Summer.

BCM 49700 - Special Topics In Construction

Credit Hours: 0.00 to 4.00. Hours, subject matter, and credit to be arranged by staff. Typically offered Fall Spring Summer.

BCM 49900 - Special Assignments

Credit Hours: 1.00 to 4.00. Special assignments for students who wish to undertake individual study on approved topics. Permission of instructor required. Typically offered Fall Spring Summer.

BCM 51000 - Topics In Environmentally Sustainable Construction, Design And Development

Credit Hours: 3.00. This course explores environmental sustainability in all its forms, starting with the historical and theoretical basis and continuing through an understanding of sustainable building construction, design, development, and renewable energy strategies/management tools and how these can be applied in practice. Typically offered Fall Spring Summer.

BCM 51100 - Energy Conserving Building Retrofit

Credit Hours: 3.00. This course introduces energy related reconstruction of buildings with an emphasis on light commercial buildings. Retrofit topics include: Basic thermodynamics, Energy conserving technologies, Impact of site characteristics, Indoor air quality, Water conservation measures, Measuring and benchmarking energy performance, Cost/Benefit Analysis, Financing energy improvements, as well as Building operation and management to reduce energy and water use. Typically offered Fall Spring Summer.

BCM 52000 - Preconstruction Project Management

Credit Hours: 3.00. Management and control of projects from authorization to start of construction. Project success factors, conceptual and parametric estimating, design planning and management constructability review techniques and value engineering methods. Real estate transactions. Land zoning, platting, development and pro forma calculations. Typically offered Spring.

BCM 52500 - Managing Construction Quality And Production

Credit Hours: 3.00. Advanced techniques for assessing the success of construction project management including schedule cost, safety and quality measurements. Impacts of pre planning, human factors, and communication systems on quality and productivity. Statistical methods for analysis of construction operations. Typically offered Fall.

BCM 53000 - Construction Operations And Strategic Management

Credit Hours: 3.00. Principles of construction company business management for U.S. companies. Executive-level construction functions including strategic planning, organizational structure, and ownership structure including succession planning. Typically offered Spring.

BCM 53500 - Construction Accounting And Financial Management

Credit Hours: 3.00. Accounting techniques, financial methods, and financial management for construction firm management. Analysis techniques for contemporary construction company accounting and finance practice with an emphasis on cash flow analysis and cash management. Typically offered Fall.

BCM 54000 - Law For Construction Managers

Credit Hours: 3.00. A study of the legal system and its impact on the construction process. The focus is on the legal obligations, rights and remedies pertaining to the construction company. Topics include bidding, contracts, and construction changes. Typically offered Fall.

BCM 54500 - Construction Management Training And Development

Credit Hours: 3.00. Identification, training and development of future company leaders. Mentorship as a required, managerial activity, effective delegation of responsibility, and empowerment of subordinates to take initiative. Typically offered Fall.

BCM 55000 - Risk Management In Construction

Credit Hours: 3.00. Analysis of the depth and breadth of risk in construction. Defining key terms and concepts used in various risk management arenas - legal statutes, precedent and case studies relevant to construction risk management, insurance, and surety bonding. Subjects include: contracts, torts, insurance, surety, safety laws, quality, and risk management models. Analysis of case studies to utilize risk management tools and identify issues and possible approaches. Project risk control including management of foreseeable hazards as well as unforeseen conditions. Typically offered Spring.

BCM 55500 - Construction Leadership And Marketing

Credit Hours: 3.00. Analysis of organizational leadership at the executive level. The goals of this course are to introduce and stimulate thought and discussion of leadership theories, characteristics and behaviors of successful leaders, contextual factors affecting leader effectiveness, dynamics of leader-follower relationships, communication, decision-making and contemporary challenges confronting organizational leaders as well as marketing theory, marketing vs. business development, the marketing process, and an introduction to a construction marketing dashboard. Typically offered Spring.

BCM 56000 - Academic Writing Seminar I

Credit Hours: 1.00. Analysis of the requirements of research reports. Emphasis on research methods and concepts, identifying major issues, academic literature reviews, data collection and presentation methods, and selecting a research topic. Typically offered Fall.

BCM 56500 - Academic Writing Seminar II

Credit Hours: 1.00. Provides a higher level understanding of scholarly writing as it is applied to the individual student's research. Students also learn to present his or her technical work to an audience in a clear, easily understandable form. Typically offered Fall.

BCM 57000 - Analysis Of Research In Construction

Credit Hours: 3.00. Analysis of research and evaluation of research reports. Emphasis on understanding the application of business research procedures including fundamental statistical methods in the solution of a construction industry relevant problem. Typically offered Spring.

BCM 58100 - Workshop In Building Construction Management Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Summer Fall Spring.

BCM 59000 - Special Problems In Building Construction Management Technology

Credit Hours: 1.00 to 6.00. Independent study of a special problem under the guidance of a member of the staff. Does not substitute for either M.S. thesis or M.S. project credit. Permission of instructor required. Typically offered Summer Fall Spring.

BCM 59800 - Directed MS Project

Credit Hours: 1.00 to 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of instructor required. Typically offered Summer Fall Spring.

BCM 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Chemical Engineering

CHE 19000 - Chemical and Biomedical Engineering Introduction

Credit Hours: 3.00. An orientation course to inform students of the various areas in chemical engineering, to assist them in selection of electives suited to their particular abilitites and interest, and to instill a sence of professional ethics, and responsibility. Lectures drawn from all fields of chemical engineering. Typically offered Fall.

CHE 20000 - Chemical Engineering Seminar

Credit Hours: 0.00. An orientation course to inform students of the various areas in chemical engineering, to assist them in selection of electives suited to their particular abilities and interest, and to instill a sense of professional ethics and responsibility. Lectures drawn from all fields of chemical engineering. Typically offered Fall.

CHE 20100 - Cooperative Seminar I

Credit Hours: 0.00. Lectures by faculty and students on subjects that relate the academic work and the industrial experience. Written reports on the industrial experience are required and will include a documentation of the student's success in finding application of specified academic activities. For students returning from the first and second work periods. Typically offered Fall Spring.

CHE 20500 - Chemical Engineering Calculations

Credit Hours: 4.00. Quantitative applications of steady-state mass and energy balances to solve problems involving multi-component systems and multi-unit chemical processes. Single-component and multi-component phase equilibria, single-reaction and multiple-reaction stoichiometry, coupled mass and energy balances, chemical processes involving bypass and recycle streams. Typically offered Fall Spring.

CHE 21100 - Introductory Chemical Engineering Thermodynamics

Credit Hours: 4.00. Basic principles and concepts of thermodynamics applied to chemical engineering problems; use of basic thermodynamic functions of enthalpy, entropy, free energy to solutions, phase equilibria, and chemical equilibria; thermodynamic processes and efficiencies; equations of state; and relation of macroscopic to molecular properties. Typically offered Fall Spring.

CHE 29000 - Industrial Practice I

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Must be accepted for the program by the cooperative program coordinator. Typically offered Fall Spring Summer.

CHE 29100 - Industrial Practice II

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Must be accepted for the program by the cooperative program coordinator. Typically offered Fall Spring Summer.

CHE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

CHE 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of departmet required. Typically offered Fall Spring Summer.

CHE 29600 - Professional Internship I

Credit Hours: 0.00. Professional experience in chemical engineering. Program coordinated by school in cooperation with participating employers. Students submit a summary report. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 29699 - Professional Practice Internship I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

CHE 30000 - Chemical Engineering Seminar

Credit Hours: 0.00. Continuation of CHE 20000. Typically offered Spring.

CHE 30100 - Cooperative Seminar II

Credit Hours: 0.00. Continuation of CHE 20100. For students returning from the third and fourth work periods. Typically offered Summer Fall Spring.

CHE 30300 - Frontiers In Chemical Engineering

Credit Hours: 1.00. Exposure to advances in thermodynamics, fluid mechanics, heat and mass transfer, kinetics and reaction engineering. Applications of chemical engineering in case studies from the biomedical, biochemical, pharmaceutical, polymer, and microelectronics industry. Typically offered Fall Spring.

CHE 30600 - Design Of Staged Separation Processes

Credit Hours: 3.00. The application of equilibria and mass and energy balances for the design of staged separation processes. Use of various equilibrium data and thermodynamic principles for the design of batch and continuous distillation, absorption, stripping, and extraction systems. Stagewise calculations and graphical methods for design of binary systems. Design of multicomponent separators. Determination of stage efficiency and column size. Typically offered Fall.

CHE 32000 - Statistical Modeling And Quality Enhancement

Credit Hours: 3.00. Statistical modeling methods, design of experiments, error analysis, curve fitting and regression, analysis of variance, confidence intervals, quality control and enhancement: emphasizes preparation for designing chemical engineering laboratory experiments and analyzing data. Typically offered Spring.

CHE 33000 - Principles Of Molecular Engineering

Credit Hours: 3.00. Application of concepts of atomic and molecular bonding, solid microstructure, phase equilibria, and rate processes to the design of solid materials for specific engineering objectives. Typically offered Spring.

CHE 34800 - Chemical Reaction Engineering

Credit Hours: 4.00. Application of kinetic rate equations, mass balances and energy balances to the analysis and design of chemical reactors involving homogeneous and heterogeneous chemical reactions. Chemical equilibria, kinetic rate equations for homogeneous and heterogeneously catalyzed reactions, design of ideal isothermal reactors, effects of non-isothermal operation, effects of diffusion in porous catalysts and non-ideal mixing in continuous flow reactors. Typically offered Fall Spring.

CHE 37700 - Momentum Transfer

Credit Hours: 4.00. Differential (microscopic) and integral (macroscopic) mass, momentum, and energy balances. Newtonian and non-Newtonian fluids. Fluid statics. One-dimensional steady and transient laminar flows. Turbulence. Dimensional analysis and similarity. Friction factors and drag coefficients. Applications to engineering analysis of practical problems. Introduction to numerical analysis and visualization of flows. Typically offered Fall.

CHE 37800 - Heat And Mass Transfer

Credit Hours: 4.00. Macroscopic and differential energy balances. Heat transfer coefficients for free and forced convection and phase change. Conductive and radiative heat transfer. Applications to heat transfer equipment design and compressible fluid flow. Macroscopic and differential species balances. Mass transfer coefficients and analogies. Mass transfer with and without chemical reaction. Mass transfer equipment design. Typically offered Fall Spring.

CHE 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of departmet required. Typically offered Fall Spring Summer.

CHE 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of departmet required. Typically offered Fall Spring Summer.

CHE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of departmet required. Typically offered Fall Spring Summer.

CHE 39200 - Industrial Practice III

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Must be accepted for the program by the cooperative program coordinator. Typically offered Fall Spring Summer.

CHE 39300 - Industrial Practice IV

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Must be accepted for the program by the cooperative program coordinator. Typically offered Fall Spring Summer.

CHE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of departmet required. Typically offered Fall Spring Summer.

CHE 39400 - Industrial Practice V

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Must be accepted for the program by the cooperative program coordinator. Typically offered Fall Spring Summer.

CHE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of departmet required. Typically offered Fall Spring Summer.

CHE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of departmet required. Typically offered Fall Spring Summer.

CHE 39600 - Professional Internship II

Credit Hours: 0.00. Professional experience in chemical engineering. Program coordinated by school in cooperation with participating employers. Students submit a summary report. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 39699 - Professional Practice Internship II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

CHE 40000 - Professional Guidance

Credit Hours: 1.00. Lectures to acquaint the senior students with professional ethics, job opportunities, graduate study, graduate schools' continuing study, and services of professional societies. Typically offered Fall.

CHE 40100 - Cooperative Seminar III

Credit Hours: 1.00 to 3.00. Continuation of CHE 30100. For senior students returning from the last work period. Typically offered Fall.

CHE 41100 - Chemical Engineering Science Research Problems

Credit Hours: 1.00 to 4.00. Experience in chemical engineering science research or development; either directed or independent work that can be experimental or theoretical. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 41200 - Chemical Engineering Design Research Problems

Credit Hours: 1.00 to 4.00. Experience in chemical engineering design research or development; either directed or independent work that can be experimental or theoretical. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 42000 - Process Safety Management

Credit Hours: 3.00. Students will develop knowledge of process safety management in the process industries. This new course is being developed with significant input from industrial safety professionals and will prepare students for the safety problems they will encounter in industry. Typically offered Fall.

CHE 42900 - Advanced Chemical Processes

Credit Hours: 3.00. A study of industrial chemical reactions by general type. Comprehensive problems in process fundamentals. Typically offered Spring.

CHE 43400 - Chemical Engineering Laboratory I

Credit Hours: 3.00. Quantitative experimental study of thermodynamics, fluid mechanics, and heat and mass transfer; operation and evaluation of equipment; application of methods of data analysis in practice; use of computers in controlling and simulating experiments; strong emphasis on report writing and oral communication. Typically offered Fall.

CHE 43500 - Chemical Engineering Laboratory

Credit Hours: 4.00. Quantitative experimental study of projects involving problems in fluid mechanics and heat and mass transfer or operation and evaluation of equipment; projects include analysis and data-based design of operations involving mass transfer such as distillation, absorption, extraction, drying, humidification, etc; study of rates and equilibria in simple chemical reaction systems; study of chemical processes; application of methods of data analysis in practice; some library work; emphasis on group work, report writing, and oral communication. Typically offered Fall Spring.

CHE 44200 - Chemistry And Engineering Of High Polymers

Credit Hours: 3.00. Introduction to basic principles of polymer engineering, including the chemical structure and use of a variety

of industrial polymers, polymerization mechanisms and kinetics, techniques for molecular and morphological characterization, polymer processing, and a variety of engineering properties. Typically offered Spring.

CHE 44900 - Fundamental Process Design

Credit Hours: 3.00. Use of process and product synthesis methods and concepts; detailed design of unit operation equipment, the economics of chemical plants, and flow sheet optimization methods. Typically offered Fall.

CHE 45000 - Design And Analysis Of Processing Systems

Credit Hours: 4.00. Use of process and product synthesis methods and concepts; detailed design of unit operation equipment, the economics of chemical plants and flow sheet optimization methods. Synthesize, develop, and evaluate a preliminary design of a chemical process that meets market requirements for a specific product. Analysis of design alternatives using case studies and optimization methods. Typically offered Spring.

CHE 45600 - Process Dynamics And Control

Credit Hours: 3.00. Dynamic response and control of chemical processing equipment, such as heat exchangers, chemical reactors, and absorption towers. Use is made of fundamental techniques of servomechanism theory, such as block diagrams, transfer functions, and frequency response. Introduction to advanced control techniques. Typically offered Fall.

CHE 46100 - Biomedical Engineering

Credit Hours: 1.00. An introduction to the field of biomedical engineering, with particular stress on the chemical engineer's role. Typically offered Fall.

CHE 46300 - Applicatiions Of Chemical Engineering Principles

Credit Hours: 3.00. Team-based design projects in materials transport, heat transfer, mass transfer, separations, chemical reactors. Emphasis on team operation and decision-making. Consideration of current technical challenges, societal and economic issues. Typically offered Fall.

CHE 49600 - Chemical Engineering Honors Laboratory

Credit Hours: 3.00. Quantitative experimental study of fluid mechanics, heat and mass transfer, chemical kinetics, and reactions. Design of experimental studies. Comparison of experimental results with theory. Development of new experiments. Library work. Strong emphasis on report writing and oral communication. Honors classification. Typically offered Fall.

CHE 49700 - Special Topics In Chemical Engineering

Credit Hours: 1.00 to 4.00. Primarily designed for subject areas for which there is no specific course offered. Areas of study will deal with topics that have enough student interest to justify the teaching of specialized courses on a trial basis. The course can be repeated by a student as long as the topic being taught is not repeated. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 49800 - Undergraduate Thesis Research I

Credit Hours: 3.00. Individual research projects for students completing a non-honors undergraduate thesis. Requires prior approval of, and arrangement with, a faculty research advisor. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 49801 - Undergraduate Honors Thesis Research I

Credit Hours: 3.00. Individual research projects for students completing an honors designated undergraduate thesis. Requires prior approval of, and arrangement with, a faculty research advisor. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 49900 - Undergraduate Thesis Research II

Credit Hours: 3.00. Individual research projects for students completing a non-honors undergraduate thesis. Continuation of CHE 49800. Includes submission of written thesis and public oral presentation. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 49901 - Undergraduate Honors Thesis Research II

Credit Hours: 3.00. Individual research projects for students completing an honors designated undergraduate thesis. Continuation of CHE 49801. Includes submission of written thesis and public oral presentation. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 51700 - Micro/Nanoscale Physical Processes

Credit Hours: 3.00. (ME 51700) Study of physical processes encountered in small scale systems like Micro-Electromechanical Systems (MEMS) and nanotechnology. Introduction of tools for micron to molecular scale analysis of statics, dynamics, electricity and magnetism, surface phenomena, fluid dynamics, heat transfer, and mass transfer. Quantitative analysis of specific MEMS devices using finite element analysis. Typically offered Spring.

CHE 52500 - Biochemical Engineering

Credit Hours: 3.00. Enzyme kinetics, mathematical models of microbial growth, bioreactor design and operation, genetic and metabolic engineering, plant and animal cell culture, and purification of biological products. . Typically offered Fall.

CHE 53600 - Particulate Systems

Credit Hours: 3.00. A broad overview of the fundamental concepts in particulate systems including particle characterization, particle size measurement, sedimentation, fluidization, gas and liquid conveying, particle storage, fluid-particle separation, particle size enlargement and reduction, particle mixing and hazards associated with the handling of particulate solids. Practical applications are emphasized, with a focus on how particles behave differently than fluids. Typically offered Spring.

CHE 53800 - Design And Processing Of Particulate Products

Credit Hours: 3.00. Characterization particulate systems, use of population balances to describe processes that make or transform particles, applications in important unit processes including crystallization, granulation, milling, aerosol processes. Typically offered Fall Spring.

CHE 54000 - Transport Phenomena

Credit Hours: 3.00. Continuation of CHE 37700 and CHE 37800. Topics in fluid mechanics, heat transfer and mass transfer including unsteady state transport problems, stream functions, potential flow, hydrodynamic and thermal layers, turbulence, and multicomponent diffusion. Typically offered Fall.

CHE 54300 - Polymerization Reaction Engineering And Reactor Analysis

Credit Hours: 3.00. Polymerization kinetics, polycondensation, gelation, radical polymerization, ionic polymerization, copolymerizations, Ziegler-Natta polymerizations, polymerization in bulk, solution, suspension and emulsion, modeling,

stochastic processes, Z-transforms, batch, CSTR and tubular reactors, stability analysis, computer control, separation, and drying. Typically offered Fall.

CHE 54400 - Structure And Physical Behavior Of Polymer Systems

Credit Hours: 3.00. Statistical mechanics of chain molecules, thermodynamics of polymer solutions, phase separations, experimental methods of molecular weight determination, crystallization of polymers, polymer physics, rubber elasticity, viscoelasticity. Typically offered Spring.

CHE 55000 - Optimization In Chemical Engineering

Credit Hours: 3.00. Survey of the basic computational tools for solving nonlinear constrained and unconstrained optimization problems. Emphasis on methods applicable to problems arising in chemical plant design, process operations and scheduling, parameter estimation, and waste energy reutilization. Typically offered Spring.

CHE 55500 - Computer Integrated Process Operations

Credit Hours: 3.00. Introduction to computer-aided process operations management. Topics include: process monitoring, regulatory control, data reconciliation, unit and plant-wide optimization, process fault diagnosis, supervisory control, planning, and scheduling. A design project involving a unified application of the presented methodologies is taken from a published industrial benchmark problem. Typically offered Fall.

CHE 55700 - Intelligent Systems In Process Engineering

Credit Hours: 3.00. Introduction to artificial intelligence concepts and techniques and their application to important problems in process systems engineering. Topics covered include: introduction to artificial intelligence, knowledge representation and search, knowledge-based systems, neural networks, genetic algorithms, inexact reasoning techniques, industrial case studies in process fault diagnosis and control, design and synthesis, planning and scheduling, AI languages, tools, and environments. Typically offered Spring.

CHE 55800 - Rate-Controlled Separation Processes

Credit Hours: 3.00. Rate-controlled separation processes based on solute movement (adsorption, chromatography and ion exchange), membranes (reverse osmosis, ultrafiltration, and gas permeation), and crystallization. Typically offered Spring.

CHE 59700 - Special Topics In Chemical Engineering

Arrange Hours and Credit. Hours and credits to be arranged. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 61000 - Advanced Chemical Engineering Thermodynamics

Credit Hours: 3.00. Properties of pure fluids and mixtures are described in the context of classical and statistical thermodynamics. Equations of state and solution theories are developed for this description of fluid phase equilibrium and chemical equilibrium. Fluids encountered in mass transfer and separation operations are treated. Typically offered Fall.

CHE 61100 - Molecular Thermodynamics

Credit Hours: 3.00. This course aims at providing a systematic treatment of the microscopic foundation of thermodynamics as well as a working knowledge of the statistical formalism needed to predict microscopic properties from molecular interactions. Topics covered include kinetic theory of gases, statistical-mechanical ensembles and their correspondence with thermodynamics, ideal and imperfect gases, distribution function theory of liquids, lattice models of liquid and polymer solutions, and molecular simulation methods. Offered in alternating years. Prerequisite: CHE 61000. Typically offered Spring.

CHE 62000 - Advanced Transport Phenomena I

Credit Hours: 3.00. Analysis of transport of momentum, energy, and mass by molecular and turbulent mechanisms. Prerequisite: CHE 52700. Typically offered Spring.

CHE 62100 - Advanced Transport Phenomena II

Credit Hours: 3.00. Topics included are momentum transfer with interfacial effects, transport in porous and multiphase media, transport in dispersed phase systems, heat transfer, and multicomponent mass transfer. Prerequisite: CHE 62000. Typically offered Spring.

CHE 62300 - Separation Processes

Credit Hours: 3.00. Design of binary and multicomponent separation processes. Analysis and synthesis of adsorption, ion exchange, and chromatography in packed beds, moving beds, simulated moving beds, and in cyclic operation. Design and operation of membrane separation techniques including dialysis, reverse osmosis, ultrafiltration, and dynamic membranes. Offered in alternate years. Typically offered Spring.

CHE 63000 - Applied Mathematics For Chemical Engineers

Credit Hours: 3.00. Determinants and matrices: solution of a system of algebraic equations; applications to dimensional analysis, stoichiometry, thermodynamics, kinetics of first order reaction systems, and stagewise operations. Differential equations: series solutions, Sturm-Liouville systems, boundary value problems, applications to heat and mass transfer and chemical reactor problems. Elements of complex variables: LaPlace and infinite Fourier transforms, applications to heat and mass transfer problems. First order partial differential equations: applications to separation processes, chromatography. Prerequisite: MA 26200. Typically offered Fall.

CHE 63200 - Linear Operator Methods In Chemical Engineering

Credit Hours: 3.00. Application of the spectral theory of linear self-adjoint and non-self-adjoint operators on abstract Hilbert spaces to problems in chemical engineering. Symmetrizable non-self-adjoint problems in finite and infinite dimensional spaces with applications to physical and chemical rate processes in homogeneous and composite media. Solution of transport equations governing heat and mass transfer in deforming and chemically reacting media. Introduction to non-self-adjoint problems in chemical engineering. Offered in alternate years. Prerequisite: CHE 63000. Typically offered Spring.

CHE 63300 - Probabilistic Methods In Chemical Engineering

Credit Hours: 3.00. Introduction to probability, random variables, and stochastic processes. Ito calculus and stochastic differential equations. Brownian dynamics and Bridge processes. Applications to chemical engineering systems. Master equations and system size expansion concepts to nonequilibrium processes. Stochastic point processes and population balance. Theory of fluctuations. Prerequisite: CHE 63000. Typically offered Fall Spring.

CHE 65600 - Advanced Process Control

Credit Hours: 3.00. Topics in linear and nonlinear system theory applied to automatic control of processes. Subjects include stability analyses, phase plane methods, statistical disturbances, sampled systems, theoretical and experimental determination of process dynamics, optimization, and computer control. Prerequisite: CHE 45600. Typically offered Spring.

CHE 66000 - Chemical Reaction Engineering

Credit Hours: 3.00. Heat, mass, and momentum transfer in the design and analysis of chemical reactor systems. Optimization techniques applied to reactor design. Prerequisite: CHE 34800. Typically offered Spring.

CHE 66200 - Catalysis

Credit Hours: 3.00. Analysis of the kinetics of heterogeneous catalytic reactions, including the application of collision and transition state theories to the estimation of rate constants and calculation of rates over energetically nonuniform surfaces. Discussion of the chemical and physical properties of solid surfaces that influence catalytic reactions, and illustration of concepts of catalytic behavior with specific examples from catalytic cracking, reforming, oxidation, and hydrodesulfurization. Offered in alternate years. Prerequisite: CHE 34800. Typically offered Spring.

CHE 66600 - Methods In Catalysis

Credit Hours: 3.00. Various spectroscopic and other techniques for characterizing catalysts and for probing the chemistry of solid surfaces and their interactions with adsorbing and reacting gases are discussed. Topics include infrared, X-ray photoelectron, Mossbauer, and secondary ion mass spectroscopies. Emphasis is on understanding the principles underlying each method and gaining an awareness of the kind of information each can provide in a broad spectrum of research problems. Offered in alternate years. Prerequisite: CHM 37500. Typically offered Spring.

CHE 66800 - Colloidal And Interfacial Phenomena

Credit Hours: 3.00. Preparation, characterization, and stability of emulsions, aerosols, and other multiphase dispersions. Interparticle forces, electrokinetics, thermodynamics and kinetics of coagulation. Techniques for determining size, shape, orientation, and charge of particles. Capillary and wetting phenomena. Thermodynamics of interfacial tension and adsorption. Applications to surfactants, polymers, biodispersions, flotation, separations, oil recovery, etc. Offered in alternate years. Typically offered Spring.

CHE 68500 - Educational Methods In Engineering

Credit Hours: 3.00. (ENE 68500) Students will learn how to teach in an engineering environment where both classroom and laboratory instruction is intertwined. Classroom techniques, such as lectures, cooperative groups, mastery and PSI, TV and video, and guided design will be studied, in addition to class preparation issues, such as ABET accreditation and design content. Students will study motivation, learning theories and cycles, and personality types. Includes teaching practice and group projects. Permission of Instructor required. Typically offered Fall Spring.

CHE 69000 - Seminar In Chemical Engineering

Credit Hours: 0.00. Required of all graduate students. Typically offered Fall Spring.

CHE 69700 - Special Topics In Chemical Engineering

Arrange Hours and Credit. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

CHE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Chemistry

CHM 10000 - Preparation For General Chemistry

Credit Hours: 3.00. An introduction to the basic ideas and laboratory techniques of chemistry, together with relevant parts of algebra and elementary physics. Intended for those whose background does not permit them to proceed directly with a general chemistry course. Not available for credit toward graduation in the School of Science. Typically offered Fall.

CHM 11100 - General Chemistry

Credit Hours: 3.00. Not available for credit toward graduation in the School of Science. Required of all freshmen in the School of Agriculture who are not in CHM 11500 and required of students in the School of Consumer and Family Sciences in retailing, textile, RHIT, and dietetics options who are not in CHM 11500. Required of students in physical therapy who are not in CHM 11500. Not available for credit toward graduation in the School of Science. Metric and S.I. Units; dimensional analysis; density; the atomic concept; elements, compounds, and mixtures; the mole concept; equations and stoichiometry; atomic structure, spectra; the periodic table; chemical bonding, gases; descriptive chemistry of the common elements. Prerequisite: two years of high school algebra. Typically offered Fall Spring.

CHM 11200 - General Chemistry

Credit Hours: 3.00. Continuation of CHM 11100. Liquids and solids; solutions; chemical kinetics; equilibrium; acids and bases; oxidation and reduction; electrochemistry; descriptive chemistry of the metals and nonmetals; introduction to organic chemistry; nuclear chemistry. Not available for credit toward graduation in the School of Science. Typically offered Spring.

CHM 11500 - General Chemistry

Credit Hours: 4.00. Stoichiometry; atomic structure; periodic properties; ionic and covalent bonding; molecular geometry; gases, liquids, and solids; crystal structure; thermochemistry; descriptive chemistry of metals and non-metals. Required of students majoring in science and students in engineering who are not in CHM 12300. One year of high school chemistry or one semester of college chemistry required. Typically offered Fall Spring Summer. CTL:IPS 1721 General Chemistry I w/lab

CHM 11600 - General Chemistry

Credit Hours: 4.00. A continuation of CHM 11500. Solutions; quantitative equilibria in aqueous solution; introductory thermodynamics; oxidation-reduction and electrochemistry; chemical kinetics; qualitative analysis; further descriptive chemistry of metals and nonmetals. Typically offered Fall Spring Summer. CTL:IPS 1722 General Chemistry II w/lab

CHM 12300 - General Chemistry For Engineers I

Credit Hours: 4.00. Stoichiometry; atomic structure and chemical bonding; gases, liquids, and solids; thermochemistry; chemical kinetics; solutions; aqueous solution chemistry; introduction to equilibria. Although intended for students in the Schools of Engineering and this course will also satisfy requirements for chemistry majors in place of CHM 11500 or CHM 12500. One year of high school chemistry or one semester of college chemistry required. Typically offered Fall.

CHM 12400 - General Chemistry For Engineers II

Credit Hours: 4.00. A continuation of CHM 12300. Chemical equilibria; elementary thermodynamics; electrochemistry; phase diagrams; and nuclear chemistry. Examples will be taken from alloys and ceramics; semiconductors; organic chemistry; and polymers. Although intended for students in the Schools of Engineering this course will also satisfy requirements for chemistry majors in place of CHM 11600 or CHM 12600 or CHM 13600. Typically offered Spring.

CHM 12500 - Introduction To Chemistry I

Credit Hours: 5.00. Principles of chemistry including stoichiometry; atomic structure and chemical bonding; properties of gases, liquids, and solids; thermochemistry; descriptive inorganic chemistry. Recommended for entering students intending to major in chemistry. One year of high school chemistry or one semester of college chemistry required. Typically offered Fall.

CHM 12600 - Introduction To Chemistry II

Credit Hours: 5.00. A continuation of CHM 12500. Properties of solutions; chemical equilibrium calculations; elementary thermodynamics; oxidation-reduction reactions and electrochemical cells; rates of reaction; qualitative analysis; descriptive chemistry. Typically offered Spring.

CHM 12700 - Advanced General Chemistry Honors

Credit Hours: 5.00. Honors section of CHM 12600. Typically offered Spring.

CHM 12901 - General Chemistry With A Biological Focus

Credit Hours: 5.00. An accelerated and comprehensive one-semester general chemistry course that emphasizes principles that are important in biological systems. This course is designed to cover the essential elements of general chemistry traditionally covered in a two semester series. Topics to be covered include: Stoichiometry and chemical equations; atomic theory and structure; periodic properties; electronegativity; ionic and covalent bonding; non-covalent forces; bond energies; Lewis structures; molecular geometry; gases, liquids, and solids; solutions, quantitative equilibria in aqueous solution; acid/base chemistry and buffers; introductory thermodynamics; oxidation-reduction; electrochemical and membrane potential; colligative properties; chemical and enzyme kinetics; nuclear chemistry; coordination chemistry. One year of high school chemistry is required. Typically offered Fall.

CHM 13500 - General Chemistry Honors

Credit Hours: 4.00. A sophisticated treatment of the principles of chemistry. Stoichiometry, atomic structure and bonding, gases, thermodynamics, and phase equilibria. Satisfactory record of one year of high school chemistry and suitable high school rank and S.A.T. scores. Typically offered Fall.

CHM 13600 - General Chemistry Honors

Credit Hours: 4.00. A sophisticated treatment of the principles of chemistry. Atomic structure and bonding, spectroscopy, equilibria, thermodynamics and kinetics. Advanced Placement chemistry credit (level 4 or 5) or admission to the honors program in Science or Engineering or a score of at least 70% on the CHM 11500 test-out exam. Students with a grade of C or better in CHM 13600 who need 8 hours of credit in general chemistry may request credit for CHM 11500. Typically offered Fall.

CHM 18300 - Cooperative Work Experience I

Credit Hours: 0.00. Cooperative Work Experience. Must be accepted for the program by the Cooperative Education Program coordinator. Typically offered Fall Spring Summer.

CHM 18400 - Cooperative Work Experience II

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

CHM 19400 - Freshman Chemistry Orientation

Credit Hours: 1.00. Designed to provide incoming chemistry majors with the acedemic, survival, and computational skills to make a successful transition from high school to college. Discussion of opportunities within the chemistry department including degree options, co-op program, undergraduate research, careers in chemistry, use of spreadsheet software, graphing packages, and drawing programs for chemical structures. Attendance and performance on assigned projects are the basis of the assigned grades. Typically offered Fall Spring.

CHM 19700 - Chemistry Freshman Honors Research

Credit Hours: 1.00. Supervised individual research performed by student. Typically offered Fall.

CHM 20000 - Fundamentals Of Chemistry

Credit Hours: 2.00. Integrative study of core concepts in chemistry that play a major role in governing the physical world. These core concepts are taught within the framework of important societal issues, such as atmospheric chemistry and nutrition. The pedagogy of this course is designed to provide reflective, interactive and hands-on-learning experiences that will assist elementary education majors to develop useful instructional strategies for their own classrooms. Required of students in elementary education program in the School of Education. Not available for credit toward graduation in the School of Science. Typically offered Fall Spring.

CHM 22400 - Introductory Quantitative Analysis

Credit Hours: 4.00. Introduction to titrimetric, gravimetric, and instrumental methods of analysis; principles of separation processes, including chromatography; recognition and evaluation of possible sources of error. Required of students majoring in biology who do not take CHM 32100. Typically offered Spring.

CHM 24100 - Introductory Inorganic Chemistry

Credit Hours: 4.00. Descriptive inorganic chemistry dealing in a systematic way with the elements and the structures, properties, and reactions of their compounds. Required of students majoring in chemistry. Typically offered Fall.

CHM 25101 - Organic Chemistry Laboratory

Credit Hours: 1.00. Laboratory experiments designed to familiarize the student with the appearance, preparation, and properties of various types of organic compounds. Typically offered Fall Spring.

CHM 25500 - Organic Chemistry

Credit Hours: 3.00. A study of aliphatic and aromatic hydrocarbons and their simple derivatives in terms of (a) structure, bonding, etc.; (b) general syntheses and reactions; and (c) a logical modern rationale for fundamental phenomena as supported by reactivity orders, orientation effects, stereochemistry, and relative rates. Recommended for biology majors. Typically offered Fall Spring.

CHM 25501 - Organic Chemistry Laboratory

Credit Hours: 1.00. Laboratory experiments to accompany CHM 25500, illustrating methods of separation, instrumental methods of analysis, and the more common techniques and methods for preparing various types of organic compounds. Typically offered Fall Spring.

CHM 25600 - Organic Chemistry

Credit Hours: 3.00. A continuation of CHM 25500 with various functional groups such as the carboxyl, amino, etc., and including such polyfunctional natural products as carbohydrates and peptides. Typically offered Fall Spring.

CHM 25601 - Organic Chemistry Laboratory

Credit Hours: 1.00. A continuation of CHM 25501. Experiments are designed to illustrate principles discussed in CHM 25600. Typically offered Fall Spring.

CHM 25700 - Organic Chemistry

Credit Hours: 4.00. Introductory organic chemistry. Emphasis is on structure, nomenclature, reactions, and theory as applied to simple organic compounds. This course is designed for students who require a one semester overview in preparation for biochemistry. Not recommended for majors in the College of Science. Typically offered Fall Spring. Both CHM 25700 + CHM 25701= CTL:IPS 1723 Organic And Biochemistry w/lab

CHM 25701 - Organic Chemistry Laboratory

Credit Hours: 1.00. Laboratory experiments designed to accompany CHM 25700 and to illustrate methods of separation, identification, and preparation of selected organic molecules. Typically offered Fall Spring. Both CHM 25700 + 25701 = CTL:IPS 1723 Organic And Biochemistry w/lab

CHM 26100 - Organic Chemistry

Credit Hours: 3.00. A comprehensive study of the chemical principles underlying aliphatic and aromatic compounds. The syntheses and reactions of these materials are discussed. Modern theory and stereochemistry are stressed to illustrate the logic inherent in the subject matter and to demonstrate the predictability of many chemical transformations. Recommended for students majoring in chemical engineering. If not a chemical engineering major, see CHM 26505 - Organic Chemistry. Typically offered Fall.

CHM 26105 - Organic Chemistry For Engineers

Credit Hours: 3.00. Chemical principles underlying the reactivity of organic molecules with an emphasis on mechanism; the structure and stereochemical properties of organic molecules and functional groups; physical properties that influence the reactivity of organic molecules; an introduction to ionic and racial reaction mechanisms with particular attention given to issues of product selectivity; synthesis and structure of polymeric materials. Recommended for students majoring in Chemical Engineering. Typically offered Fall.

CHM 26200 - Organic Chemistry

Credit Hours: 3.00. A continuation of CHM 26100, but a broader scope. The chemistry of a variety of functional groups is discussed. Theory is employed extensively to demonstrate the coherence underlying seemingly diverse transformations. Qualitative organic analysis is introduced, with particular emphasis on spectroscopic methods. Typically offered Spring.

CHM 26205 - Organic Chemistry For Engineers

Credit Hours: 3.00. A continuation of CHM 26105, expanding the scope of ionic and radical reaction mechanisms, including a

survey of of functional group transformations; spectroscopic analysis of organic materials; properties and reactivity of aromatic species; principles and examples of catalysis; an introduction to supramolecular and interfacial chemistry and biological molecules. Typically offered Spring.

CHM 26300 - Organic Chemistry Laboratory

Credit Hours: 1.00. Laboratory experiments designed to illustrate the lecture material of CHM 26100. Elementary laboratory techniques essential to organic chemistry are introduced, followed by the actual syntheses and purification of compounds discussed in CHM 26100. Typically offered Fall.

CHM 26400 - Organic Chemistry Laboratory

Credit Hours: 1.00. A continuation of CHM 26300 in that the experiments are designed to illustrate principles discussed in CHM 26200. A major portion of the course is devoted to methods employed in organic qualitative analysis. The student is expected to identify several unknown compounds and mixtures. Typically offered Spring.

CHM 26500 - Organic Chemistry Laboratory

Credit Hours: 2.00. Similar to CHM 26300 except that a larger number and more sophisticated organic syntheses are required. The preparations are designed not only to illustrate the classical reactions discussed in CHM 26100, but to allow for an extrapolation of the principles involved to other systems. Typically offered Fall.

CHM 26505 - Organic Chemistry

Credit Hours: 3.00. A comprehensive study of the chemical principles underlying aliphatic and aromatic compounds. The syntheses and reactions of these materials are discussed. Modern theory and stereochemistry are stressed to illustrate the logic inherent in the subject matter and to demonstrate the predictability of many chemical transformations. Recommended for students majoring in chemistry. Typically offered Fall.

CHM 26600 - Organic Chemistry Laboratory

Credit Hours: 2.00. A continuation of CHM 26500. All experiments are designed to illustrate the principles discussed in CHM 26200. A major portion of the course is devoted to the methods employed in organic qualitative analysis. The student is expected to identify unknowns and mixtures and is introduced to some modern instrumental techniques. Typically offered Spring.

CHM 26605 - Organic Chemistry

Credit Hours: 3.00. A continuation of CHM 26505, but a broader scope. The chemistry of a variety of functional groups is discussed. Theory is employed extensively to demonstrate the coherence underlying seemingly diverse transformations. Qualitative organic analysis is introduced, with particular emphasis on spectroscopic methods. Typically offered Spring.

CHM 26700 - Organic Chemistry Laboratory Honors

Credit Hours: 2.00. Laboratory experiments designed to accompany the lecture material of CHM 26100, but at an advanced level. Modern instrumentation is introduced to supplement the usual elementary laboratory techniques of organic chemistry. Multistep syntheses are employed to illustrate and supplement the reactions discussed in CHM 26100. Typically offered Fall.

CHM 26800 - Organic Chemistry Laboratory Honors

Credit Hours: 2.00. A continuation of CHM 26700. Experiments, more sophisticated than those in CHM 26600, are designed to illustrate and extend the concepts presented in CHM 26200. A major portion of the course is devoted to organic qualitative analysis. The student is expected to identify unknown compounds by classical methods as well as by the use of modern instrumentation like infrared gas chromatography and nuclear magnetic resonance. Typically offered Spring.

CHM 28400 - Cooperative Work Experience III

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

CHM 29000 - Selected Topics In Chemistry For Lower-Division Students

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

CHM 29400 - Sophomore Chemistry Seminar

Credit Hours: 1.00. Discussion of undergraduate research opportunities, upper-division courses, career opportunities, laboratory safety, use of the library and chemical information, and topics of current interest in chemistry. Required of sophomores majoring in any chemistry curriculum. Typically offered Fall.

CHM 29500 - Undergraduate Chemistry Seminar

Credit Hours: 1.00. Opportunities in CHM 49900; Degree options and special chemsitry programs; Advice about upper-division courses; Overview of chemical field; Governmental & Industrial opportunities; Safety in the chemical laboratory; and Topics of current general interest. Required of sophomores majoring in any Chemistry curriculum. Typically offered Fall.

CHM 32100 - Analytical Chemistry I

Credit Hours: 4.00. Quantitative measurements on complex chemical systems that show matrix effects or require isolation of a component prior to its determination; general approaches to quantitative problems at the trace level; critical comparisons of competitive procedures with emphasis on principles of separation processes, including chromatography; recognition and evaluation of possible sources of error; approaches for optimizing conditions so as to minimize time and/or effort required to attain prescribed levels of accuracy and precision. Required of students majoring in chemistry. Typically offered Fall.

CHM 32300 - Analytical Chemistry I Honors

Credit Hours: 4.00. Open to students in the chemistry honors program. Topical coverage similar to CHM 32100. Laboratory will include a group of core experiments plus special experiments designed by students and staff to study original problems related to analytical chemistry. Typically offered Fall.

CHM 33300 - Principles Of Biochemistry

Credit Hours: 3.00. Structure and function of biologically important molecules. Intended for students in life sciences. Typically offered Fall Spring.

CHM 34200 - Inorganic Chemistry

Credit Hours: 3.00. Interpretation and correlation of the reactions and properties of inorganic compounds in terms of their electronic and molecular structures. A survey of the preparations and reactivities of important compounds of the representative elements, with an emphasis on group trends. The elementary chemistry of the transition metals, including magnetic and spectral properties of coordination compounds. Typically offered Spring.

CHM 34201 - Inorganic Chemistry Laboratory

Credit Hours: 1.00. Laboratory work to accompany CHM 34200. Typically offered Spring.

CHM 37000 - Topics In Physical Chemistry

Credit Hours: 3.00. Kinetic theory of gases; statistical thermodynamics; quantum mechanics; atomic and molecular structure and spectroscopy; properties of ionic phases. May not be used to satisfy requirements for graduation in chemistry. Typically offered Fall Spring.

CHM 37200 - Physical Chemistry

Credit Hours: 4.00. Principles of physical chemistry with emphasis on chemical thermodynamics and kinetics, illustrated examples from the biological sciences. Intended primarily for students in the life sciences. Typically offered Spring.

CHM 37300 - Physical Chemistry

Credit Hours: 3.00. Physical chemistry of matter. Properties of gases, liquids, and solids; equations of state; thermodynamics; energy, heat, and work; entropy; spontaneity and equilibrium; chemical potential; chemical equilibrium; phase diagrams; colligative properties. Typically offered Summer Fall.

CHM 37301 - Physical Chemistry Laboratory

Credit Hours: 1.00. A physical chemistry laboratory course that will provide students with hands-on experience that illustrates the core concepts presented in the associated physical chemistry lecture course CHM 37300. Typically offered Fall.

CHM 37400 - Physical Chemistry

Credit Hours: 3.00. Physical chemistry of molecules. Wave properties of matter; quantum mechanics of translation, rotation, and vibration; atomic structure; molecular orbitals; quantum states; stastical mechanics; chemical kinetics; collision theory; transition state theory. Typically offered Spring.

CHM 37409 - Professional Practice I

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Industrial practice fee is attached to this course. Typically offered Fall Spring Summer.

CHM 37500 - Physical Chemistry

Credit Hours: 3.00. Quantum theory of atom and molecules; theories of chemical bonding; molecular spectroscopy; methods for determining molecular structure; electrical and magnetic properties. Typically offered Fall.

CHM 37509 - Professional Practice II

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Industrial Practice fee is attached to this course. Typically offered Fall Spring Summer.

CHM 37600 - Physical Chemistry Laboratory

Credit Hours: 2.00. Laboratory portion of CHM 37300 and CHM 37400. Typically offered Fall Spring.

CHM 37700 - Physical Chemistry Honors Laboratory

Credit Hours: 2.00. A laboratory course running parallel with 376 but offering more sophicated and challenging experiments in the optional experiment section of the course and requiring a special student-designed experimental project in lieu of assigned experiments in the terminal section of the course. Open to students in the chemistry honors program. Typically offered Fall Spring.

CHM 38600 - Cooperative Work Experience IV

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

CHM 39500 - Chemistry Honors Seminar

Credit Hours: 1.00. Seminar for junior honors students. Typically offered Fall Spring.

CHM 39699 - Professional Practice Internship

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Typically offered Fall Spring Summer.

CHM 42400 - Analytical Chemistry II

Credit Hours: 4.00. Principles and application of optical and electrical methods of chemical analysis, including topics in instrumentation. Typically offered Fall.

CHM 42600 - Analytical Chemistry II Honors

Credit Hours: 4.00. Topical coverage similar to CHM 42400. Laboratory will include a group of core experiments plus special experiments designed by students and staff to study original problems related to analytical chemistry. Open to students in the chemistry honors program. Typically offered Fall.

CHM 44400 - Cosmochemistry

Credit Hours: 3.00. Stellar evolution, nucleosyntheses, and chemical abundances. Origin, composition, and structure of the solar system and objects in it. Cosmochronology with particular emphasis on meteorites. Emphasis upon recent developments in planetology. Offered in alternate years. Typically offered Spring.

CHM 46200 - Intermediate Organic Chemistry

Credit Hours: 3.00. Theory and application of organic chemistry and reaction mechanisms to organic synthesis and contemporary research topics in closely related areas. Topics include stereochemistry, reactive organic intermediates, molecular orbital theory, photochemistry, organic materials chemistry, and chemical biology. Typically offered Spring.

CHM 47500 - Advanced Physical Chemistry

Credit Hours: 3.00. Advanced applications of physical chemistry. Selected topics including theories of chemical bonding; molecular spectroscopy; crystal structure; solid-state and surface chemistry; phase equilibria in multicomponent and complex systems; theory of electrolytes; electrochemistry; chemical kinetics in solution. Typically offered Fall.

CHM 47509 - Professional Practice III

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business. Industrial Practice fee is attached to this course. Typically offered Fall Spring Summer.

CHM 48100 - Environmental Chemistry

Credit Hours: 3.00. Survey of chemical aspects of environmental problems and the application of chemistry to their solution. Topics will include atmospheric pollution problems, groundwater pollution and waste disposal problems, inorganic water pollutants, and the occurrence and fate of toxic organic compounds and other substances in the environment. Typically offered Spring.

CHM 48700 - Cooperative Work Experience V

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

CHM 49000 - Selected Topics In Chemistry For Upper-Division Students

Credit Hours: 1.00 to 4.00. Topics vary. Typically offered Fall Spring Summer.

CHM 49400 - Junior-Senior Chemistry Seminar

Credit Hours: 1.00. Major emphasis on developing skills in oral and written presentations by students. The subject matter can be library material and/or accomplishments in undergraduate or co-op research. Typically offered Spring.

CHM 49900 - Special Assignments

Credit Hours: 1.00 to 5.00. Undergraduate research. Individual research projects undertaken under faculty direction. Permission of instructor required. Typically offered Fall Spring.

CHM 50200 - Modern Chemistry In The High School

Credit Hours: 3.00. A critical discussion of the means by which the fundamentals of modern chemistry can best be introduced at the high school level. The laboratory will deal with the manufacture and use of lecture demonstration equipment, the use of films and film strips, and the problems involved in organizing and running a high school chemical laboratory. Typically offered Spring.

CHM 51300 - Chemical Literature

Credit Hours: 1.00. Types of information in technical publications; exercises in finding, assembling, and using such data. Typically offered Spring.

CHM 53300 - Introductory Biochemistry

Credit Hours: 3.00. A rigorous one-semester introduction to biochemistry. Typically offered Fall.

CHM 53800 - Molecular Biotechnology

Credit Hours: 3.00. An examination of modern tools for the characterization, manipulation, and design of nucleic acids and proteins. Typically offered Spring.

CHM 54800 - Radiochemistry

Credit Hours: 3.00. Nuclear properties, structure, and reactions; radioactive decay; interaction of radiation with matter; radioactivity in the environment; nuclear applications in chemistry. Typically offered Spring.

CHM 56000 - Organic Spectroscopic Analysis

Credit Hours: 3.00. Identification of organic compounds and characteristic groups by the use of mass spectrometry, infrared, nuclear magnetic resonance, and ultraviolet spectroscopy. Typically offered Spring.

CHM 56100 - Fundamental Organic Chemistry

Credit Hours: 3.00. A general survey of synthetic organic chemistry including some discussion of current organic theory. Should be preceded by elementary organic chemistry. Typically offered Fall.

CHM 56300 - Organic Chemistry

Credit Hours: 3.00. Ionic and free radical reactions are discussed critically with emphasis on the synthetic and mechanistic aspects of the reactions studies. Typically offered Spring.

CHM 57900 - Computational Chemistry

Credit Hours: 3.00. Theoretical basis and practical applications of computational methods relevant to chemical and biochemical research problems. Typically offered Spring.

CHM 58100 - Atmospheric Chemistry

Credit Hours: 3.00. (EAPS 52100) An introduction to the chemistry of the earth's atmosphere. Covers evolution of the earth's atmosphere, its physical and chemical structure, its natural chemical composition and oxidative properties, and human impacts, including increasing tropospheric ozone, decreasing stratospheric ozone, climate change, and acidic deposition. Typically offered Fall.

CHM 59900 - Special Assignments

Credit Hours: 1.00 to 4.00. Directed reading or special work not included in other courses. Permission of instructor required. Typically offered Fall Spring Summer.

CHM 60500 - Safety In The Chemistry Laboratory

Credit Hours: 0.00. Lectures on safe practices in the chemistry laboratory. Required of students doing research in chemistry. Typically offered Spring.

CHM 61000 - Topics In Chemical Education

Credit Hours: 2.00 or 3.00. A variable topics course for graduate students in chemistry, chemical engineering, medicinal chemistry, and biochemistry. This course provides an overview of the literature in one of the areas of chemical education, such as: chemistry misconceptions and conceptual change; theories of learning, from Piaget and Vygotsky to radical constructivism; distributed cognition; and developing and assessing instructional materials. Offered in alternate years. . Typically offered Fall Spring.

CHM 61100 - Formulas For Successful Teaching

Credit Hours: 2.00. An introduction to the issues of successful teaching of chemistry at the college/university level for graduate students in chemistry, chemical engineering, medicinal chemistry, and biochemistry who are interested in academic careers. Offered in alternate years. . Typically offered Fall Spring.

CHM 61500 - Principles Of NMR Spectroscopy

Credit Hours: 3.00. The course is intended to provide in-depth coverage of fundamental concepts in modern NMR spectroscopy. Included are the vector model of spin resonance, topics in signal processing, product operator formalism, discussion of important 2D experiments, Redfield relaxation theory, and methods for molecular structure determination. The emphasis is on general spectroscopic concepts, also used outside spin resonance spectroscopy. Spectrometer operation and data processing are also demonstrated. Prerequisite: Undergraduate degree or completed advanced coursework in chemistry, physics, biology, or engineering. Basic knowledge of NMR is expected, but not required. Typically offered Fall.

CHM 61600 - Advanced Experimental Nuclear Magnetic Resonance Spectroscopy

Credit Hours: 2.00. The theory and practice of multidimensional nuclear magnetic resonance spectroscopy and advanced NMR techniques. Prerequisite: CHM 56000, CHM 61500. Typically offered Summer.

CHM 62000 - Spectrochemical Instrumentation

Credit Hours: 3.00. A critical review of instrumental methods of analysis, with particular emphasis on spectroscopic techniques. Topics include: methods of measurement; analog and digital electronics; optics and spectrophotometric modules; and instrumental methods in UV-visible, infrared, and NMR spectroscopies. Prerequisite: introductory analytical and two semesters of physical chemistry. Typically offered Fall Spring.

CHM 62100 - Advanced Analytical Chemistry

Credit Hours: 3.00. A critical survey of recent developments in chemical and instrumental methods of analysis. Prerequisite: CHM 32100, CHM 42400. Typically offered Spring.

CHM 62200 - Chemical Aspects Of Mass Spectrometry

Credit Hours: 3.00. A graduate-level treatment of chemical aspects of mass spectrometry. No prior knowledge in mass spectrometry is required. Prerequisite: Bachelor's degree in Chemistry. . Typically offered Fall.

CHM 62400 - Particle Spectroscopy

Credit Hours: 3.00. Introduction to the application of ion and electron beams in the chemical analysis of gases and of surfaces. Emphasis is on the unity of the phenomena that underlie the preparation, manipulation, and analysis of ion and electron beams and on the analogies between inelastic reactions of ions and electrons, including those with both gaseous and solid targets. Mass spectrometry is covered in some depth, and a number of newer aspects of particle spectroscopy are treated, including ion scattering spectrometry, Rutherford scattering, energy loss spectrometry (ion and electron), ion kinetic energy spectrometry, ion cyclotron resonance and Auger spectrometry. Applications of these techniques feature structural analysis (compositions of mixtures, molecular structure of organics, electronic state assignment in simple ions), chemical preparations (ion implantation), and isotopic analysis. The underlying chemistry is explored, particularly in considering the kinetics and dynamics of unimolecular fragmentation and in terms of the factors that affect the cross-sections of inelastic collisions. Offered in alternate years. Prerequisite: CHM 42400. Typically offered Spring.

CHM 62900 - Chromatographic Methods Of Analysis

Credit Hours: 2.00. Principles and practice of modern gas and liquid chromatography are developed from an integrated point of view. Emphasis is placed on those features useful in practical analytical separations. Instrumentation is described and evaluated using chemical examples from recent literature. Although column techniques are emphasized, thin-layer chromatography and electrophoresis methods also are described. Offered in alternate years. Prerequisite: CHM 42400. Typically offered Fall.

CHM 63100 - Magnetic Resonance Spectroscopy:

Credit Hours: 2.00. Theory, experimental practice, and current applications to biological systems of nuclear magnetic resonance spectroscopy and, to a lesser extent, electron paramagnetic resonance spectroscopy. Offered in alternate years. Prerequisite: CHM 53300, CHM 56100, 57700, 57800. Typically offered Fall.

CHM 63200 - Membranes: Structure And Function

Credit Hours: 3.00. The structure and molecular properties of biological membranes and appropriate model systems. Offered in alternate years. Typically offered Spring.

CHM 63400 - Biochemistry: Structural Aspects

Credit Hours: 3.00. Chemistry of materials of biochemical interest; carbohydrates, lipids, proteins, amino acids, nucleic acids, porphyrins; biochemistry of blood. Prerequisite: CHM 26200, CHM 32100, CHM 37400. Typically offered Fall.

CHM 63500 - Biochemistry: Dynamic Aspects

Credit Hours: 3.00. Enzymes, metabolism, and protein and nucleic acid biosynthesis. Prerequisite: CHM 63400. Typically offered Spring.

CHM 63800 - Biophysical Chemistry

Credit Hours: 3.00. Applications of the principles and methods of physical chemistry in biochemistry with emphasis on the behavior of macromolecules in solution. Protein engineering. Offered in alternate years. Prerequisite: CHM 57800, CHM 63400. Typically offered Spring.

CHM 64100 - Advanced Inorganic Chemistry

Credit Hours: 3.00. Survey of main group and transition metal chemistry. Main group special topics, bonding and structure of boron hydrides. Coordination chemistry, bonding models in coordination compounds. Transition metal organometallic chemistry, ligand types and reactivity patterns. Survey of inorganic NMR spectroscopy. Prerequisite: CHM 34200. Typically offered Fall.

CHM 64200 - Advanced Inorganic Chemistry

Credit Hours: 3.00. Physical inorganic chemistry. Applications of group theory to chemistry and spectroscopy, especially vibrational and electronic spectra of transition metal complexes. Molecular orbital theory and theoretical bases for reactivity. Magnetic properties and electron paramagnetic resonance (EPR) spectroscopy of inorganic materials. Prerequisite: CHM 34200. Typically offered Spring.

CHM 64400 - Solid State Chemistry

Credit Hours: 3.00. The chemistry of solids, including a discussion of ionic crystals, metals, alloys, and binary compounds, and their characterizations by various physical methods. Description of chemical reactions, phase changes, and catalysis in terms of current theories of the solid state. Prerequisite: CHM 34200, CHM 37400. Typically offered Fall Spring Summer.

CHM 64600 - Kinetics And Mechanisms Of Inorganic Reactions

Credit Hours: 3.00. Chemical kinetics, reaction orders, mechanisms and rate expressions; experimental techniques; transition state theory; reactions in solution; complex mechanisms; linear free-energy relationships; acid-base catalysis and proton-transfer reactions; redox reactions (electron and atom transfer, oxidative addition-reductive elimination); substitution reactions of metal ion and organometallic complexes; homogeneous catalysis; and heterogeneous reactions. Prerequisite: CHM 34200. Typically offered Spring.

CHM 64700 - Transition Metal And Organometallic Chemistry

Credit Hours: 3.00. A study of the chemistry and physical properties of compounds of the transition metals. Halides, oxides, and oxy-salts; transition metal carbonyls and derivatives; pi-bonded organometallic compounds; catalysis; spectral and magnetic properties of compounds. Prerequisite:CHM 64100. Typically offered Spring.

CHM 64800 - Bioinorganic Chemistry

Credit Hours: 3.00. Provides a detailed perspective on the roles of metals in biology. Emphasis is placed upon principles guiding the field. The basics of biochemistry and inorganic chemistry are provided such that students from diverse backgrounds may participate. Readings are from the research literature. Offered in alternate years. Typically offered Fall.

CHM 65100 - Advanced Organic Chemistry

Credit Hours: 3.00. Modern structural organic chemistry, including introductions to molecular orbital theory and reaction mechanisms. Prerequisite: a year's course in organic chemistry. Typically offered Fall Spring.

CHM 65200 - Synthetic Organic Chemistry

Credit Hours: 3.00. An advanced treatment of methods for preparing major types of organic functionalities and bonds, stressing stereochemical control and involving mechanisms for understanding the reactions employed. Prerequisite: CHM 65100. Typically offered Spring.

CHM 66800 - Physical Organic Chemistry

Credit Hours: 3.00. The theoretical and mechanistic bases for structure and reactivity in organic chemistry is discussed. Individual topics include kinetics and thermodynamics, molecular orbital theory, stereochemistry and reactive intermediates as applied to the mechanisms of organic reactions. Prerequisite: CHM 56300 or CHM 65100. Typically offered Fall.

CHM 67100 - Advanced Physical Chemistry

Credit Hours: 3.00. Selected topics, including atomic and molecular structure and modern theories underlying thermodynamics and chemical kinetics. Prerequisite: CHM 57800. Typically offered Spring.

CHM 67200 - Quantum Chemistry

Credit Hours: 3.00. Basic principles of classical and quantum mechanics, exact solutions for simple systems, approximation methods, atomic structure, spectroscopy, application of group theory, theory of molecular binding. Prerequisite: CHM 67100. Typically offered Fall.

CHM 67300 - Computational Quantum Chemistry

Credit Hours: 3.00. Semiempirical and molecular-mechanics treatments of large molecules, ab initio methods, modern density functional theory, Green's functions, multichannel quantum defect theory, global optimization methods. Prerequisite: CHM 67100. Typically offered Spring.

CHM 67500 - Chemical Kinetics

Credit Hours: 2.00 or 3.00. Experimental and theoretical consideration of chemical reaction rates and mechanisms. Typically offered Fall Spring Summer.

CHM 67605 - Molecular Spectroscopy

Credit Hours: 3.00. Theoretical and experimental fundamentals of the interactions between molecules and electromagnetic waves. Topics include electronic, vibrational, and rotational spectroscopies, and laser-based methods. Prerequisites: CHM 67100. Typically offered Spring.

CHM 67900 - Chemical Thermodynamics

Credit Hours: 3.00. Advanced thermodynamics of chemical and phase equilibria, of electrolytic and nonelectrolytic solutions, and of imperfect gases. Prerequisite: CHM 57800. Typically offered Spring.

CHM 68200 - Statistical Thermodynamics

Credit Hours: 3.00. Application of statistical mechanics to the description of imperfect gases, liquids, and solutions; to order-disorder phenomena in solids and surfaces; and to absolute reaction rate theory. Prerequisite: CHM 67100, CHM 67900. Typically offered Fall.

CHM 69500 - Seminar

Credit Hours: 0.00 or 1.00. Groups meeting for review and discussion of important current literature in analytical, biological, inorganic, organic, and physical chemistry. Each graduate student is required to attend the seminar of his or her major subject. Typically offered Fall Spring Summer.

CHM 69600 - Special Topics In Chemistry

Credit Hours: 1.00 to 3.00. Lectures on selected topics of current interest. Typically offered Fall Spring Summer.

CHM 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

CHM 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Chinese

CHNS 10100 - Chinese Level I

Credit Hours: 4.00. A comprehensive course in elementary Mandarin, designed to develop basic proficiency in listening, speaking, reading, and writing. Systematic coverage of syntactical patterns. After oral foundation work, 20 characters are introduced each lesson in unsimplified and simplified forms. Typically offered Summer Fall Spring.

CHNS 10200 - Chinese Level II

Credit Hours: 4.00. A continuation of the study of elementary Mandarin. Students will complete study of basic syntactical patterns. Character recognition will be built to 500. Typically offered Summer Fall Spring.

CHNS 10700 - Chinese For Heritage Students

Credit Hours: 4.00. A Chinese language course designed for students who have acquired some oral Chinese from home or other sources. It capitalizes on students' heritage background to develop communication and comprehension skills, maintaining and vitalizing the linguistic and cultural proficiency already acquired. Typically offered Fall Spring.

CHNS 20100 - Chinese Level III

Credit Hours: 4.00. A course in intermediate Mandarin, with integrated spoken and written tracks emphasizing the cultural contexts of usage. Mastery of more advanced syntactic patterns, with enriched vocabulary. Character recognition built to 800. Introduction to Chinese dictionaries. Typically offered Summer Fall Spring.

CHNS 20200 - Chinese Level IV

Credit Hours: 4.00. A continuation of the study of intermediate Mandarin. Development of enhanced oral narrative skills and listening comprehension skills through audio-visual supplements. Short exercises in expository composition. Character recognition built to 1,100-plus. Introduction to Chinese newspaper. Typically offered Summer Fall Spring.

CHNS 20700 - Intermediate Chinese For Heritage Students

Credit Hours: 4.00. An intermediate level Chinese language course which capitalizes on students' heritage background for further development of communication and comprehension skills. It maintains and further vitalizes the linguistic and cultural proficiency that has already been acquired. Typically offered Fall Spring.

CHNS 22400 - Chinese Level IV Business Chinese

Credit Hours: 3.00. Practical reading, writing, speaking, and listening comprehension skills directed towards use of Chinese for business purposes. Course materials cover daily business dealings as well as national and international trade, living conditions, environmental, cultural, and social problems. Typically offered Fall Spring.

CHNS 23000 - Chinese Literature In Translation

Credit Hours: 3.00. Reading and discussion of selected texts from major writers and genres. The course provides a broad survey of the Chinese literacy tradition and its cultural and historical background. Emphasis may vary from year to year. Knowledge of Chinese not required. Typically offered Fall Spring.

CHNS 24100 - Introduction To The Study Of Chinese Literature

Credit Hours: 3.00. Class reading and discussion of selected Chinese poetry, prose, and drama; introduction to the methods of literary criticism, applied to the reading of Chinese literary discourse. Texts, discussion, and written assignments primarily in Chinese. Permission of instructor required. Typically offered Fall Spring.

CHNS 28000 - Topics in Chinese Civilization and Culture

Credit Hours: 3.00. Selected topics on Chinese civilization and culture including history and geography, Confucianism, contemporary China, education, family, international cultural and economic cooperation. Course materials also cover most current issues on and in Chinese-speaking communities. Lectures in English. Typically offered Fall Spring.

CHNS 28500 - Chinese Calligraphy

Credit Hours: 1.00. Principles and techniques of writing Chinese characters. The aesthetics of Chinese calligraphy, its function as an art form, and its role in Chinese culture. Emphasis on training and practice in calligraphic writing. Conducted in English. Typically offered Fall Spring.

CHNS 30100 - Chinese Level V

Credit Hours: 3.00. Continued development of Chinese speaking, listening, reading, and writing abilities, using materials dealing primarily with everyday life and civilization from a variety of sources, e.g., newspapers, magazines, television, recent literature, etc. Typically offered Fall Spring.

CHNS 30200 - Chinese Level VI

Credit Hours: 3.00. Continued development of Chinese speaking, listening, reading, and writing abilities, using materials dealing primarily with everyday life and civilization from a variety of sources with stronger emphasis on authentic texts, e.g., newspapers, magazines, television, recent literature, etc. Typically offered Fall Spring.

CHNS 30500 - Introduction To Classical Chinese

Credit Hours: 3.00. Introduction to the grammar of Classical Chinese. Reading will include selections from pre-Ch'in texts as well as later classical prose and verse. Typically offered Fall Spring.

CHNS 31300 - Reading And Writing Practice

Credit Hours: 3.00. Concentration on further development of reading and writing abilities for students with conversational proficiency, using materials primarily from modern social and cultural studies, including annotated literary texts. Conducted in Chinese. Permission of instructor required. Typically offered Fall Spring.

CHNS 34100 - Chinese Literature I: Traditional Chinese Literature

Credit Hours: 3.00. Reading and discussion of selected classical Chinese texts from major writers and genres. Introduction to methods of literary criticism as applied to Chinese literature. Texts, discussion, and written assignments are largely in Chinese. Typically offered Fall Spring.

CHNS 34200 - Chinese Literature II: Modern Chinese Literature

Credit Hours: 3.00. Study of selected poetry, drama, and fiction from the twentieth century. Students will read and discuss major authors and texts and will write critical essays on literary topics. Texts, discussion, and written assignments are largely in Chinese. Typically offered Fall Spring.

CHNS 39900 - Special Study Abroad Credit In Chinese

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in Chinese earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

CHNS 40100 - Chinese Level VII

Credit Hours: 3.00. Continued development of Mandarin Chinese speaking, listening, reading, and writing skills. Emphasis will be upon modern, everyday language and culture (with some introduction to traditional culture) using various sources such as textbooks, newspapers, and literary works. Typically offered Fall Spring.

CHNS 40200 - Chinese Level VIII

Credit Hours: 3.00. Further development of Mandarin Chinese speaking, listening, reading, and writing skills. Materials will include advanced textbooks and original texts such as newspapers and literary works. Typically offered Fall Spring.

CHNS 49000 - Special Topics In Chinese Language

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring.

CHNS 49300 - Special Topics In Chinese Literature

Credit Hours: 1.00 to 3.00. Study of a selected topic in Chinese literature. The topic will be announced in advance. Conducted in English; readings in English. Permission of department required. Typically offered Fall Spring.

CHNS 59400 - Special Topics In Chinese Literature

Credit Hours: 1.00 to 4.00. Special topics in Chinese Literature. Permission of instructor required. Typically offered Spring Fall Summer.

Civil Engineering

CE 19100 - Civil Engineering Practice I

Credit Hours: 0.00. Practice in industry and written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

CE 20300 - Principles And Practice Of Geomatics

Credit Hours: 4.00. Basic surveying measurements and computations for engineering project control, mapping, and construction layout; theory of observational errors and error propagation; fundamental concepts of horizontal and vertical control systems; use of topographic maps and plan-profile sheets; computation of horizontal and vertical curves; introduction to computer tools used in Civil Engineering. Typically offered Fall Spring.

CE 22200 - Life Cycle Engineering And Mangement Of Constructed Facilities

Credit Hours: 3.00. The objective of this course is to introduce concepts relating to the engineering and construction of facilities throughout their life cycle. Topics that will be explored include the nature of the construction industry, construction contracts, legal and management organization of construction companies, basics of the design and construction process, as well as an introduction to the role estimating and project scheduling. Cost, time, safety and quality concepts of construction management relationships will also be discussed. Typically offered Fall Spring.

CE 23100 - Engineering Materials I

Credit Hours: 3.00. Nature and performance of materials under load. Structure of materials. Elastic, inelastic, and time-dependent behavior. Influences of composition and processing upon material properties. Composite materials particulate systems. Chemical effects on materials. Typically offered Fall Spring.

CE 27000 - Introductory Structural Mechanics

Credit Hours: 4.00. Loads; structural forms; analysis of axially loaded members, flexural members, torsional members; combined loading conditions; buckling. Basic behavioral characteristics of structural elements and systems illustrated by laboratory experiments. Typically offered Fall Spring.

CE 29000 - Civil Engineering Seminar

Credit Hours: 0.00. An orientation course to provide counsel to the student on the major areas of civil engineering, including information on typical activity of civil engineers, integrated course sequences and content, and an introduction of the faculty. Typically offered Fall Spring.

CE 29100 - Civil Engineering Practice II

Credit Hours: 0.00. Practice in industry and written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

CE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 29201 - Contemporary Issues In Civil Engineering

Credit Hours: 1.00. The objective of this course is to provide a forum on contemporary issues in the profession of civil engineering. Items addresses include professionalism and ethics, entrepreneurships, interactions with engineering faculty and professionals outside the University. A professional portfolio of communication assignments including understanding of cultural differences and collaborating globally, individual plans of study, and academic career options within civil engineering will be addressed. Restricted to sophomore status in College of Engineering. Typically offered in Fall Spring.

CE 29202 - Contemporary Issues In Civil Engineering

Credit Hours: 2.00. This course provides a forum on issues in the civil engineering profession in a contemporary context. Topics include professionalism and ethics, entrepreneurship, cultural differences, and collaborating globally. Students have interactions with engineering faculty and professionals outside the University. Guidance on the preparation of individual plans of study and information on civil engineering career options are provided. Students learn and apply fundamental aspects of written communication in professional settings. Emphasis is placed on delivery of technical and managerial content. Students will compile a professional portfolio of communication assignments, including lab reports prepared in other CE courses. Typically offered Fall Spring.

CE 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 29700 - Basic Mechanics I (Statics)

Credit Hours: 3.00. Statics of particles. Rigid bodies: equivalent systems of forces, equilibrium. Centroids and centers of gravity. Static analysis of trusses, frames, and machines. Friction. Area moments of inertia. Typically offered Fall Spring.

CE 29800 - Basic Mechanics II Dynamics

Credit Hours: 3.00. Kinematics of particles. Kinetics of particles and systems of particles. Kinematics of rigid bodies. Mass moments of inertia. Kinetics of rigid bodies. Mechanical vibrations. Typically offered Fall Spring.

CE 30300 - Engineering Surveying

Credit Hours: 3.00. Horizontal and vertical control surveys on site and route projects for engineering design and construction layout. Geometric design of horizontal circular curves, spiral easement curves, and vertical parabolic curves. Earthwork volume computation and balancing. Use of coordinate geometry (COGO) design software including terrain and design surface modeling. Methods and tools used for construction layout, as-built surveys, and industrial measurements. Typically offered Spring.

CE 30600 - Analysis Of Survey Observations

Credit Hours: 3.00. Analysis of survey measurement systems and methods for observing distances, directions, angles, elevations, and positions. Introduction to instrument calibration, error propagation methods, and control survey design. Typically offered Fall.

CE 31100 - Architectural Engineering

Credit Hours: 3.00. This course introduces energy efficiency, thermal comfort, indoor environmental quality and green building design concepts. The course covers engineering fundamentals required for the design and analysis of building systems such as thermodynamics, fluid mechanics, heat and mass transfer, light and sound transmission. The course presents engineering principles and selected applications related to hygrothermal analysis of building enclosures, air conditioning processes in heating, ventilating and air conditioning systems, building illumination, and building acoustics. Typically offered Fall Spring.

CE 32201 - Project Control And Life Cycle Execution Of Constructed Facilities

Credit Hours: 3.00. The objective of this course is to continue an introduction to construction management and engineering concepts for future engineers, contractors and owner representatives involved at different stages in the life-cycle of constructed faculties. Building on the broad framework introduced in the prerequisite course, this course develops further ability with analytical tools and extends the basic foundation for advanced topics in construction engineering and management. Specifically, this course focuses on the principles, tools, and procedures used in the construction industry for project selection and financing, advanced planning and scheduling techniques, resource management, and project monitoring. Typically offered Fall Spring.

CE 33100 - Engineering Materials II

Credit Hours: 3.00. A continuation of CE 23100. Typically offered Fall Spring.

CE 33300 - Civil Engineering Materials

Credit Hours: 3.00. The nature and performance of materials under load. Important engineering materials for evaluation of

physical and mechanical properties, including ferrous and nonferrous metals, plastics, bituminous materials, Portland cement, aggregates, concrete, timber, and particulate systems. Typically offered Spring.

CE 34000 - Hydraulics

Credit Hours: 3.00. Fluid properties; hydrostatics; kinematics and dynamics of fluid flows; conservation of mass, energy, and momentum; flows in pipes and open channels. Formal laboratory experiments. Typically offered Summer Fall Spring.

CE 34100 - Hydraulics, Hydrology, And Drainage

Credit Hours: 3.00. Basic hydraulic theory, including properties, kinematics, and dynamics of liquid flow in open channels and closed conduits. Principles of hydrology with emphasis on rainfall and runoff. Application of the above principles to the analysis and design of storm sewers, sanitary sewers, drainage courses, and culverts. Typically offered Spring.

CE 34300 - Elementary Hydraulics Laboratory

Credit Hours: 1.00. The laboratory covers basic concepts in analysis of experimental data and methods in hydraulic measurements. A variety of simple laboratory experiments illustrating the principles of hydraulics are performed. Typically offered Summer Fall Spring.

CE 34400 - Drainage Design Laboratory

Credit Hours: 1.00. This laboratory for land surveying engineering and construction engineering and management students covers basic concepts in the hydrological design of drainage systems. Typically offered Spring.

CE 35000 - Introduction To Environmental And Ecological Engineering

Credit Hours: 3.00. Introduction to water pollution, air pollution, noise, hazardous and solid wastes, and their control. Environmental impact statements and global pollution issues. Field trips required. Typically offered Fall Spring Summer.

CE 35200 - Biological Principles Of Environmental Engineering

Credit Hours: 3.00. Introduction and application of environmental microbiological concepts to the solution of problems of water pollution and its control. Typically offered Fall Spring.

CE 35300 - Physico-Chemical Principles Of Environmental Engineering

Credit Hours: 4.00. This course presents basic physico-chemical aspects of air, water, and wastewater pollution, and pollution control methods. Topics covered in the course include acid/base chemistry, solubility, colloidal chemistry, sorption processes, and oxidation-reduction. Selected physico-chemical processes and analytical procedures are discussed, demonstrated, and applied in the laboratory. Typically offered Spring.

CE 35500 - Engineering Environmental Sustainability

Credit Hours: 3.00. (EEE 35500) An introduction to the examination of global-scale resource utilization, food, energy and commodity production, population dynamics, and their ecosystem impacts. Typically offered Spring.

CE 36100 - Transportation Engineering

Credit Hours: 3.00. Transportation functions; transportation systems, including land, air, and marine modes; transportation system elements, including traveled way, vehicle, controls, and terminals; techniques of transportation system planning, design, and operation. Typically offered Fall Spring.

CE 37100 - Structural Analysis I

Credit Hours: 3.00. Stress resultants (reactions, axial forces, shear forces, and bending moments) for beams and framed structures. Deflections of beams and frames by geometric methods (moment-area theorems and applications; conjugate beam analogy). Analysis of statically indeterminate beams and frames by classical stiffness methods; slope deflection and moment distribution. Influence functions and their applications. Typically offered Fall Spring.

CE 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 38300 - Geotechnical Engineering I

Credit Hours: 3.00. Introduction to the nature and origin of soils and rocks; engineering significance of geologic landforms and soil deposits; identification and engineering classification of soils; engineering behavior and properties of soils; permeability, compressibility, shearing resistance; soil compaction. Typically offered Summer Fall Spring.

CE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 39100 - Civil Engineering Practice III

Credit Hours: 0.00. Practice in industry and written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

CE 39201 - Technical Communication In Civil Engineering

Credit Hours: 2.00. This course will build upon the technical communication components of CE 29202, adding instruction in oral communication, projects, and working in teams. This course involves both individual and team assignments intended to offer students the opportunity to practice preparing and delivering written correspondence and reports, as well as oral presentations. These activities may be coordinated with other CE courses being taken by students in CE 39201. Typically offered Fall Spring.

CE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

CE 39699 - Professional Practice Internship

Credit Hours: 0.00. Professional experience in civil engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

CE 39700 - Undergraduate Professional Internship

Credit Hours: 0.00. Professional experience in Civil Engineering. This internship experience is intended to complement the student's academic coursework and help prepare the student for a career as a practicing engineer. Program coordinated by school with cooperating employers. A written report is required. Permission of department required. Typically offered Fall Spring Summer.

CE 39800 - Introduction To Civil Engineering Systems Design

Credit Hours: 3.00. An introduction to engineering economy and systems analysis. A systematic approach to the engineering method of design and problem solving. Typically offered Fall Spring.

CE 40300 - Principles Of Photogrammetry And Remote Sensing

Credit Hours: 3.00. Introduction to photogrammetry and remote sensing methods used to produce maps and capture spatial information for solving civil engineering problems. Topics include: terrestrial, airborne, and satellite-based imaging systems; photogrammetric measurement, and mapping methods; photographic and digital image interpretation; digital image processing techniques. Typically offered Spring.

CE 40800 - Geographic Information Systems In Engineering

Credit Hours: 3.00. This course provides an introduction to the application of geographic information systems (GIS) to civil engineering problems. GIS is a tool for analysis, modeling, and evaluation of civil engineering problems. The design of spatial databases, assembly of requisite data, and the development of analysis tools within GIS are presented. This course will address: definition of spatial data, data types, spatial relationships, computer operation on spatial data, topology in spatial data, representation of features in a GIS, data models, data dictionaries, data capture techniques; database types, composition of spatial queries, analysis of engineering data using a GIS, complex analysis of polygon and linear features, presentation of results, use of a GIS as an engineering model test bed. Typically offered Fall.

CE 41300 - Building Envelope Design And Thermal Loads

Credit Hours: 3.00. This course discusses the basic thermal processes in buildings and presents comprehensive methods for thermal design of envelope assemblies in commercial and residential buildings. The first part of the course includes steady-state transient conduction through envelope assemblies, convection and radiation heat transfer in buildings, solar radiation and solar gains, thermal performance of windows, internal gains, ventilation and infiltration. The second part of the course considers surface and room energy balance equations and presents analytical and computational models for calculation of hourly heating and cooling loads throughout the year. Climate-based standards, passive solar design, advanced energy guides, and innovative technologies for high performance buildings are discussed. The course also includes a design project on analytical heating/cooling load calculations for a commercial building. Typically offered Fall Spring.

CE 41400 - Building Mechnical And Electrical System Design

Credit Hours: 3.00. This course covers the design of building mechanical and electrical systems. In the first part of the course students learn principles of designing and integrating heating, ventilation, and air conditioning systems into building air delivery systems, mechanical cooling and heating technologies, duct design and layout, blower and pump selection, and hydronic systems. They also learn to design heating, ventilation, and air conditioning systems within the constraint of achieving satisfactory occupant thermal comfort in buildings. The second part of the course covers design concepts related to building electrical systems; including, single and three-phase power systems, motors, transformers, switching, and relays. The course includes a design project related to mechanical and electrical systems for a commercial building. Typically offered Fall Spring.

CE 42400 - Human Resource Management In Construction

Credit Hours: 3.00. Survey of the fundamental legislation affecting planning and administration of the labor resources employed in the construction industry, and introduction to the principles of labor productivity improvement and worker motivation. Typically offered Fall Spring.

CE 42600 - Construction Cost Control Concepts

Credit Hours: 3.00. An investigation of the principles of cost control and financial concepts required at the project and company level. The course addresses the development of control estimates and budgets as well as various methods of cost control. Sources of construction costs as well as work breakdown structure and work packaging will be presented and discussed. In addition, the interface between field costs and company financial documents will be developed in detail. A project designed to illustrate both company- and project-level management will be required. Typically offered Fall.

CE 44000 - Urban Hydraulics

Credit Hours: 3.00. Sources and distribution of water in urban environment, including surface reservoir requirements, utilization of groundwater, and distribution systems. Analysis of sewer systems and drainage courses for the disposal of both wastewater and storm water. Pumps and lift stations. Urban planning and storm drainage practice. Typically offered Fall.

CE 44200 - Introduction To Hydrology

Credit Hours: 3.00. Description, measurement, and analysis of hydrologic processes: precipitation, evapotranspiration, infiltration, and runoff. Hydrograph analysis: unit and synthetic unit hydrographs and flood routing. Statistical analysis of hydrologic data. Fundamentals, budget, and yield analysis of groundwater flows; well hydraulics. Case studies illustrating the application of principles in both surface and groundwater flows. Typically offered Fall Spring.

CE 44300 - Introductory Environmental Fluid Mechanics

Credit Hours: 3.00. Kinematics of fluid flow. Differential equations for environmental fluid flows, including effects of variable density and rotation. Ideal fluid flow; boundary layer approximation; turbulence; water waves. Typically offered Fall.

CE 45600 - Water And Wastewater Treatment

Credit Hours: 3.00. Fundamental concepts and design procedures for the treatment of municipal and industrial water and wastewaters. Problem assessment; determination of water and wastewater characteristics, biological, physical, and chemical treatment methods, process design, and disposal of residues. Typically offered Fall.

CE 45700 - Air Pollution Control And Design

Credit Hours: 3.00. Fundamental concepts and design procedures for the removal of particulates, gases, and toxic air pollutants from waste gas streams. Problem assessment; characterization of exhaust gas streams; fan characteristics. Typically offered Spring.

CE 46100 - Roadway And Pavement Design

Credit Hours: 3.00. Design of highway and airport pavement systems, subgrades, subbases and bases, soil stabilization, flexible and rigid pavements; cost analysis and pavement selection; quality control; drainage; earthwork; pavement evaluation and maintenance. Typically offered Fall.

CE 46300 - Highway Transportation Characteristics

Credit Hours: 3.00. Analysis of basic characteristics of highway transportation systems and the elements influencing these characteristics: drivers, vehicles, pedestrians, flow, density, speed, travel time, delay, stream flow, intersection performance, capacity, accidents, traffic demand, and parking. Techniques used include experimental observation, deterministic and probabilistic queueing theory, probability and statistics, and graphical analysis. Typically offered Fall.

CE 47000 - Structural Steel Design

Credit Hours: 3.00. The elements of structural steel design, including tension members and their connections; structural connections, including welding, and high-strength bolts; compression members; rolled and built-up flexural members; and combined axial and flexural loading effects. Typically offered Fall Spring.

CE 47300 - Reinforced Concrete Design

Credit Hours: 4.00. Design and behavior of reinforced concrete beams, one-way slabs, and columns. Typically offered Fall Spring.

CE 47400 - Structural Analysis II

Credit Hours: 3.00. Determination of deflections by the method of virtual work; analysis of trusses, continuous beams, and frames by direct stiffness method; approximate methods of analysis. Typically offered Fall Spring.

CE 47900 - Design Of Building Components And Systems

Credit Hours: 3.00. Design of simple floor and roof systems and load bearing walls; uses of building materials; fundamentals of

design of metal form decking, steel joists, masonry (beams, columns and load bearing walls), and timber (beams, trusses, and mechanical connections). Typically offered Fall Spring.

CE 48300 - Geotechnical Engineering II

Credit Hours: 3.00. Subsurface investigations and techniques for sampling soils, lateral earth pressures, and stability of retaining structures; stability of earth slopes; shallow and deep foundations design. Typically offered Fall Spring.

CE 49100 - Civil Engineering Practice IV

Credit Hours: 0.00. Practice in industry and written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

CE 49200 - Civil Engineering Practice V

Credit Hours: 0.00. Practice in industry and written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

CE 49700 - Civil Engineering Projects

Arrange Hours and Credit. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

CE 49800 - Civil Engineering Design Project

Credit Hours: 3.00. Planning, design, and analysis of a civil project; an integrated and realistic group project involves as much as possible all major aspects of the civil engineering profession. Typically offered Fall Spring.

CE 49900 - Research In Civil Engineering

Arrange Hours and Credit. Credit arranged. Permission of instructor required. Typically offered Fall Spring Summer.

CE 51200 - The Comprehensive Urban Planning Process

Credit Hours: 3.00. An introductory course that provides a framework for better understanding of the current urban planning process. Concepts and emerging trends are covered as well as an elementary description of planning methods and techniques. For planning majors and those in related design, development, and socioeconomic disciplines. Typically offered Spring.

CE 51300 - Lighting In Buildings

Credit Hours: 3.00. This course focuses on the design of illumination systems in buildings (electric and natural lighting) in order to achieve energy efficiency and visual comfort. The first part of the course includes analytical lighting calculation techniques, visual perception, radiative transfer, lamp characteristics, electric lighting system design and control for calculation of required indoor illuminance levels. The second part of the course covers daylighting (natural lighting) systems, including state-of-the-art daylighting prediction models as well as design and control of such devices and advanced metrics. The course also has a lab section, in which the students learn how to work with lighting and daylighting tools and build their own computational transient lighting models in open programming languages, in order to design illumination systems and predict electricity consumption and potential energy savings. Typically offered Fall Spring.

CE 51401 - Building Controls

Credit Hours: 3.00. This course is designed to provide students with the knowledge of fundamentals, design, and analysis for building control systems. It primarily consists of three parts. The first part covers basic concepts, terminology, procedures and computations of control systems including block diagrams & transfer functions, open-loop & closed-loop control, control system modeling, time response, root locus techniques, design via root locus, and digital control systems. The second part focuses on issues surrounding the building controls: interfacing components such as sensors and actuators, problems encountered, and state-of-the-art solutions for building energy efficiency and thermal comfort. The third part aims to develop students' ability to convert control system concepts into real building control systems. The course provides a hands-on opportunity for students to complete three projects associated with the three primary components during the semester: indoor environmental quality assessment, building HVAC system commissioning and its control analysis, and new control algorithm development for building energy efficiency, occupant health, and individual productivity. Typically offered Fall Spring.

CE 51501 - Building Energy Audits

Credit Hours: 3.00. This course is designed to provide students with the necessary skills to perform an energy audit on commercial and residential buildings. Energy accounting procedures for all major building subsystems are covered in detail, along with operational cost analysis of these systems. Students learn fundamental techniques for auditing the building envelope; electrical and lighting systems; heating, ventilation, and air conditioning systems; internal thermal loads; and building maintenance and operation procedures. Students also learn to analyze electric and natural gas utility tariffs and rate structures and apply their findings to the energy auditing process. Typically offered Fall Spring.

CE 52000 - Construction Project Control Systems

Credit Hours: 3.00. Techniques used for planning and scheduling, estimating, and cost control for construction projects. The interface of cost control with the financial management at the company level will be considered. Work breakdown structure as a method of control will be developed. Typically offered Fall.

CE 52100 - Construction Business Management

Credit Hours: 3.00. Develops students' understanding of the fundamental theories and applied principles of management of U.S. construction companies. Exposes students to the present and future practice of business management at the construction company level. Provides insight into basic construction business operations including strategic planning, organizational structure, marketing, accounting, financing, risk analysis, quality, and international construction business practice. Typically offered Fall.

CE 52200 - Computer Applications In Construction

Credit Hours: 3.00. A study of current computer usage in the construction industry; basic computer hardware and software concepts; computer applications in construction; commercially available software applications. Typically offered Fall Spring.

CE 52300 - Selection And Utilization Of Construction Equipment

Credit Hours: 3.00. A study of economics and functional applications for major categories of construction equipment. Operational characteristics are identified for selected equipment items and are applied to typical construction situations. Typically offered Spring.

CE 52400 - Legal Aspects In Engineering Practice

Credit Hours: 3.00. Legal principles and landmark cases relevant to engineering. Subjects covered include contracts, torts, agency, real property, environmental and labor laws, expert testimony, arbitration, patents and copyrights, sureties and ethics. Three evenings may be required. Typically offered Fall Spring.

CE 52600 - Construction Of Temporary Facilities

Credit Hours: 3.00. Temporary facilities employed by the construction industry for various projects. Design and construction of temporary structures such as formwork, falsework, scaffolding, cofferdams, and cableways. An investigation of recent examples described in the literature. Typically offered Fall.

CE 52700 - Analytical Methods For The Design Of Construction Operations Sem. 1

Credit Hours: 3.00. Provides an investigation of quantitative methods used for the design and analysis of construction operations to maximize productivity and minimize resource idleness. Includes discussions on queuing theory, line of balance techniques, linear programming, and simulation. Comprehensive group projects involve modeling and analyzing actual construction operations. Typically offered Fall.

CE 53000 - Properties And Production Of Concrete

Credit Hours: 3.00. Basic properties of hydraulic cements and mineral aggregates and their interactions in concrete. Properties of plastic and hardened concrete. Modifications through admixtures. Production, handling, and placement problems. Specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. A one-day field trip is required. Typically offered Fall Spring.

CE 53500 - Bituminous Materials And Mixtures

Credit Hours: 3.00. Consideration of major types of bituminous materials-asphalt cements, cutback asphalts, asphalt emulsions, and tars. Influence of chemical composition upon physical properties. Desirable aggregate characteristics for bituminous mixtures. Construction techniques. Current practices for determining optimum asphalt contents. Two one-day field trips are required. Typically offered Spring.

CE 53800 - Experimental Methods In Construction Materials Research

Credit Hours: 3.00. This course will introduce the student to the fundamental aspects of the computer control of experimental equipment. Emphasis is placed on the difficulties of interfacing computers and instruments. Experimental techniques for measuring important properties of construction materials are discussed. For example, techniques involving the use of strain gages, optical measurements, and measurement of properties such as pore structure and surface area are considered. Emphasis is placed on the effects of experimental techniques on the resulting measurements. Typically offered Spring.

CE 54000 - Open Channel Hydraulics

Credit Hours: 3.00. Energy and momentum principles, design of open channels for uniform and nonuniform flow, boundary layer and roughness effects, flow over spillways, energy dissipation, flow in channels of nonlinear alignment and nonprismatic section. Typically offered Fall Spring.

CE 54200 - Hydrology

Credit Hours: 3.00. Meteorology; precipitation; stream flow, evaporation, and transpiration; subsurface flows, well hydraulics; runoff relations and hydrographs; elements of stream flow routing, frequency and duration studies; extreme values statistics applied to flood and drought forecasting; application of hydrologic techniques. Typically offered Fall Spring.

CE 54300 - Coastal Engineering

Credit Hours: 3.00. An introduction to coastal engineering with emphasis on the interaction between oceanic dynamic processes (waves, currents, and tides) and coastal regions (beaches, harbors, structures, and estuaries) and on the engineering approaches necessary to prevent adverse effects caused by this interaction. Typically offered Fall.

CE 54400 - Subsurface Hydrology

Credit Hours: 3.00. Basic principles of fluid flow in saturated and unsaturated materials. Darcy's law, well hydraulics, determination of hydraulic properties of aquifers. Infiltration theory. Discussions of artificial recharge, land subsidence, saltwater intrusion, ground water quality and contamination. Typically offered Spring.

CE 54500 - Sediment Transport Engineering

Credit Hours: 3.00. Sediment properties and the mechanics of sediment transport. Threshold of movement. Riverbed load and suspended load theories. Regime theory and stable channel design. River diversion problems. Erosion. Geomorphologic and water quality aspects. Typically offered Fall Spring.

CE 54700 - Transport Processes In Surface Waters

Credit Hours: 3.00. Four main topics are covered: (1) density-stratified two-layer systems in lakes and channels, with applications to mixed-layer growth, oil-spill containment, salinity intrusions, (2) advection-diffusion modeling in channels, including analytical solutions to steady and unsteady, one- and two-dimensional problems, (3) mechanisms of diffusional transport, including turbulence in channels and longitudinal shear dispersion, and (4) near-field analysis of discharges, including similarity analyses of jets and plumes. Typically offered Spring.

CE 54900 - Computational Watershed Hydrology

Credit Hours: 3.00. Use of professional computer programs for the calculation of the runoff from complex basins. Generation of unit hydrographs. Calculation of losses, channel and reservoir routing, parameter optimization, and application of Kinematic wave technique to urban catchments. Offered in alternate years. Typically offered Fall.

CE 55000 - Physico-Chemical Processes In Environmental Engineering I

Credit Hours: 3.00. This is the first of a two-course sequence and covers physico-chemical processes as applied in water and wastewater treatment. Topics include: reactor theory, mixing, gravity separation, centrifugation, adsorption, ion exchange, disinfection kinetics, acid/base chemistry, neutralization, precipitation, and corrosion. Typically offered Fall.

CE 55700 - Air Quality Management

Credit Hours: 3.00. Discussion of fugitive, mobile, and point sources of air pollution with attendant effects on materials, plants, and humans. Development and status of state and federal regulations with emphasis on the development and use of mathematical dispersion models including meteorological fundamentals and atmospheric transport. Discussion of concepts for ambient air quality control strategies including urban planning and transportation considerations. Typically offered Fall.

CE 55900 - Water Quality Modeling

Credit Hours: 3.00. Mathematical modeling of chemical and biological processes occurring in natural aquatic systems. Classical oxygen demand and nutrient processes are modeled, as well as chemical specific transport and fate processes. Emphasis is placed on deterministic models, mass balance approaches, and chemical specific coefficients or parameters. Typically offered Spring.

CE 56000 - Public Mass Transportation

Credit Hours: 3.00. Public mass transportation system technologies, design, operation, and planning including vehicle characteristics, bus transit, light rail and rail rapid transit, schedules and networks, capacity, passenger characteristics, and paratransit. Typically offered Spring.

CE 56100 - Transportation Systems Evaluation

Credit Hours: 3.00. Concepts and principles of transportation economic analysis, transportation costs and benefits, user and nonuser consequences, needs studies, finance and taxation, methods of evaluation of plans and projects, cost-effectiveness, environmental impact assessment. Typically offered Fall.

CE 56200 - Geometric Design Of Highways

Credit Hours: 3.00. Development and applications of concepts of geometric design for rural and urban highways. Design controls and criteria, elements of design including sight distance and horizontal and vertical alignment, cross-section elements, highway types, intersection design elements, types of interchanges and interchange design elements, grade separations and clearance. Typically offered Spring.

CE 56300 - Airport Design

Credit Hours: 3.00. Airport design requirements derived from using aircraft design parameters and operational characteristics; airport configuration; runway length and orientation; geometric design of taxiways, exits, and runways; apron design; airspace obstacles; effects of air traffic control; lighting and marking; asphalt pavement and rigid concrete pavement design; pavement overlays; evaluation of runway pavement; drainage; earthwork; and project management. A field trip is required. Typically offered Spring.

CE 56500 - Traffic Engineering: Operations And Controls

Credit Hours: 3.00. Traffic laws and ordinances; design and application of signs, markings, and signals; timing of isolated and interconnected signals; speed regulation; one-way streets; pedestrian, bicycle, and mass transit considerations; traffic engineering administration. Typically offered Spring.

CE 56600 - Transportation Planning

Credit Hours: 3.00. Fundamentals of transportation planning. Historical development and current status of techniques used in travel demand forecasting: trip generation, trip distribution, mode choice, traffic assignment. Data collection and use of surveys. Applications to passenger and freight movement in urban and statewide contexts. Implications for policy formulation and analysis. Typically offered Fall.

CE 56700 - Highway Traffic And Safety Analysis

Credit Hours: 3.00. Traffic and safety studies including: traffic and safety impact studies, control and geometry improvements, hazard and countermeasures identification, predicting safety benefits, before-and-after studies; data collection and computer tools for highway traffic and safety evaluation. Typically offered Spring.

CE 56800 - Highway Infrastructure Management Systems

Credit Hours: 3.00. Processes and techniques of managing rehabilitation and maintenance of highway infrastructure facilities including roads and bridges. Three management systems are examined: pavement, bridge, and roadway maintenance. The

primary emphasis is on data collection, life cycle cost analysis, priority setting and optimization, program development strategies, and institutional issues. Typically offered Spring.

CE 57000 - Advanced Structural Mechanics

Credit Hours: 3.00. Studies of stress and strain, failure theories, and yield criteria; flexure and torsion theories for solid and thin-walled members; and energy methods. Typically offered Fall.

CE 57100 - Earthquake Engineering

Credit Hours: 3.00. The objectives of the course are to: (1) expose the fundamentals of structural design in earthquake regions; (2) explain the functions of linear, nonlinear, and limit analyses with respect to design; (3) describe the complex relationships between ground motion models and structural response models in the linear and nonlinear response ranges; and (4) provide the students perspectives about the behavior of building structures in the earthquake environment. Typically offered Spring.

CE 57200 - Prestressed Concrete Design

Credit Hours: 3.00. Behavior and design of prestressed concrete structures, prestress losses, composite construction, flexure and shear design, deflections, and special topics. Typically offered Spring.

CE 57300 - Structural Dynamics

Credit Hours: 3.00. Analysis of structural members and systems subject to dynamic loads such as wind and earthquake loads; basic theory for single-degree-of-freedom and multi-degree-of-freedom analytical models of civil engineering structures; free vibration, harmonic and transient excitation, foundation motion, resonance spectrum, Lagrange's equation, modal analysis, lumped parameter methods, computer methods. Typically offered Fall.

CE 57500 - Experimental Methods In Structural Engineering

Credit Hours: 3.00. Theory, methods, and techniques for experimental studies of structural members and systems. Measurements fundamentals; transducers for measuring strain, displacements, force and torque, pressure, and temperature. Physical modeling principles: similitude, materials and their properties, and loading systems for application to studies of elastic and inelastic models. Case studies. Individual project required of each student. Permission of instructor required. Typically offered Fall.

CE 57600 - Advanced Reinforced Concrete Design

Credit Hours: 3.00. Design and behavior of columns, two-way slab and slab-beam floor systems, and beam-column joints; strut-and-tie models. Typically offered Fall.

CE 57900 - Structural Stability

Credit Hours: 3.00. Bending of structural members subjected to axial and lateral loads; buckling of compression members and frames in elastic and inelastic ranges, local buckling, lateral buckling of beams, design criteria. Typically offered Spring.

CE 58000 - Advanced Geotechnical Engineering

Credit Hours: 3.00. Advanced treatment of topics in geotechnical engineering, including the engineering response to loading, soil properties, earth pressures, shear strength, soil compaction and fabric, permeability, and consolidation and settlement analysis. Typically offered Fall.

CE 58300 - Slopes And Retaining Structures

Credit Hours: 3.00. Selected topics in soil response and technology needed in conventional geotechnical analysis and design; shearing behavior in clays; subsurface investigation; lateral earth pressures, retaining walls, and sheet pile walls; stability of slopes. Typically offered Fall.

CE 58400 - Foundation Analysis And Design

Credit Hours: 3.00. Design of shallow foundations (isolated, combined, and strip footings), with specific attention to issues of mutual concern and interest to geotechnical and structural engineers. Review of factors that serve as the basis for selection of foundation type. Interpretation of subsurface exploration results. Settlement analyses and limit bearing capacity analyses. Communications and interaction between geotechnical and structural engineers. Structure and contents of a geotechnical report. Detailed treatment of geotechnical/structural design criteria and methodologies for various types of shallow and deep foundations. Typically offered Fall.

CE 58700 - Soil Dynamics

Credit Hours: 3.00. Vibration of elementary systems, foundation vibratory theory, foundation design for vibratory loads, foundation isolation, wave propagation theory, response of soils to dynamic loading, dynamic soil properties, dynamic behavior of waste materials, field and laboratory methods for evaluation of dynamic soil properties, liquefaction of sands, vibratory compaction of granular materials. Typically offered Fall Spring.

CE 59100 - Advanced Structural Steel Design

Credit Hours: 3.00. Design and behavior of plate girders; design of composite beam and column members; behavior and design of bolted and welded connections, including moment-resistant connections, seated connections, and gusset-plate connections. Typically offered Fall.

CE 59200 - Plastic Design Of Steel Structures

Credit Hours: 3.00. Ultimate load capacity of steel structures; methods of analysis for structures in the plastic range; plastic design of continuous beams, frames, and connections. Typically offered Fall Spring.

CE 59300 - Environmental Geotechnology

Credit Hours: 3.00. Review of regulations related to hazardous and solid waste disposal, including hazardous waste characterization. Discussion of contaminant transport in porous media and relationship with remediation technologies for hazardous waste sites. Discussions of soil properties relative to waste containment systems, soil stability, and permeability. Typically offered Spring.

CE 59400 - Transportation Systems Analysis

Credit Hours: 3.00. Identifies concepts fundamental to the planning, design, operation, and management of transportation systems. Aims to impart a systems perspective to transportation problems. Incorporates concepts from economics, engineering, operations research, management, psychology, and public policy analysis. Topics include supply-demand microeconomic framework, analysis of transportation demand, system performance, network equilibrium, and associated case studies. Typically offered Fall.

CE 59500 - Finite Elements In Elasticity

Credit Hours: 3.00. Fundamentals of theory of elasticity; variational principles; one-, two-, and three-dimensional elasticity finite elements; interpolation methods; numerical integration; convergence criteria; stress interpretation. Typically offered Spring.

CE 59700 - Civil Engineering Projects

Arrange Hours and Credit. Hours and credits to be arranged. Permission of instructor required. Typically offered Fall Spring Summer.

CE 59800 - Graduate Professional Internship

Credit Hours: 0.00. Professional experience in Civil Engineering. This internship experience is intended to complement the student's academic coursework and help prepare the student for a career as a practicing engineer. Program coordinated by school with cooperating employers. Must complete one academic year in Civil Engineering. A written report is required. (May be repeated but may not be taken in successive semesters.). Permission of instructor required. Typically offered Summer Fall Spring.

CE 61200 - Physical Geodesy

Credit Hours: 3.00. Gravity field modeling. Spherical harmonics. Gravimetry and gravity reduction methods. Discrete/continuous estimation. Gravity prediction, collocation. Local and world height datums. Earth rotation, differential equations of Euler and Liouville. Basics of inertial surveying. Prerequisite: CE 61100. Typically offered Spring.

CE 61400 - Statistical And Econometric Methods I

Credit Hours: 3.00. Basic and advanced statistical and econometric methods as applied to engineering-related problems. Introduction to ordinary least squares regression, count-data models including Poisson and Negative binomial regressions and their extensions, simultaneous equations models, multinomial logit models, ordered probability models, joint discrete/continuous models, and hazard-based duration models. Prerequisites: STAT 51100. Typically offered Fall.

CE 61500 - Statistical And Econometric Methods II

Credit Hours: 3.00. Advanced statistical and econometric methods as applied to engineering-related problems extending the techniques covered in CE 61400. Topics include: seemingly unrelated regression, three-stage least squares, generalized extreme value models, nested logit models estimated by full information maximum likelihood, random parameters (mixed) logit models, models with fixed and random effects, and zero-inflated count-data models. Prerequisites: CE 61400. Typically offered Spring.

CE 63100 - Advanced Concrete And Aggregates

Credit Hours: 3.00. Microstructure of concrete. Physicochemical properties of cements and their hydration. Nature of hardened cement paste. Properties of aggregates. Workability, strength, shrinkage, creep, and fracture of concrete. Durability, freezing and

thawing, air-entertainment, reactions of aggregates, chemical attack. Influence of microstructure on engineering properties of concrete. Prerequisite: CE 53000. Typically offered Spring.

CE 66100 - Algorithms In Transportation

Credit Hours: 3.00. Modeling and analysis of transportation network problems through the design, analysis, and implementation of algorithms. Emphasis on the use of quantitative techniques of operations research to model system performance. Covers fundamental data structures, complexity analysis, memory management, recursive programs, application of graph theory and network analysis to transportation problems, analytical formulations and solution algorithms for traffic assignment problems, and dynamic traffic assignment. Prerequisite: CE 59600 or IE 50100. Typically offered Fall.

CE 67100 - Behavior Of Metal Structures

Credit Hours: 3.00. Study of the behavior of metal structural components and metal structural systems. The performance of civil engineering type metal structures in various loading environments is examined, and correlations between behavioral characteristics and various design specification requirements are reviewed. Primary emphasis is placed on the behavior of steel structures, although other metal systems also are discussed. Specific topics include material behavior, manufacturing processes, fatigue and fracture, bolting and welding procedures, and repair and retrofit techniques. Course material is augmented with a number of case studies. Prerequisite: CE 59100. Typically offered Fall Spring.

CE 67200 - Advanced Topics In Structural Engineering

Credit Hours: 1.00 to 3.00. A series of minicourses on special topics offered as CE 67000, CE 67200, etc. These special topic minicourses provide an opportunity for introducing students to topics of contemporary importance or special interest which fall outside the scope of the regular structural courses. Information about current offerings may be obtained from the schedule of classes or the structural engineering. Typically offered Fall Spring.

CE 67401 - Bridge Engineering

Credit Hours: 3.00. This course reviews a number of fundamental topics related to the structural design of highway bridges. Some of the key features include bridge types, aesthetics, structural analysis methods, vehicle load distribution, deck design and detailing, steel girder design, concrete girder design, integral abutment design, bearings, and construction. Concurrent prerequisites: CE 57200 and CE 59100. Typically offered Fall Spring.

CE 67500 - Finite Element Analysis

Credit Hours: 3.00. Theoretical basis of the finite element method; elements for use in the solution of two- and three-dimensional

stress problems, plate-bending problems and shell problems; static and dynamic loadings; vibration and stability problems; geometrical or material nonlinearities; flow problems. Prerequisite: CE 57700 or 57800. Typically offered Spring.

CE 67600 - Behavior Of Reinforced Concrete Members

Credit Hours: 3.00. Studies of the behavior and strength of reinforced concrete members, behavior of beam-columns, deflections, shear, bond, and cracking. Review of research and pertinent literature. Emphasis is placed on the background, use, and limitations of present design specifications. Prerequisite: CE 57600. Typically offered Spring.

CE 68100 - Engineering Properties Of Soils

Credit Hours: 3.00. Engineering properties of soils, including compaction phenomena, with emphasis on strength and compressibility. Experiments to examine the nature and validity of strength and compressibility theories and their application to stability and settlement analysis. Measures of soil fabric; behavior of waste/marginal materials. Prerequisite: CE 48300. Typically offered Fall.

CE 68200 - Ground Water And Seepage

Credit Hours: 3.00. Hydromechanics of confined and unconfined flow of water through soils, potential theory, conformal mapping transient flow. Applications to design of earth dams. Prerequisite: CE 483000. Typically offered Summer Spring.

CE 68400 - Geological Engineering

Credit Hours: 3.00. Principles describing the mechanical response of geomaterials subjected to disturbance by man. Relation between geology and engineering. Weathering and hydrothermal alteration of rock masses. Weathered rocks, problem soils, and transitional materials. Soluble rock terrain (karst). Applied geomorphology. Civil engineering design factors and case histories that relate to the behavior of rocks and sediments. Characterization of geomaterials behavior, exploration and measurement of their engineering properties. The focus of the course is on theoretical and practical solution of engineering problems. Prerequisite: CE 483000. Typically offered Fall.

CE 68500 - Rock Mechanics

Credit Hours: 3.00. Mechanical properties governing rock behavior, from intact rock to fractured rock masses. Laboratory experiments and field tests. Failure criteria. Linear Elastic Fracture Mechanics. Rock mass deformability. Analytical and empirical approaches for the design and construction of civil engineering structures in rock masses. Slope stability. Bearing capacity of shallow and deep foundations. Prerequisite: CE 48300. Typically offered Fall.

CE 68600 - Underground Construction

Credit Hours: 3.00. Planning, analysis, design, and construction of underground structures in soft ground and rock. Ground structure interaction. Static and seismic stresses on tunnel support. Relative stiffness method. Ground deformations. Construction methods, types of support, and their effects on the surrounding ground. The focus of the course is on the understanding of the interaction between ground and structure. Prerequisite: CE 48300. Typically offered Fall.

CE 68901 - Plasticity Theory

Credit Hours: 3.00. The course covers stress analysis, strains analysis, elastic and inelastic constitutive relations, with emphasis on plasticity, and the solution of plastic boundary-value problems for a wide range of materials, including metals, soils and alloys of various types. Specific topics covered by the course include: tensors, stress analysis, strain analysis, laws of thermodynamics, basic concepts from elasticity, viscoplasticity as an extension of viscoelastic concepts, classical plasticity, principle of maximum plastic dissipation, Drucker¿s inequality, yield function and yield surface, flow rule, hardening rule, classical models (Tresca, Von Mises, Mohr-Coulomb, Drucker-Prager), bounding-surface plasticity, thermodynamics and constitutive models, causes of plasticity at the microstructural level, noncoaxial plasticity, limit analysis, method of characteristics (slipline method) and cavity expansion analysis. Prerequisite: AAE 55300 or ME 61200. Typically offered Fall.

CE 69100 - Civil Engineering Seminar

Credit Hours: 0.00. An interdisciplinary seminar which provides a forum for invited speakers and staff to discuss new developments in practice and current research in civil engineering. Typically offered Fall Spring.

CE 69500 - Probabilistic Methods In Geotechnical Engineering

Credit Hours: 3.00. Examines the nature of particulate media and their description and characteristics. Compares deterministic and probabilistic approaches to the action and reaction of structures of, on, or in soil when subjected to loadings. Considers uncertainties in material parameters and their effect on designs. Stability is assessed in terms of reliability as well as customary factors of safety. Prerequisite: CE 58000. Typically offered Fall Spring Summer.

CE 69700 - Civil Engineering Projects

Arrange Hours and Credit. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

CE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

CE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Classics

CLCS 18100 - Classical World Civilizations

Credit Hours: 3.00. Course introduces students to "Classical" civilizations on three continents (Europe, Africa, and Asia) demonstrably interconnected by an ancient world system. Course focuses on essential themes of past civilization: religion, philosophy, surviving texts, gender relations, urbanism, technology, social and political formations. Typically offered Summer Fall Spring.

CLCS 22000 - Topics In Classical Literature

Credit Hours: 3.00. Selected topics in Greek and Roman literature. All readings in English translation. Typically offered Fall Spring Summer.

CLCS 23010 - Survey Of Greek Literature In Translation

Credit Hours: 3.00. Introduction to Ancient Greek literature from homer to Plato. All readings in English. Typically offered Fall Spring Summer.

CLCS 23100 - Survey Of Latin Literature

Credit Hours: 3.00. Highlights of literature written in Ancient Rome at times of political, social, and intellectual turbulence. Reading (all in English) includes Vergil's Aeneid, as well as selections from other influential Latin texts. Typically offered Fall Spring Summer.

CLCS 23200 - Classical Roots Of English Words

Credit Hours: 3.00. This is an introduction to English etymology with emphasis on building vocabulary. Students will learn English derivatives from both classical Greek and Latin. All texts to be read in English. Typically offered Fall Spring Summer.

CLCS 23300 - Comparative Mythology

Credit Hours: 3.00. Comparative study of the myths of major ancient cultures, with emphasis on shared typological features. Typically offered Summer Fall Spring.

CLCS 23500 - Introduction To Classical Mythology

Credit Hours: 3.00. Study of the myths of western antiquity, as represented in ancient Greek and Latin texts and images. Typically offered Fall Spring Summer.

CLCS 23600 - Ancient World Onscreen

Credit Hours: 3.00. How film represents ancient Mediterranean civilizations and retells ancient myths; how cinematic renderings of ancient history shape views of the past and how these are affected by contemporary sensibilities. No knowledge of Greek or Latin required. Typically offered Fall Spring Summer.

CLCS 23700 - Gender And Sexuality In Greek And Roman Antiquity

Credit Hours: 3.00. How identities based on gender, sexual behavior and sexual desire, and socio-economic status are established in ancient Greece and Rome. Exploration of why these ancient views of gender and sexuality remain of continuing importance in the 21st century. All readings in English. Typically offered Fall Spring Summer.

CLCS 23800 - The Tragic Vision

Credit Hours: 3.00. Greek and Roman tragedy from their beginnings until today. Readings in English from representative authors such as Aeschylus, Sophocles, Euripides, and Seneca; later receptions of ancient tragedy in drama and other media. Course may include performance, theories of comedy and tragedy, or recent and current expressions of the tragic in film and other media. Typically offered Fall Spring.

CLCS 28000 - Topics In Classical Civilization

Credit Hours: 3.00. Selected topics in Ancient Civilization. Typically offered Fall Spring Summer.

CLCS 33100 - Survey of Latin Literature in Translation

Credit Hours: 3.00. This introductory-level course explores just a few of the highlights of Latin literature in English translation. We shall investigate the topics of power, persuasion, and memory, among other themes. Readings (all in English) include Vergil's Aeneid (in its entirety), as well as selections from Catullus, Cicero, Ovid, Tacitus, and others.

CLCS 33700 - The Ancient Epic

Credit Hours: 3.00. Study of the epic in four ancient cultures, with emphasis on its structure, nature, and social functions. Readings may include Gilgamesh, Iliad, Odyssey, Aeneid, Beowulf, Tain, Mahabharata, and others. Typically offered Fall Spring Summer.

CLCS 33800 - The Tragic Vision

Credit Hours: 3.00. "The Tragic Vision" explores the "script" of Hollywood movies as it pertains to the classical literary and performance genre of tragedy, which emerged in Athens in the fifth century BCE. This course is different from CLCS 336, "The Ancient World Onscreen," in that while CLCS 336 gives an overview of the Greco-Roman periods in films, such as Clash of the Titans, Troy, or Gladiator, CLCS 338 focuses on "tragedy" as it was defined in ancient Greece and by subsequent philosophers, including Hegel and Nietzsche. Examples of films viewed in this class are Pasolini's Edipo Rei (Oedipus), Eugene O'Neill's Mourning Becomes Electra, and Marcel Camus's Black Orpheus. We approach the literary texts as "scripts" of the tragic genre, and we are also interested in what tragedy means today.

CLCS 33900 - Literature And The Law

Credit Hours: 3.00. Study of literary texts that shed light on the varied practices and ideals that different ancient and modern societies have regarded as "lawful", "just", and "good". Exploration of questions and conflicts arising from disagreement about these ideals and from the difficulties enacting them through legal systems, political structures, and individual choices. Typically offered Fall Spring Summer.

CLCS 38000 - Alexander The Great and Hellenistic World

Credit Hours: 3.00. Course examines the career of Alexander the Great and the rise of Macedonia in the Hellenistic Era. Topics include the emergence of Macedonia under Philip II; the achievements of Alexander the Great; and the wars of succession following his demise. Typically offered Summer Fall Spring.

CLCS 38100 - Julius Caesar: Statesman, Soldier, Citizen

Credit Hours: 3.00. Course Examines the career of Julius Caesar by focusing on events from Caesar's birth (100 BCE) through his assassination in 44 BCE. Course places Caesar's complex personality within the context of political, military, economic, social, and cultural upheaval during the Late Roman Republic. . Typically offered Summer Fall Spring.

CLCS 38300 - The Roman Empire

Credit Hours: 3.00. Course examines developments from the Augustan Settlement to the end of the Roman Empire (27BCE - 476CE), along with aspects of religious, social, sexual and material culture throughout the Mediterranean at that time. Typically offered Summer Fall Spring.

CLCS 38500 - Science, Medicine And Magic In The Ancient West

Credit Hours: 3.00. Study of the development of the idea of rationality in the West through examination of the evolution of Greek and Roman sciences, with emphasis on medicine and astronomy. Typically offered Fall Spring Summer.

CLCS 38600 - Ancient Greek Religion

Credit Hours: 3.00. Study of the religious beliefs and practices of ancient Greece, based on written, artistic, and archaeological evidence of their forms and functions. Typically offered Fall Spring Summer.

CLCS 38700 - Roman Religion

Credit Hours: 3.00. Study of the religious beliefs and practices of ancient Rome, based on written, artistic, and archaeological evidence of their forms and functions. Typically offered Fall Spring Summer.

CLCS 48000 - Potters And Society In Antiquity

Credit Hours: 3.00. Course covers the range of eastern Mediterranean ceramics encountered in Rough Cilicia Archaeological Survey Project from the Bronze Age to the Later Roman Empire. Course also explores strategies employed by archaeologists and historians to exploit ceramics as research materials. Typically offered Summer Fall Spring.

CLCS 48100 - Culture And Society In The Age Of Pericles

Credit Hours: 3.00. Course explores interrelationships between the emergence of Greek democracy and the cultural, political, social, and economic rise of Athens in the fifth century BCE. More broadly, course surveys history of the Greek world from the Late Bronze Age to 362 BCE. Typically offered Summer Fall Spring.

CLCS 48300 - Republican Rome

Credit Hours: 3.00. Course examines the military, political, economic, and social developments that enabled the Roman people to expand from an Italian city-state to a trans-Mediterranean empire, and the consequences that initiated the decline and transition in their republican form of government. . Typically offered Summer Fall Spring.

CLCS 49900 - Special Topics In Classics

Credit Hours: 1.00 to 4.00. Special Topics in Classics. Permission of instructor required. Typically offered Summer Fall Spring.

CLCS 59000 - Directed Reading In Classics

Credit Hours: 1.00 to 4.00. Directed readings in Classics. Permission of instructor required. Typically offered Spring Fall.

CLCS 59300 - Special Topics In Classical Literature

Credit Hours: 1.00 to 4.00. Special topics in Classical Literature. Permission of instructor required. Typically offered Spring Fall.

Clinical Pharmacy

CLPH 36100 - Geriatric Pharmacy Practice

Credit Hours: 1.00. This course is designed to provide health professional students with a general understanding of the elderly population and the medical care they receive. The course considers sociological-psychological aspects of aging and their effects on health delivery for the elderly. Typically offered Fall.

CLPH 43000 - Introduction To Critical Care Pharmacotherapy

Credit Hours: 2.00. The purpose of this course is to familiarize the student with the specialized use of drugs in certain types of critical care disease states with a strong orientation toward case based learning. The course is designed to meet the needs of students with an interest in further developing their knowledge base in common acute diseases by utilizing real-life patient cases. Instruction will be provided through a combination of lectures and progressive case discussions. Typically offered Spring.

CLPH 43500 - Pediatric Pharmacotherapy

Credit Hours: 2.00. This elective course will focus on the pharmacotherapeutics and pathophysiology of the more common disorders that apply to the pediatric population. The purpose of the course is to discuss the relevant differences between the adult and pediatric population in regards to the diagnosis, treatment options, desired therapeutic outcomes and therapeutic drug monitoring parameters. Instruction will be provided through a combination of lectures, case discussions, homework assignments, and group presentations. Typically offered Spring.

CLPH 44800 - Therapeutic Case Studies

Credit Hours: 2.00. This course is intended to complement instruction of other courses in the second professional year of the Doctor of Pharmacy curriculum and to review many of the topics previously addressed in the Integrated Pharmacotherapy courses and Professional Program Laboratories. It is hoped that students who elect this course will enhance their development of a strong foundation of knowledge, clinical skills and abilities in order to meet the school's professional outcome abilities. Team-based problem-solving methodology will be utilized to discuss patient cases related to topics covered in the IP sequence. Typically offered Fall Spring.

CLPH 44900 - Introduction To Psychiatric Pharmacy Practice

Credit Hours: 1.00. This course that provides an overview of psychiatric pharmacy practice, introduction to stigma and diversity issues in mental illness, and disease state overviews in a lecture format. In one class period, the students are able to interact with 4th year pharmacy students and/or pharmacy residents who have worked or are working in the area of psychiatric pharmacy. Four of the class periods also provide live presentations and interactions with persons living with severe mental illness and mental health workers who work with them. Mental Health America of Tippecanoe County works with the instructor to schedule these live presentations. Students are assessed for attendance and participation and also for a reflection written about each class period. Typically offered Fall.

CLPH 45100 - Pharmacy Practical Training

Credit Hours: 1.00. Course allows students to gain employment experience in a pharmacy practice setting. Students receive credit for practical experience in the time period just prior to course enrollment when they complete the course paper requirement. Pre-

approval of enrollment required prior to employment experience. Permission of instructor required. Typically offered Fall Spring Summer.

CLPH 45300 - Advanced Primary Literature Evaluation: A Focus On Therapeutic Issues

Credit Hours: 2.00. The purpose of this elective course is to enhance the primary literature evaluation skills of the student prior to clerkship rotations. The course is designed to meet the needs of students with an interest in pursuing post-graduate training programs to enhance their ability to discuss the medical literature. Instruction is provided through a combination of lectures and class discussions of recently published literature articles with a cardiovascular focus. Typically offered Spring.

CLPH 45400 - Advanced Practice In Psychiatric Pharmacy

Credit Hours: 2.00. The purpose of this course is to provide the student with knowledge and insight regarding the use of medications in persons with mental illness. Instruction will be provided in the following areas (but not limited to): (1) psychiatric disease states; (2) psychiatric medications - usual dosing, adverse effects, drug interactions; (3) clinical use of psychiatric medications in psychiatric pharmacy practice; (4) useful and appropriate monitoring parameters; (5) the interaction of medical illness in the treatment of psychiatric disorders; (6) strategies to improve medication adherence and minimize adverse events; (7) utilization of recognized treatment guidelines in clinical care. Case-based learning will be utilized in emphasize important points in clinical use and monitoring of psychiatric medications and disorders. Typically offered Spring.

CLPH 45600 - Pharmaceutical Care Of Diabetes

Credit Hours: 2.00. The purpose of this course is for students to obtain a comprehensive knowledge of the pharmaceutical care of diabetes. Students will expand understanding of comprehensive diabetes care. This will expose the students to experiences in which they will gain an appreciation for the complexities involved with diabetes, develop empathy for patients with diabetes, construct evidence-based treatment plans, and enhance oral and written communication skills. Students will also complete care plan assignments to apply concepts learned in the didactic lectures. This course provides a platform for shaping pharmacists into excellent caregivers for patients with diabetes. Typically offered Fall.

CLPH 45700 - Pharmaceutical Care In Developing Countries

Credit Hours: 2.00. This elective will emphasize the major disease states, rational drug selection, especially with a limited medication formularly, desired therapeutic outcomes, and the provision of complete pharmaceutical care to patients in developing countries. The impact of drug therapy on health care, economics, and quality of life for diverse populations will be emphasized. Students will prepare to provide care in a cross-cultural environment in which resources are limited. Instruction is provided through a combination of lectures, discussions, and presentations. Enrollment is limited to Doctor of Pharmacy students (068) DP-C status or by consent of course coordinator. Typically offered Spring.

CLPH 46000 - Principles Of Pharmaceutical Care And Biometrics

Credit Hours: 3.00. Therapeutics use of drugs to selected human disease states and an introduction to biometrics with an emphasis on the applications of biometrics to interpret and analyze data. Permission of department required. Typically offered Summer Fall Spring.

CLPH 46300 - Pediatric Pharmacotherapy

Credit Hours: 1.00. This course will consist of a lecture/case discussion format. The lectures will focus on the pediatctric management of the following topics: Clinical Application in Pharmacokinetics, Fluids and Electrolytes, Nutrition, Respiratory Infections/Menigitis, Pain Management, and OTC products. The case discussions allow for practical application of the information gained through the lectures. Typically offered Spring.

CLPH 46900 - Principles Of Pharmacy Practice

Credit Hours: 2.00. The relationship of the pharmacist to drug product selection, preparation and delivery, assessment and documentation of drug therapy outcomes, and the identification and prevention of medication-related problems are emphasized. The therapeutic use of drugs for numerous chronic human disease states are introduced through lecture, written assignments, and case studies. Typically offered Fall.

CLPH 47100 - Pathophysiology And Therapeutics I

Credit Hours: 3.00. Introduction to the therapeutic use and monitoring of drug effects. Teaching strategies employ lecture, case studies, and exercises that develop student knowledge and abilities with patient databases, use of medical terminology, and development of drug monitoring parameters and patient care plans. Typically offered Spring.

CLPH 49000 - Special Topics

Credit Hours: 1.00 to 3.00. An honors course to be used to relate to, and supplement, an existing course. Subject matter and method of approach individually directed by instructor. Permission of instructor required. Typically offered Fall Spring.

CLPH 69000 - Special Problems

Credit Hours: 2.00. Individual research topics pertaining to the practice of clinical pharmacy in institutions and the community. Permission of instructor required. Typically offered Fall Spring Summer.

CLPH 69600 - Seminar In Pharmacy

Credit Hours: 1.00. Designed to provide the student with experience in the oral and written presentation of special topics of interest to clinical pharmacists and researchers. Discussion of current problems relating to the clinical practice of pharmacy. Typically offered Fall Spring.

CLPH 86600 - Introduction To The Advanced Pharmacy Practice Experience

Credit Hours: 1.00. The Introduction to Advanced Pharmacy Practice Experience (APPE) course was designed to provide students with the tools needed to be successful clerkship students. Students will participate in a variety of activities, including case studies, group work, evaluations and assessment, review of therapeutic topics, and student/preceptor panel interactions. Activities will be supplemented by didactic lecturing for each topic. The activities and lecture topics were selected based on feedback from previous clerkship students, preceptors, and faculty, and are intended to "de-mystify" the clerkship experience. This course prepares students to enter the clerkship year with the ability to successfully submit required clerkship forms, evaluate preceptors and peers, avoid common clerkship student mistakes, document clinical interventions, review medical charts, and prepare for therapeutic and pharmacokinetic responsibilities. Typically offered Spring.

CLPH 86700 - Principles Of Drug Information And Literature Evaluation

Credit Hours: 2.00. This course is designed to provide students with basic fundamentals needed for the provision of drug information in pharmacy practice. Emphasis is placed on the evaluation, interpretation, and practical implications of primary literature on the delivery of pharmaceutical care. Concepts of formulary management, medication use improvement, medication safety, and evaluating and reporting adverse drug events will also be reviewed. Typically offered Fall.

CLPH 87200 - Pathophysiology And Therapeutics II

Credit Hours: 1.00 to 6.00. Pathophysiologic and therapeutic instruction on selected disease states to prepare the student to design, recommend, implement, monitor, and alter cost-effective, patient-specific pharmacotherapeutic plans. Typically offered Fall.

CLPH 87300 - Pathophysiology And Therapeutics III

Credit Hours: 1.00 to 6.00. A continuation of CLPH 57200. Pathophysiologic and therapeutic instruction on selected disease states to prepare the student to design, recommend, implement, monitor, and alter cost-effective, patient-specific pharmacotherapeutic plans. Typically offered Spring.

CLPH 88500 - Inpatient Medicine Clerkship

Credit Hours: 4.00. Four-week clinical experience rotation in a selected inpatient medical, pharmacy, or healthcare related patient care facility. Students gain experience in therapeutic decision making, disease management, communication, drug information activities, administrative skills, and research in the context of providing pharmaceutical care and services. Typically offered Fall Spring Summer.

CLPH 88800 - Doctor Of Pharmacy Clerkship - Ambulatory Medicine

Credit Hours: 4.00. Four-week clinical experience rotation dealing with patients in a selected ambulatory care medical or pharmacy facility. Students gain experience in therapeutic decision making, disease management, communication, drug information activities, and the provision of pharmaceutical care. Typically offered Fall Spring Summer.

CLPH 88900 - Doctor Of Pharmacy Clerkship - Elective Rotation

Credit Hours: 4.00. Four-week clinical experience rotation in a selected medical, pharmacy, or healthcare related facility. Students gain experience in therapeutic decision making, disease management, communication, drug information activities, administrative skills, research, and the provision of pharmaceutical care and services. Typically offered Fall Spring Summer.

Communication

COM 10000 - Introduction To Communication Studies

Credit Hours: 1.00. This semester-long course will introduce students to many opportunities offered by the Department of Communication. Permission of department required. Typically offered Fall Spring.

COM 10200 - Introduction To Communication Theory

Credit Hours: 3.00. Overview of approaches treating communication as an individual, functional activity and as a social, structuring activity. Covers definitions and models of communication, core processes (interpretations, sending, receiving), structures (language, nonverbal behavior), and key contexts (personal, organizational, public). Typically offered Summer Fall Spring.

COM 11400 - Fundamentals Of Speech Communication

Credit Hours: 3.00. A study of communication theories as applied to speech; practical communicative experiences ranging from interpersonal communication and small group process through problem identification and solution in discussion to informative and persuasive speaking in standard speaker-audience situations. Typically offered Fall Spring Summer. NOTE: Concurrent registration is not permitted for ENGL 10600 and COM 11400. CTL:ICM 1103 Fundamentals Of Public Speaking

COM 20400 - Critical Perspectives On Communication

Credit Hours: 3.00. Introduction to critical thinking and writing about communication. Draws on humanistic and qualitative traditions to help students learn and apply critical approaches to understanding communication. . Typically offered Summer Fall Spring.

COM 21000 - Debating Public Issues

Credit Hours: 3.00. Study of argumentation as applied to public discourse. Lectures on logic and reasoning, library research methods and bibliography, identification and analysis of issues, construction and organization of cases, refutation and rebuttal, and the phrasing and delivery of the argumentative speech. Preparation of debate cases. Typically offered Fall Spring.

COM 21200 - Approaches To The Study Of Interpersonal Communication

Credit Hours: 3.00. A study of the basic characteristics of human communication and the theoretical and practical implications of these characteristics for various forms of oral communication. Typically offered Fall Spring Summer. CTL:ICM 1101 Interpersonal Communication

COM 21700 - Science Writing And Presentation

Credit Hours: 3.00. Students learn to effectively communicate scientific and technical information both verbally and in writing to a variety of audiences. Typically offered Fall Spring.

COM 22400 - Communicating In The Global Workplace

Credit Hours: 3.00. This introductory course explores communication issues that arise in the global workplace. The course develops an appreciation of the relationship among culture, communication, and ways of organizing and doing business. Typically offered Fall.

COM 25000 - Mass Communication And Society

Credit Hours: 3.00. A survey of the print, broadcast, and film media in their relationship and influence on society. Study topics include: mass communication theories, documentaries, commercialism, news media, media effects and control, feedback, educational broadcasting, and audience analysis. Typically offered Fall Spring Summer. CTL:ICM 1102 Introduction To Mass Communication

COM 25100 - Communication, Information, And Society

Credit Hours: 3.00. This course provides an introduction to information and communication technologies, including media and computer-related technologies. Basic information and technical literacy skills are developed, while discussing fundamental concepts of mediated communication in 21st century contexts. Typically offered Fall Spring Summer.

COM 25200 - Writing For Mass Media

Credit Hours: 3.00. Labor intensive course teaches basics of newspaper writing, broadcast writing, news releases, and online journalism. Typically offered Summer Fall Spring.

COM 25300 - Introduction To Public Relations

Credit Hours: 3.00. An analysis of public relations theory and practice from their origins to the present. From a communication perspective, the course examines public relations environments, audiences, and message strategies. Typically offered Fall Spring Summer.

COM 25600 - Introduction To Advertising

Credit Hours: 3.00. An analysis of commercial persuasion from colonial times to the era of mass communication. The course examines the structure of advertising messages, how they are adapted to specific audiences, and the social settings in which they occur. Typically offered Fall Spring Summer.

COM 25700 - Public Relations Techniques

Credit Hours: 3.00. This class introduces students to a range of public relations techniques, with a focus on writing. From press releases to new media, this class offers practice and feedback on how to use common public relations tools. Typically offered Fall Spring Summer.

COM 26100 - Introduction To Digital Video Production

Credit Hours: 3.00. Basic production principles and practices. Emphasis on preplanning and conceptualizing skills in addition to practical production techniques. Required for admission to all television production courses. Permission of department required. Typically offered Fall Spring.

COM 30300 - Intercultural Communication

Credit Hours: 3.00. Study of the complex relationship between culture and communication in a variety of interpersonal, group, organizational, and computer-mediated settings. Application of theory and research to development of the knowledge, attitudes, and skills associated with intercultural communication competence. Typically offered Fall Spring.

COM 30400 - Quantitative Methods For Communication Research

Credit Hours: 3.00. Introduction to the development and application of quantitative research methods pertinent to communication problems. Fundamental concepts of problem identification, reliability and validity of both measurement and research design, and statistical analyses of data. Typically offered Summer Fall Spring.

COM 31100 - Copy Editing

Credit Hours: 3.00. Study of, and practice in, copyreading and headline writing. Laboratory practice includes copy editing on video-display terminals. Typically offered Summer Fall Spring.

COM 31200 - Rhetoric In The Western World

Credit Hours: 3.00. An explanation of major theoretical and philosophical concepts concerning rhetoric; the relationships between rhetoric and political, social, and personal decisions are explored. Ancient and modern authors will be read. Typically offered Fall Spring.

COM 31400 - Advanced Presentational Speaking

Credit Hours: 3.00. Development of a marked degree of skill in the composition and delivery of various types of speeches

including presentations in corporate board rooms, orientation meetings, banquet halls, public forms. Special emphasis on speeches related to the student's major vocational area. Typically offered Fall Spring Summer.

COM 31500 - Speech Communication Of Technical Information

Credit Hours: 3.00. The organization and presentation of information of a practical technical nature. Emphasis is placed upon the study, preparation, and use of audiovisual materials in such presentations. Typically offered Fall Spring Summer.

COM 31800 - Principles Of Persuasion

Credit Hours: 3.00. Persuasion and its effects, ranging from individual influences to societal impacts. Various perspectives and models of persuasion are examined, including classical and modern approaches. Both theoretical and pragmatic considerations are introduced. Typically offered Fall Spring Summer.

COM 32000 - Small Group Communication

Credit Hours: 3.00. A study of group thinking and problem-solving methods; participation in, and evaluation of, committee, and informal discussion groups. Focus on the roles, networks, and messages employed by small group communicators. Typically offered Fall Spring Summer.

COM 32400 - Introduction To Organizational Communication

Credit Hours: 3.00. An introduction to fundamental concepts and basic research related to communication behavior in organizational settings. Units cover message processing, leadership communication, communication climates, communication training, and communication audits. Students participate in an organizational simulation in some sections. Typically offered Summer Fall Spring.

COM 32500 - Interviewing: Principles And Practice

Credit Hours: 3.00. Theory and practice of methods in selected interview settings: informational, employment, and persuasive. Emphasis on communication between two persons, questioning techniques, and the logical and psychological bases of interpersonal persuasion. Typically offered Fall Spring Summer.

COM 32800 - Diversity At Work: A Rhetorical Approach

Credit Hours: 3.00. Introduces students to theories and experiences related to issues dealing with both diversity in the workplace and diversity at work to change or influence the world. Typically offered Fall.

COM 32900 - History Of The Mass Media

Credit Hours: 3.00. Study of Anglo-American press traditions, including the development of American mass media within socio-cultural environments. Typically offered Fall Spring.

COM 33000 - Theories Of Mass Communication

Credit Hours: 3.00. An examination of mass communication theories and theorists. Readings and discussion of McLuhan, Lippman, De Fleur, Lazarsfeld, Schramm, Stephenson, and other significant contributors. Typically offered Fall Spring.

COM 33200 - Television Production

Credit Hours: 3.00. Basic principles of producing, writing, and directing for television. Treats program types and television criticism, and explores creative treatment of visual, artistic, and nonverbal elements of communication in television. Permission of department required. Typically offered Spring Fall.

COM 33600 - Advertising In The Electronic Mass Media

Credit Hours: 3.00. Theory and practice of advertising as applied to the electronic mass media. Emphasizes the adaptation of advertising messages to government regulation, client, audience, product, and particular medium. Typically offered Fall Spring.

COM 33700 - Advanced Digital Video Production

Credit Hours: 3.00. Provides experience in writing program proposals and scripts, taping with small-format television equipment, and audio and video editing for various program formats. Special attention to editing, theory and technique, aesthetic considerations, and institutional and community cable outlets. Permission of department required. Typically offered Fall Spring.

COM 35100 - Mass Communication Ethics

Credit Hours: 3.00. A survey of various ethical approaches applied to situations confronting contemporary mass communicators,

including misrepresentation in newsgathering, protection of sources, suppression of information, reporting of terror and violence, pressure from management and advertisers, and reporter bias. Typically offered Fall Spring.

COM 35200 - Mass Communication Law

Credit Hours: 3.00. Study of Anglo-American traditions and trends as well as current American conditions of the laws of libel, privacy, fair comment and criticism, privilege, property rights, and copyright as such factors affect the print journalist and the broadcaster. Emphasis is on existing state and federal regulations and precedents. Typically offered Fall Spring.

COM 35300 - Problems In Public Relations

Credit Hours: 3.00. Approaches to problems in public relations as they occur in industry, government, education, social agencies, and other institutions. Typically offered Fall Spring.

COM 35600 - Problems In Advertising

Credit Hours: 3.00. Approaches to problems in advertising as they involve the planning, creation, and evaluation of commercial messages. Typically offered Fall Spring.

COM 35900 - Public Affairs Reporting

Credit Hours: 3.00. Study of, and practice in, reporting local and state news, including activities of the state legislature, local school boards, the courts, and the impact of national and international events on local affairs. Typically offered Fall Spring.

COM 36800 - Sociolinguistic Study Of African American English

Credit Hours: 3.00. (ANTH 36800, AUSL 36800, ENGL 36800, LC 36800, IDIS 37800, LING 36800) A study of the history, structure, uses, and educational concerns of African American English in African American speech communities and the U.S. culture at large. Typically offered Fall Spring.

COM 37200 - Communication In Relationships

Credit Hours: 3.00. An examination of communication in personal relationships (including dating and marital relationships,

friendships, and families) and professional relationships (including co-worker and supervisor-supervisee relationships and relationships in specific professions, such as doctor-patient and attorney-client.). Typically offered Fall Spring.

COM 37300 - Self-Presentation And Social Image

Credit Hours: 3.00. Review of history, research, and theory in impression management. People frequently 'package' information about themselves to influence others to draw the 'right' conclusions about them. This course examines how people use interpersonal communication to manage how others perceive them. Typically offered Fall Spring.

COM 37400 - Social Interaction Skills: Assessment And Development

Credit Hours: 3.00. An examination of several major communication skills and procedures for their development. Focus is on skill measurement, methods of enhancement, assessment of training programs, and personal skill development. Skills examined include those for conversing, managing conflict, providing support, and influencing. Typically offered Fall Spring.

COM 37500 - Conflict And Negotiation

Credit Hours: 3.00. This course surveys theory and research focused on the role of communication in conflict and negotiation, and helps students develop skills needed to manage conflict effectively in their personal and professional relationships. Typically offered Fall Spring.

COM 37600 - Communication And Gender

Credit Hours: 3.00. Course is based on the assumption that studies of gender and communication are intertwined. Focus is on communication processes that create symbols of gender and how those processes recreate the meanings of gender in the lives of individuals and groups. Typically offered Fall Spring.

COM 38100 - Gender And Feminist Studies In Communication

Credit Hours: 3.00. This course examines the ways in which communication constructs and maintains our conceptions of gender. It explores different approaches to the study of gender and feminist issues in public, organizational, and mass communication. Typically offered Fall Spring.

COM 40600 - Web Production

Credit Hours: 3.00. Introduces students to basic theoretical principles of web production and the process of creating web sites. Typically offered Summer Fall Spring.

COM 40700 - Introduction To New Media/Social Media Production

Credit Hours: 3.00. An exploration of how new technologies such as Twitter, Facebook, Pinterest, Soundslides, blogs, and audio and video are influencing the dissemination of information to mass audiences and correct practices such technologies. Typically offered Summer Fall Spring.

COM 40800 - News Magazine Production

Credit Hours: 3.00. Students plan, write and produce a weekly video news magazine to be aired on Boiler TV. Typically offered Summer Fall Spring.

COM 40900 - Video Journalism

Credit Hours: 3.00. Students plan, write and produce a weekly news magazine to be aired on Boiler TV. Typically offered Summer Fall Spring.

COM 41100 - Communication And Social Networks

Credit Hours: 3.00. This course explores the growing area of networks. The class focuses on understanding how social structure influences our everyday life by examining the ways individuals, groups, and entities are tied together. Permission of instructor required. Typically offered Fall Spring Summer.

COM 41200 - Theories Of Human Interaction

Credit Hours: 3.00. An exploration and critique of major theories of human interaction in a variety of contexts; consideration of language, nonverbal behavior, cognition, emotion, social perception, and social relations. Typically offered Fall Spring.

COM 41500 - Discussion Of Technical Problems

Credit Hours: 3.00. Principles of speech communication related to interpersonal and group discussions on technical topics and problems; practice in using these modes in situations typically encountered by technologists. Typically offered Fall Spring.

COM 41600 - United States Politics And The Media

Credit Hours: 3.00. This course examines the roles and influences of the mass media on American politics generally and with particular emphasis on election campaigns and the evolving political culture of the U.S. Typically offered Fall Spring.

COM 41700 - Training And Development In Organizations

Credit Hours: 3.00. This course is designed to enhance student understanding of the design, development, presentation and evaluation of organizational training programs. Permission of instructor required. Typically offered Fall Spring Summer.

COM 41900 - Judgment And Decision Making

Credit Hours: 3.00. This course is designed to foster an understanding, critique and analysis on issues related to judgment and decision processes. Permission of instructor required. Typically offered Fall Spring Summer.

COM 42300 - Leadership, Communication And Organizations

Credit Hours: 3.00. This course explores leadership from a communication perspective. It examines topics such as leadership styles, leading change, influencing others, emotional intelligence, burnout, and engagement. Permission of instructor required. Typically offered Fall Spring Summer.

COM 42700 - Careers, Communication Issues And Strategies

Credit Hours: 3.00. This course explores the nature of career from a variety of definitions and strategies for employability, objective or external and subjective or psychological success, entrepreneurship, and advancement in corporate and not-for-profit contexts. Permission of instructor required. Typically offered Fall Spring Summer.

COM 43500 - Communication And Emerging Technologies

Credit Hours: 3.00. Both historical and contemporary perspectives of the reciprocal influence of new and changing technologies

and the processes and practices of communication. The impact of print, telegraph, telephone, radio, and television will be surveyed, along with cable systems, direct broadcast satellites, and videotext. Typically offered Fall Spring Summer.

COM 43600 - Script Writing

Credit Hours: 3.00. Study of forms and materials suitable for the electronic mass media; practice in selection, adaptation, and organization of program materials. Typically offered Fall Spring.

COM 44700 - The Television Documentary

Credit Hours: 3.00. Study and application of principles of documentary television formats. Students will research an appropriate topic for documentary treatment and produce that program during the semester. Documentary formats examined include news, biographical, ethnographic, and documentary drama. Typically offered Fall Spring.

COM 45300 - Reporting Of Science News

Credit Hours: 3.00. Study of, and practice in, the techniques of gathering and reporting news of scientific developments to the general public through the examination of samples of science news and regular reporting exercises. Attention given to professional demands made of science reporters. Typically offered Fall Spring.

COM 45600 - Advertising Writing

Credit Hours: 3.00. The theory and practice of copy writing in various advertising contexts. Typically offered Fall Spring.

COM 46200 - Advanced Newswriting

Credit Hours: 3.00. Combines practical experience with classroom learning. Students will work 10-12 hours weekly at the daily local city newspaper and attend a one hour class weekly, during which their writing assignments are critiqued and readings discussed and applied to work assignments. Permission of instructor required. Typically offered Summer Fall Spring.

COM 48900 - Research Experience In Communication

Credit Hours: 1.00 to 3.00. This course grants credit to students who participate in structured research projects within the Brian Lamb School of Communication. Permission of instructor required. Typically offered Fall Spring Summer.

COM 49000 - Internship In Communication

Credit Hours: 1.00 to 3.00. Experiential, supervised training in public relations, journalism, telecommunication, oral interpretation, speech education, organizational communication, or public communication. Usually given in junior or senior year. Usually gives two credits per internship experience. Permission of instructor required. Typically offered Summer Fall Spring.

COM 49100 - Special Topics In Communication

Credit Hours: 1.00 to 3.00. Intensive study of selected topics, varying from semester to semester, from the literature or practice of communication. Course content will be drawn from areas not dealt with in the regular curriculum and may include such topics as photojournalism, economic reporting, and campaign communication. Permission of instructor required. Typically offered Summer Fall Spring.

COM 49500 - Special Topics In Public Relations And Rhetorical Advocacy

Credit Hours: 3.00. In-depth study of a particular area of public relations and rhetorical advocacy. Students read, discuss, and write about contemporary applications of public relations, advertising and rhetoric. Possible offerings include Integrated Marketing Communication, Persuasion and Social Protest, Communication Campaigns. Typically offered Summer Fall Spring.

COM 49600 - Special Topics In Corporate Communication

Credit Hours: 3.00. This course offers students the opportunity to explore in-depth, thorough readings, lectures and written assignments on current issue in corporate communication. Topics may include diversity in the workplace, organizational assessments, or spirituality in organizations. Permission of instructor required. Typically offered Fall Spring Summer.

COM 49700 - Special Topics In Mass Communication

Credit Hours: 3.00. Offers students the opportunity to explore in-depth, thorough readings, lectures and written assignments, a current topic or trend in Media, Technology and Society. Possible offerings include Media and Social Change, Online Communities, and Technology and International Communication. Typically offered Summer Fall Spring.

COM 49800 - Practicum In Human Relations

Credit Hours: 3.00. This course provides students within the Human Relations major an opportunity for an internship or directed research. Typically offered Fall Spring.

COM 50700 - Introduction To Semiotics

Credit Hours: 3.00. (ANTH 51900, AUSL 58900, ENGL 57000, LC 57000) The study of languages, literatures, and other systems of human communication. Includes a wide range of phenomena, which can be brought together by means of a general theory of signs. The course deals with three fundamental areas: 1) verbal communication, 2) nonverbal communication (iconic systems, gestures, body language, etc.), and 3) communication through art forms. Typically offered Fall Spring Summer.

COM 50800 - Nonverbal Communication In Human Interaction

Credit Hours: 3.00. An examination of theoretical writings and critical studies in selected areas of nonverbal communication, e.g., the environmental influences, space and territory relationships, physical appearance and dress, physical behavior, and vocal cues. One unit will deal specifically with measurement, recording, or transcription methods used in nonverbal study. Typically offered Fall.

COM 51200 - Theories Of Interpersonal Communication

Credit Hours: 3.00. Review of contemporary theories, analysis of concepts, models, and pertinent research across the broad spectrum of interpersonal communication. Typically offered Summer Fall.

COM 51500 - Persuasion In Social Movements

Credit Hours: 3.00. A study of the concept of persuasion in social movement theory and the role rhetoric has played historically in selected social movements such as suffrage, women's liberation, civil rights, evangelism, and trade unionism. Typically offered Summer Spring.

COM 51700 - Communication In Politics

Credit Hours: 3.00. Development and application of critical standards to the rhetoric employed by candidates for public office, study of the campaign strategies employed by parties and their candidates at various levels of government. Typically offered Summer Fall.

COM 51800 - Theories Of Persuasion

Credit Hours: 3.00. Review of contemporary theories, including analysis of concepts, models, and pertinent research across the broad spectrum of persuasive communication. Typically offered Fall Spring Summer.

COM 52000 - Small Group Communication

Credit Hours: 3.00. Survey and critical evaluation of theoretical and empirical literature dealing with human communication within small group settings. Typically offered Summer Fall.

COM 52100 - Theories Of Rhetoric

Credit Hours: 3.00. A comprehensive survey of the principal figures, theories, and movements in rhetoric from the classical era to the present. Typically offered Spring Fall.

COM 53100 - Special Topics In Mass Communication

Credit Hours: 3.00. Critical analysis and evaluation of current and continuing problems in both commercial and public mass communication. Typically offered Fall Spring Summer.

COM 55700 - Legal Dimensions Of Communication

Credit Hours: 3.00. Analysis of contemporary issues in communication law. Research into selected problems concerning the law and its impact on both face-to-face and mass communication. Typically offered Fall Spring.

COM 55800 - Historical Trends In Mass Communication Research

Credit Hours: 3.00. An examination of research on the process and effects of mass communication. Early studies on radio and film effects, propaganda, attitude formation and change, public opinion and voting, and the interpersonal dimensions of mass communication. Typically offered Fall Spring Summer.

COM 55900 - Current Trends In Mass Communication Research

Credit Hours: 3.00. An examination of current research as it contributes to understanding the process and effects of mass communication. Topics covered include gatekeepers and information control, audience selection processes and uses of the media, persuasive effects of the media, media content and social learning, the effects of adult programming on children, and the effects of the media on the governmental process. Typically offered Fall Spring.

COM 56500 - Sociolinguistics

Credit Hours: 3.00. (ANTH 56500, AUSL 56500, ENGL 56500, LC 56500) An introduction to language in its social context, focusing on uses and users of language. Topics include social class, ethnic group, gender, language attitudes, and bilingualism. Typically offered Fall Spring.

COM 57400 - Organizational Communication

Credit Hours: 3.00. Survey of the theoretical and empirical literature dealing with human communication behavior as it occurs within the context of complex organizations. Among topics covered are superior-subordinate communication, communication networks, message distortion, feedback processes, internal corporate mass media, managerial-communication climate, semantic and stylistic dimensions of messages, and communication in decision making. Typically offered Summer Fall.

COM 57600 - Health Communication

Credit Hours: 3.00. Survey of health communication theory and research. Examines issues such as patient-provider and everyday communication, broader community-societal discourse, and organizational and mass health communication. Prepares participants for subsequent more specialized seminars and enriched study in allied specialties. Typically offered Fall Spring.

COM 58200 - Descriptive/Experimental Research In Communication

Credit Hours: 3.00. Introduction to the fundamental tools of quantitative research in communication, including data analysis, statistical design and methods, basic measurement concepts, and designs for descriptive and experimental research. Individual and/or group research projects are planned, conducted, and reported. Permission of instructor required. Typically offered Fall Spring Summer.

COM 58300 - Research And Assessment In Organizational Communication

Credit Hours: 3.00. An overview of applied research methodologies in organizational communication. The course focuses on the design of field investigations and the use of self-report measures, network analysis, and interviewing in organizational communication research. These general methodologies are applied to specific research approaches. Typically offered Spring.

COM 58400 - Historical/Critical Research In Communication

Credit Hours: 3.00. Introduction to modes of qualitative research in communication, including theoretical assumptions, bibliographical methods, varying approaches to historical and critical inquiry, and the standards and techniques of scholarly writing. Emphasis is placed on historical research during fall semesters and on critical research during spring semesters. Permission of instructor required. Typically offered Fall Spring Summer.

COM 58500 - Qualitative Methods In Communication Research

Credit Hours: 3.00. An introduction to qualitative research methods in communication studies. Provides students with an overview of several techniques for, and issues in, gathering, analyzing, writing-up, and using qualitative data. Department permission required. Typically offered Fall Spring Summer.

COM 59000 - Directed Study Of Special Problems

Credit Hours: 1.00 to 3.00. Directed study of special problems. Permission of instructor required. Typically offered Fall Spring Summer.

COM 60000 - Foundations Of Human Communication Inquiry I

Credit Hours: 3.00. Introduces doctoral students to major and emerging approaches to understanding human communication and provides them with the theoretical background and analytic skills needed to navigate the tensions among these approaches. Reviews the intellectual history of communication inquiry, overviews traditional and innovative questions about human communication, examines the ways in which these questions can be addressed from different perspectives, addresses some of the varied forms that knowledge about human communication can take, and explores how different research traditions go about making and warranting knowledge claims. Typically offered Fall.

COM 60100 - Foundations Of Human Communication Inquiry II

Credit Hours: 3.00. Following COM 60000, this course continues to introduce doctoral students to major and emerging approaches to understanding human communication and provides theoretical background and analytic skills needed to navigate the tensions among these approaches. Reviews the intellectual history of communication inquiry, overviews traditional and innovative questions about human communication, examines the ways in which these questions can be addressed from different perspectives, addresses some of the varied forms that knowledge about human communication can take, and explores how different research traditions go about making and warranting knowledge claims. Prerequisite: COM 60000. Typically offered Spring.

COM 60111 - Seminar In Strategic Communication

Credit Hours: 3.00. This graduate course will survey the theories and processes of strategic communication and its practice by business, government, politicians, and non-profits - in domestic and international arenas. The course will emphasize the application of theory to provide an in-depth understanding of planning, executing, and evaluating strategic communication plans. Prerequisite: Graduate student in communication. Permission of department required. Typically offered Fall Spring Summer.

COM 60211 - Seminar In Global Stategic Communication

Credit Hours: 3.00. This course provides students with a global perspective in strategic communication and provides knowledge and understanding of how to address communication issues with international audiences. This class emphasizes such questions as how strategic communication plans can be successfully implemented in other countries and how plans can be measured and evaluated. Prerequisites: Graduate student in communication and COM 60111. Permission of department required. Typically offered Fall Spring Summer.

COM 60311 - Seminar In Crisis Communication

Credit Hours: 3.00. This graduate course will focus on how to communicate in a time of crisis in order to manage the situation and disseminate key messages to various stakeholders. Prerequisite: Graduate student in Communication and COM 60111. Permission of department required. Typically offered Fall Spring Summer.

COM 60411 - Seminar In Communication Research Methods

Credit Hours: 3.00. This graduate course serves as the methodological foundation of strategic communication. Students in this class will survey core research methods (qualitative and quantitative) in professional and applied settings. This class is fully online. Students will interact with faculty and other students throughout the week. Permission of department required. Typically offered Fall Spring Summer.

COM 60511 - Strategic Communication And Professional Writing

Credit Hours: 3.00. This graduate course covers topics related to professional writing and strategic communication. Topics include grammar basics, audience considerations, credibility and ethics, and documentation style. In addition, writing will be discussed in a variety of contexts such as media, public relations, advertising, and business communication. Permission of department required. Typically offered Fall Spring Summer.

COM 60611 - Seminar In Financial And Investor Relations

Credit Hours: 3.00. This course will provide students with a theoretical and practical overview of theory and practice in financial and investor relations. Student will learn about how the potential investors in public companies are and how to reach them. An emphasis will be placed on communicating with investors to facilitate informed investor decision-making. Prerequisite: COM 60111. Permission of department required. Typically offered Fall Spring Summer.

COM 60711 - Strategic Communication And Fundraising Management

Credit Hours: 3.00. This graduate course serves as an introduction to the concepts, elements, and best practices of fundraising. Permission of department required. Typically offered Fall Spring Summer.

COM 60811 - Leadership And Global Strategic Communication

Credit Hours: 3.00. Over the last decade, the field of strategic communication has grown rapidly. The work of strategic communication professionals requires coordinated responses between distinct organizational units that are often separated by time and space. These conditions necessitate effective leadership. Further complicating leadership in these contexts is the fact that the work of strategic communication has increasingly become global in nature. This course provides students with theoretical background in leadership and global strategic communication, as well as the opportunity to apply what they learn to strategic communication cases and to their own professional experiences. It also encourages them to think proactively about leadership challenges in these contexts and to articulate theoretically-informed analyses and evaluations of leadership in action. Permission of department required. Typically offered Fall Spring Summer.

COM 60911 - Strategic Public Relations

Credit Hours: 3.00. Strategic communication is composed, in part, of integrated marketing communication (IMC), advertising, and public relations. This course highlights public relations scholarship, which is one of the strengths of the Brian Lamb School of Communication. As such, it builds on the general strategic communication course by providing an in-depth understanding of public relations. Specifically, the class will cover public relations theories, ethics, concepts, principles, and applications. Permission of department required. Typically offered Fall Spring Summer.

COM 61000 - Seminar: Special Topics In Rhetorical Studies

Credit Hours: 3.00. Intensive study, varying from semester to semester, of the role of rhetoric in selected movements, crises, historical periods, programs, campaigns, or institutions. Permission of instructor required. Typically offered Fall Spring.

COM 61011 - Strategic Communication And Ethics

Credit Hours: 3.00. This graduate course introduces the application of ethical principles and decision making. In this course, students will study both philosophical and practical ethical questions related to strategic communication. Permission of department required. Typically offered Fall Spring Summer.

COM 61200 - Seminar: Special Topics In Interpersonal Communication

Credit Hours: 3.00. Intensive study of selected topics, varying from semester to semester, from the theoretical and research literature of interpersonal communication. Topics may include communication models, information theory, systems theory, general semantics, sociolinguistics, etc., as they relate to the study of interpersonal communication. Prerequisite: COM 51200. Typically offered Summer Spring.

COM 62100 - Seminar: Special Topics In Rhetorical Theory

Credit Hours: 3.00. Intensive study of selected topics, varying from semester to semester, from the literature of rhetorical theory. Prerequisite: COM 52100. Typically offered Fall Spring Summer.

COM 62111 - Seminar In Strategic Communication And Social Media

Credit Hours: 3.00. This course will provide an overview of social media and its relationship to strategic communication. Students will learn about the available forms of social media (e.g., Blogs, Social Networks, and Wikis) as well as their uses, strengths and weaknesses for building and managing relationship with stakeholders. Students will also gain exposure to methods for analyzing social media metrics as a framework for evaluating the effectiveness of social media strategies as tools for developing corporate, nonprofit, and governmental images and brands. Permission of department required. Typically offered Fall Spring Summer.

COM 62411 - Focus Groups And Interviewing For Strategic Communication

Credit Hours: 3.00. This course provides students with an overview of qualitative research in public relations with a particular emphasis on focus group and interview methodologies. The course will consider practical applications of these protocols in strategic communication contexts. Prerequisite: COM 60411. Permission of department required. Typically offered Fall Spring Summer.

COM 62511 - Survey Design, Analysis, And Reporting For Strategic Communication

Credit Hours: 3.00. This course provides students with an overview of quantitative research in public relations with a particular emphasis on survey design analysis. The course will cover the design and delivery of questionnaires, the use and interpretation of

descriptive and inferential statistical methods, and reporting of quantitative results. The course will consider practical applications of these methods in professional strategic communication contexts. Prerequisite: COM 60411. Permission of department required. Typically offered Fall Spring Summer.

COM 63200 - Seminar: Special Topics In Mass Communication

Credit Hours: 3.00. Intensive study of selected topics, varying from semester to semester, from the literature of mass communication. Topics may include institutional analysis, mass communication law, information diffusion, uses of mass communication, or other issues. Permission of instructor required. Typically offered Fall Spring.

COM 67400 - Seminar: Special Topics In Organizational Communication

Credit Hours: 3.00. Intensive study of selected topics, varying from semester to semester, from the theoretical and research literature of organizational (including business and industrial) communication; analysis of recurring communication problems in complex organizations; critique of research findings and methodologies. Typically offered Fall Spring.

COM 67600 - Seminar: Special Topics In Health Communication

Credit Hours: 3.00. Intensive study of selected topics, varying from semester to semester, from the theoretical and research literature on health communication. Prerequisite: COM 57600. Typically offered Fall Spring.

COM 68200 - Seminar: Special Topics In Quantitative Research

Credit Hours: 3.00. Intensive study, varying from semester to semester, of different aspects and applications of quantitative research in communication. Prerequisite: COM 58200. Typically offered Fall Spring Summer.

COM 69500 - Curricular Practical Training

Credit Hours: 1.00 or 2.00. Internship providing practical field experience under professional supervision in selected situations related to the student's area of specialization. Good standing in the graduate program of the Department of Communication and an approved plan of study including the internship. Permission of instructor required. Typically offered Fall Spring Summer.

COM 69800 - Research MA Or MS Thesis

Credit Hours: 1.00 to 18.00. Research MA Or MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

COM 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Comparative Literature

CMPL 23000 - Introduction To Comparative Literature

Credit Hours: 3.00. (LC 23000) Foundations for comparison of works in different languages, thematic (philosophical, sociological, psychological), and structural (genre, composition, use of linguistic devises); parallel interrelation of theme and structure in works of different literatures. The importance of literary norms and systems of genres. Examination of crosscurrents in different literatures during successive periods of development. Typically offered Summer Fall Spring.

CMPL 26600 - World Literature: From The Beginnings To 1700 A D

Credit Hours: 3.00. (ENGL 26600) World literature in translation. A comparative and chronological survey of the masterpieces of Eastern and Western literature. Typically offered Summer Fall Spring.

CMPL 26700 - World Literature: From 1700 A D To The Present

Credit Hours: 3.00. (ENGL 26700) World literature in translation. A comparative and chronological survey of the masterpieces of Eastern and Western literature. Typically offered Spring Summer Fall.

CMPL 59000 - Directed Reading In Comparative Literature

Credit Hours: 1.00 to 3.00. Directs the reading of students with special interests. Guides students in profitable reading in subjects of their own choice. Individual conferences. No class meetings. Permission of instructor required. Typically offered Fall Spring Summer.

CMPL 63000 - Comparative Literature: Function And Methods

Credit Hours: 3.00. (ENGL 66000 and LC 63000) An introduction to methods, problems, and the bibliographical tools pertaining to comparative study. Typically offered Fall.

CMPL 65000 - Seminar In Comparative Literature

Credit Hours: 3.00. (ENGL 66500 and LC 63900) Exploration of a significant topic in comparative literature, e. g., the arts of translation, thematology, genre studies, literary movements, literary relations among countries. Typically offered Fall Spring Summer.

CMPL 69900 - Research PhD Thesis

Credit Hours: 1.00-18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Comparative Pathobiology

CPB 15000 - Clinical Pathology I-DL

Credit Hours: 1.50. This course is the first of three courses that provide basic instruction in the concepts of clinical pathology to the veterinary technician student. This course will place an emphasis on the terminology used in clinical pathology, as well as red blood cell production, function, and morphology. Typically offered Fall Spring Summer.

CPB 15100 - Clinical Pathology II-DL

Credit Hours: 1.50. This course is the second of three courses that provide basic instruction in the concepts of clinical pathology to the veterinary technician student. This course will place an emphasis on white blood cell production, function, as well as white blood cell morphology characteristics and identification. Typically offered Fall Spring Summer.

CPB 15200 - Clinical Pathology III-DL

Credit Hours: 1.00. This course is the third of three courses that provide basic instruction in the concepts of clinical pathology to the veterinary technician student. This course will place an emphasis on the basic concepts of clinical chemistry, urinalysis evaluation, as well as the fundamentals of cytological sample handling and evaluation. Typically offered Fall Spring Summer.

CPB 22500 - Parasitology for Veterinary Technicians I - DL

Credit Hours: 1.00. This course is the first of two courses that provide basic instruction in the concepts of parasitology for the veterinary technician student. This course will place an emphasis on the basic information needed to accurately identify parasites commonly encountered in veterinary medicine. Emphasis will be placed on life cycles and the zoonotic aspects of the parasites. Typically offered Fall Spring Summer.

CPB 22600 - Parasitology for Veterinary Technicians II - DL

Credit Hours: 1.00. This course is the second of two courses that provide basic instruction in the concepts of parasitology for the veterinary technician student. This course will place an emphasis on the basic information needed to accurately identify parasites commonly encountered in veterinary medicine. Emphasis will also be placed on life cycles and the zoonotic aspects. Students are expected to be able to make accurate identifications and to communicate effectively. Typically offered Fall Spring Summer.

CPB 22700 - Microbiology for Veterinary Technicians-DL

Credit Hours: 2.00. This course is designed to enable the veterinary technician to satisfactorily collect and process specimens, and characterize and identify microorganisms that may be encountered in veterinary practice situations. This course will introduce microorganisms commonly encountered in veterinary medicine. Different laboratory techniques will be illustrated. Typically offered Fall Spring Summer.

CPB 24000 - Public and Occupational Health for Vet Techs I -DL

Credit Hours: 1.00. This is the first of two courses that provide basic instruction in the concepts of workplace safety related to the veterinary technician. This course will place an emphasis on the basic information needed to recognize hazards commonly encountered and the steps that should be taken to reduce the risk of exposure to hazards. Other practical aspects of public health will be discussed. Typically offered Fall Spring Summer.

CPB 24100 - Public and Occupational Health for Vet Techs II-DL

Credit Hours: 1.00. This is the second of two courses that provide basic instruction in the concepts of workplace safety related to the veterinary technician. Typically offered Fall Spring Summer.

CPB 25500 - Clinical Pathology For Veterinary Technicians

Credit Hours: 4.00. Basic instruction in clinical pathology, including theory and techniques of hematology, clinical chemistry, urinalysis, cytology, and specimen handling. Typically offered Spring.

CPB 35100 - Microbiology For Veterinary Technicians

Credit Hours: 2.00. Biology and laboratory identification of bacteria and fungi that cause infectious diseases in animals. Emphasis will be placed on the collection of specimens for culture, the isolation and identification of pathogenic organisms, and antibiotic susceptibility testing. Procedures and commercial systems available to veterinary practices will be utilized. Typically offered Spring.

CPB 35200 - Parasitology For Veterinary Technicians

Credit Hours: 2.00. Biology and life cycles of selected protozoan, helminth, and arthropod parasites of veterinary importance. Emphasis will be placed on laboratory procedures for the identification of common parasites of domestic and laboratory animals. Typically offered Spring.

CPB 48000 - Seminar In Animal Welfare And Human-Animal Interaction

Credit Hours: 2.00. This course will be required for students involved in the interdisciplinary "Animal Welfare and Societal Concerns" program of study. Seminar in Animal Welfare and Human-Animal Interaction is for discussion of current topics in animal welfare and other areas involving the interaction of humans and animals. Outside speakers will present their perspectives in various areas. Journal articles will also be presented and discussed. Typically offered Fall.

CPB 56400 - Ecological Health And Wildlife Diseases

Credit Hours: 2.00. Provides an overview of issues involved with understanding ecological underpinnings of disease and of wildlife diseases common in North America. Presents basic concepts and approaches for identifying, studying, and managing diseases of wild populations and the role of veterinarians in conservation biology, wildlife zoonosis prevention and management, and prevention of transmission between wildlife reservoirs and domestic animals. Permission of instructor is required. Typically offered Fall.

CPB 57500 - Introduction To Animal Experimentation

Credit Hours: 2.00. A didactic course focusing on basic principles of animal research, including basic tenets of anesthesia, analgesia, euthanasia, surgery, and handling of various species of laboratory animals; introduction to experimental design and hypothesis testing, overview of regulatory aspects of animal experimentation, including provisions of the Animal Welfare Act,

the NIH Guide to the Care and Use of Laboratory Animals, and other applicable regulations governing the use of animals, discussion of organizations that support animal experimentation and those opposed to animal research. . Typically offered Summer Fall Spring.

CPB 57600 - Biology And Management Of Laboratory Animals

Credit Hours: 2.00. A didactic course focusing on basic principles of the biology of laboratory animals and how they are managed in a vivarium. Covers regulatory aspects, anatomy, biological techniques, research uses, and management of mice, rats, hamsters, guinea pigs, gerbils, other rodentia, rabbits, dogs, cats, ferrets, and various species of primates, reptiles, and avians, in experimental and educational applications. Offered in alternate years. . Typically offered Summer Fall Spring.

CPB 57700 - Diseases Of Laboratory Animals

Credit Hours: 3.00. A didactic course focusing on basic understanding of the diseases of laboratory animal medicine and concentrating on effects of disease on research productivity, prevention programs, and pathogenesis. Etiology, pathogenesis, gross and microscopic pathology, diagnosis, control, and research complications of diseases of rats and mice, primates, rabbits, guinea pigs, hamsters, and ferrets; and health assessment programs. Offered in alternate years. . Typically offered Summer Fall Spring.

CPB 57800 - Animal Models Of Human Disease

Credit Hours: 2.00. A mixed didactic and discussion course focusing on animal models used in biomedical research. Didactic instruction on principles of model development and use will be coupled with student presentations of models currently used in various research disciplines or disease states. Advantages and limitations of research with various spontaneous and experimentally induced models of human disease, including genetically engineered models. Offered in alternate years. Typically offered Summer Fall Spring.

CPB 57900 - Seminar In Comparative Medicine

Credit Hours: 2.00. A discussion course focusing on current issues of laboratory animal medicine. Review of current activities, health surveillance reports, etc. Selected cases are presented in detail, including clinical presentation, interpretation of diagnostic tests, and gross and microscopic pathology. In addition, this seminar includes discussions on animal resource management; surgery; animal experimentation; current journal reports; zoonoses; and clinical animal disease diagnosis, prevention, treatment, and control, and other species and topics not formally covered in other core courses. Typically offered Fall Spring Summer.

CPB 58000 - Special Topics

Credit Hours: 1.00 to 4.00. Directed readings, discussions, and other intensive studies in specialized topics of the disciplines of the department. The topic of study will be selected and announced prior to the semester offered and will be indicated in the student's record. Permission of instructor required. Typically offered Summer Fall Spring.

CPB 59000 - Special Topics In Animal Welfare And Human-Animal Interaction

Credit Hours: 1.00 to 4.00. Individual study and directed readings in specialized areas of interest of animal welfare or human-animal interaction either for advanced undergraduate or beginning graduate students. Permission of instructor required. Typically offered Fall Spring.

CPB 60000 - Special Problems In Pathology

Credit Hours: 0.00 to 4.00. Selected problems in veterinary pathology. The topic will be indicated in the student's record. Permission of instructor required. Typically offered Fall Spring Summer.

CPB 60100 - Advanced Veterinary Clinical Pathology

Credit Hours: 0.00 to 8.00. Comparative hematology, clinical chemistry, diagnostic cytology, and surgical microscopic pathology in the diagnosis of diseases of animals, including laboratory application. Prerequisite: DVM degree. Permission of instructor required. Typically offered Fall Spring Summer.

CPB 60200 - Advanced Veterinary Anatomic Pathology

Credit Hours: 0.00 to 8.00. Comparative gross and microscopic pathology in the diagnosis of diseases of animals. Prerequisite: DVM degree. Permission of instructor required. Typically offered Fall Spring Summer.

CPB 60300 - Graduate Teaching Practicum

Credit Hours: 1.00. Graduate students assist in running the laboratory sessions in a sophomore DVM course. They also grade exams and may give one lecture in or make a scholarly contribution to the course. Permission of instructor required. Typically offered Summer Fall Spring.

CPB 60400 - Neoplastic Diseases Of Animals

Credit Hours: 3.00. Histogenesis and structure of neoplasms of animals; consideration of clinical and pathological entities within groups of neoplasms. Prerequisite: CPB 55600. Typically offered Fall.

CPB 60500 - Pathology Of Avian Diseases

Credit Hours: 2.00. Avian diseases presented from a gross and histopathological viewpoint. Pathogenesis and differential diagnosis of avian diseases discussed. Prerequisite: DVM degree. Typically offered Fall Spring.

CPB 60700 - Pathology Of Laboratory Animal Diseases

Credit Hours: 4.00. Emphasis will be placed upon the etiology and pathology of the diseases of small laboratory animals including rodents, rabbits, primates, and fish. The prevention and control of the diseases produced by viral, bacterial, parasitic, and fungal pathogens also will be included. Prerequisite: DVM degree. Typically offered Fall.

CPB 61000 - Ultrastructural Pathology

Credit Hours: 2.00. The ultrastructural alterations that occur in organelles of damaged cells are described. The basic morphologic alterations in pathology (degeneration, necrosis, inflammation, growth disturbances, and neoplasia) are outlined. The ultrastructural alterations of representative diseases of animals that involve each of the body systems are discussed. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

CPB 61200 - Advanced Morphologic Techniques

Credit Hours: 2.00. Provides advanced study of specialized morphologic techniques used in research and for the diagnosis of diseases. The technical basis of such methods as immuno-chemistry, in situ hybridization, laser capture microdissection, and confocal microscopy will be presented, as well as some of their applications. The goal of this course is to provide a fairly detailed understanding of these techniques. A course in basic biology or immunology. Students should have a basic understanding of these disciplines prior to taking this course. Permission of instructor required. Typically offered Spring.

CPB 61400 - Topics In Advanced General Pathology

Credit Hours: 0.50 or 1.00. Discussion of current topics in the following areas of general pathology: cellular injury, fluid and hemodynamic alterations, inflammation, immunopathology, neoplasia, genetic and developmental disorders, pathogenesis of infectious diseases, and nutritional disorders. Class meets one hour in alternate weeks. Prerequisite: DVM degree. Permission of instructor required. Typically offered Fall Spring Summer.

CPB 61800 - Ethical Issues In Biomedical Research

Credit Hours: 2.00 or 3.00. Examination of moral reasoning as it applies to epidemiologic inquiry and the methods of biomedical research. Topics include obligations to human and animal research subjects, ethical considerations in research design, data interpretation and fraud, funding of research, and public policy. Typically offered Spring.

CPB 61900 - Design, Conduct, And Analysis Of Clinical Trials

Credit Hours: 2.00. Reviews the various types of clinical trials that are used in medical research (e.g., therapeutic and preventive). The stages and activities in a "typical" trial are defined along with factors that influence study design. Key elements of data collection, organization, analysis, and interpretation and reporting of results are discussed and illustrated using published reports of clinical trials. Differences in the design and conduct of trials in human and veterinary medicine are considered, including the ethical concerns and costs. Prerequisite: Graduate level course work in Biostatistics. Typically offered Fall.

CPB 62000 - Advanced Immunology

Credit Hours: 2.00. Teaches advanced concepts in basic immunology and applications to disease prevention and therapy. Emphasis is on recent developments and experimental approaches in this rapidly evolving discipline. Topics include antigen presentation, T-cell development, signal transduction in B and T lymphocytes, immunoglobulin structure, type I hypersensitivity (asthma), neuroendocrine regulation of the immune response, immune response in viral infections (influenza and HIV), and tumor immunology. Permission of instructor required. Typically offered Fall.

CPB 62200 - Microbial Pathogenesis

Credit Hours: 2.00. Provides advanced study of the concepts of microbial pathogenesis and host-microbe interaction. The virulence factors and molecular mechanisms of infection used by bacteria, viruses, and protozoa to cause disease will be examined. Specific diseases will be studied as examples of how microbes affect animals as well as humans. Permission of instructor required. Typically offered Fall Spring.

CPB 62400 - Advanced Laboratory Animal Medicine

Credit Hours: 0.00 to 8.00. Experiential training and practice in laboratory animal medicine. Prerequisite: DVM degree. Restriction: Only CPB graduate students in Laboratory Animal Medicine may enroll in this course. Typically offered Fall Spring Summer.

CPB 62500 - Clinical Biostatistics

Credit Hours: 2.00. Intended for veterinary medical and biological science graduate students, this course is designed to familiarize them with the appropriate usage (and reporting) of different statistical tests in biomedical research. Students are taught the basic theories underlying the different tests, the data assumptions underlying the application of those tests, and review/critique published scientific articles that employed these tests. Students have the opportunity to describe the appropriate statistical methods to be used in their proposed research and/or report the usage or appropriate statistical tests on their own data. Typically offered Fall.

CPB 62600 - Design And Analysis Of Epidemiologic Studies

Credit Hours: 3.00. Focuses on epidemiologic study design and applications of statistical software to the analysis of data derived from health research. Includes an overview of epidemiologic study designs, frequency and association measures, generalized linear models and survival analysis. Hands-on computer laboratories are provided using data derived from field studies. Prerequisites: One graduate level course in biostatistics. Typically offered Fall alternate years.

CPB 68000 - Special Topics

Credit Hours: 1.00 to 4.00. Directed readings, discussions, and other intensive studies in specialized topics of the disciplines of the department. The topic of study will be selected and announced prior to the semester offered and will be indicated in the student's record. Permission of instructor required. Typically offered Fall Spring Summer.

CPB 69100 - Seminar In Veterinary Pathology

Credit Hours: 0.00 to 2.00. Discussions of selected current disease problems with emphasis on gross and microscopic tissue changes and pathogenesis. Required of all graduate students in veterinary pathology each semester in residence. Typically offered Fall Spring Summer.

CPB 69400 - Special Topics In Immunology

Credit Hours: 1.00. Understanding of principles of immunology is required. Journal club style class geared to provide graduate students with in-depth knowledge in current immunology. Faculty will participate in class to facilitate the students' understanding and discussion. Students present one-two times depending on the number of participating students. They select a research paper, recently published in the area of immunology, assigned for the semester and have it approved by the course organizer. Typically offered Fall Spring.

CPB 69500 - Seminar In Epidemiology

Credit Hours: 1.00. Discussion of recent research in epidemiology, emphasizing study design, analysis, and public health significance. Discussion topics will be selected from the following areas: clinical epidemiology, infectious disease epidemiology, chronic disease epidemiology, and environmental epidemiology. Required of graduate students with a principal field of study in epidemiology. Prerequisite: Course work in Statistics and Epidemiology. Typically offered Fall Spring.

CPB 69700 - Research Seminar

Credit Hours: 0.00 or 1.00. Discussion of current concepts and research results in epidemiology, immunology, microbiology, parasitology, pathology, virology, host-parasite relationships, and other aspects of veterinary pathobiology. Each graduate student is expected to register each semester for VPB 69700 and to make one oral presentation per year. A grade of pass/not-pass and one credit will be awarded for the semester the presentation is given. Permission of instructor required. Typically offered Fall Spring.

CPB 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

CPB 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

CPB 81600 - Applied Small Animal Toxicology

Credit Hours: 1.00. A study in the understanding of clinical signs, pathogenesis, treatment, and prevention of important toxicants in veterinary medicine. Emphasis is on toxicants that most commonly affect dogs, cats, pet birds, and pocket pets. Typically offered Spring Summer.

CPB 81800 - Applied Large Animal Toxicology

Credit Hours: 1.00. A study in the understanding of the clinical signs, pathogenesis, treatment, and prevention of important toxicants in veterinary medicine. Emphasis is on toxicants that most commonly affect horses and production medicine operations or individual/small herd swine or ruminant populations. Typically offered Fall Summer.

CPB 84000 - Use And Care Of Laboratory Animals

Credit Hours: 1.00. Topics will include the history of animal use in research; ethical thought related to animal use in research; alternatives; government regulatory requirements; statistical considerations in designing animal studies; animal models; use of the National Agricultural Library Animal Welfare Information Center; biology, husbandry, techniques, and diseases of common laboratory animal species; hygiene and occupational health; biohazard control; perioperative care and aseptic surgical techniques; anesthesia; analgesia; and euthanasia. Typically offered Spring Summer.

CPB 85100 - General Pathology

Credit Hours: 3.00. An overview of the basic cellular reactions that develop in response to injurious agents. Focuses on the gross and microscopic alterations in tissues, events leading to the development of those alterations, and the consequences of those changes on the health of animals. Includes degenerative, necrotic, inflammatory, and neoplastic changes in various animal species. Typically offered Fall Summer.

CPB 85201 - Veterinary Parasitology I

Credit Hours: 3.00. Covers the important helminth diseases of animals. Emphasis is placed on the pathogenesis, epidemiology, clinical features, diagnosis, control, and zoonotic implications. Typically offered Fall Summer.

CPB 85202 - Veterinary Parasitology II

Credit Hours: 2.00. Covers the important protozoal and arthropod diseases of animals. Emphasis is placed on the pathogenesis, epidemiology, clinical features, diagnosis, control, and zoonotic implications. Typically offered Spring, Summer.

CPB 85300 - Principles Of Veterinary Immunology

Credit Hours: 2.00. An overview of the fundamental concepts of immunology, with an emphasis on the immune system of domestic animals and comparative immunology. Focuses on the interactions between the host and microbial pathogens and on mechanisms that underlie hypersensitivity reactions, autoimmune diseases, and immune deficiencies. Discusses the principles of vaccination and serologic tests. Typically offered Spring Summer.

CPB 85400 - Principles Of Epidemiology

Credit Hours: 1.00. An introduction to the principles of epidemiology as it relates to evaluating and describing the health of human and animal populations. An emphasis is placed on the appropriate use by veterinarians of information derived from epidemiologic studies in making clinical decisions regarding the diagnosis, treatment, prognosis, and prevention of disease in

individual patients. A goal is to demonstrate why epidemiology is considered by some as "a basic science for clinicians.". Typically offered Spring Summer.

CPB 85500 - Veterinary Hematology And Cytology

Credit Hours: 2.00. Provides an overview of veterinary hematology and cytology. Normal morphology and function of the cells of the hematopoietic system are reviewed. Laboratory analyses of the different cell types are discussed. The responses of the hematopoietic cells that can be seen during different disease processes are presented. Fundamentals of veterinary diagnostic cytology are introduced. Typically offered Spring Summer.

CPB 85602 - Veterinary Bacteriology And Mycology

Credit Hours: 4.00. The lecture portion provides an introduction to bacterial and fungal agents of animal diseases. The taxonomy, morphology, and physiology of the organisms are discussed. Pathogenic features of the infectious agents and host responses to infection will be emphasized. Epidemiology, diagnosis, and control of the various diseases will be presented. The laboratory portion of the course covers laboratory safety, sterilization and disinfection in addition to microbiological techniques, antimicrobial susceptibility testing and interpretation, and identification of cultured bacteria and dermatophytes. Typically offered Fall Summer.

CPB 85700 - Veterinary Systemic Pathobiology

Credit Hours: 5.00. Provides coverage of system specific pathologic terminology and characteristic pathologic responses of the various body systems to injury. This is followed by presentation of representative examples of diseases of various etiologies, including, but not limited to, infectious and noninfectious diseases. Typically offered Spring, Summer.

CPB 86000 - Veterinary Virology

Credit Hours: 3.00. Principles of medical virology and discussions of important viral diseases of animals. Typically offered Fall Summer.

CPB 86100 - Veterinary Clinical Chemistry

Credit Hours: 2.00. Laboratory techniques and interpretation of laboratory data as profiled by organ system are presented. Integration of data to explain pathophysiologic changes as an aid to diagnosis, prognosis and progression of disease is emphasized. Typically offered Spring Summer.

CPB 86200 - Clinical Epidemiology For Companion Animals

Credit Hours: 1.00. Fundamentals of experimental epidemiology and clinical decision making are explored, particularly as they relate to the practice of companion animal medicine. Methods for disease detection and prevention are emphasized in catteries and kennels. The computer laboratories illustrate the software available for problem solving in population medicine. Typically offered Fall, Summer.

CPB 86300 - Epidemiology For Livestock Production

Credit Hours: 1.00. Study of the fundamental concepts for epidemiologic implications in livestock production, including design of epidemiologic studies in livestock populations, investigation of disease outbreaks, use of diagnostic tests, infectious disease control, and animal health economics. Rationale, strategies, and concepts of animal disease control are emphasized with examples. Typically offered Fall, Summer.

CPB 86900 - Veterinary Public Health And Zoonoses

Credit Hours: 2.00. A survey of fundamental topics on diseases that are caused by viral, bacterial, rickettsial, and parasitic agents and are known to be transmissible from animals to humans, as well as those diseases that are common to humans and animals. Topics emphasize the epidemiology and methods for prevention and control of these diseases in animal and human populations. Food safety and foodborne diseases, with particular emphasis on foods of animal origin, are discussed. Risk assessment of occupational and environmental health conditions to which veterinarians are likely to be exposed in training or the work place also is covered. Typically offered Spring Summer.

CPB 87000 - Diagnostic Veterinary Cytology

Credit Hours: 1.00. A combination of didactic and wet laboratory microscopic sessions are used to demonstrate applications of diagnostic cytology. Consists of weekly sessions with a brief lecture overview of the basic cytologic features of a particular organ system followed by microscopic review of collected cytology material from that particular organ system. The didactic and laboratory sessions are supplemented by Internet-based and digital-format archived images for student review. Typically offered Spring, Summer.

CPB 88300 - Public Health

Credit Hours: 3.00. This course is designed for senior veterinary students to fulfill their interests in public health and preventive veterinary medicine. There will be a classroom and field component, focusing on topics including epidemiology, food safety, infectious diseases, environmental health and health communications. Visits to various agencies will complement the course material by offering inside views of the day to day operations of the facilities as well as the career experiences of the employees working in them. Students will also gain field experience in actual or devised research projects that will include activities such as study design, questionnaire development, collecting epidemiologic data, date input, analysis, and interpretation. Students will be

asked to design a study, produce an information brochure, and prepare a verbal presentation for elementary school children about topics relating to being safe with your pets. Total clinic hours 129. Typically offered Fall Spring Summer.

CPB 88400 - Laboratory Animal Medicine

Credit Hours: 3.00. Students will participate in laboratory animal medicine practice which can include facility inspections, protocol review, preventative medicine, monitoring disease status, and diagnosis and treatment of spontaneous diseases in laboratory animals. Total clinic hours 129. Typically offered Fall Spring Summer.

CPB 88501 - Necropsy I

Credit Hours: 1.00. This is one of three concurrent courses (CPB 88501, CPB 88502, CPB 88503) in which senior veterinary students will be enrolled. Students will actively participate in the diagnostic necropsy service within the ADDL. The student is expected to gain basic clinical experience and training in necropsy and diagnostic pathology as they contribute to and support the practice of veterinary medicine. Students are expected to actively assist faculty in performing necropsies, discuss pathophysiology of cases and submit reports of their observation. Total clinic hours 43. Typically offered Fall Spring Summer.

CPB 88502 - Microbiology I

Credit Hours: 1.00. This is one of three concurrent courses (CPB 88501, CPB 88502, CPB 88503) in which senior veterinary students will be enrolled. This course is designed for senior veterinary students to gain additional training in diagnostic microbiology (bacteriology, mycology, virology and molecular diagnostics) in relation to clinical diseases. Students will actively participate in self study and discussion of selected diagnostic microbiology cases as well as hands-on logistically approached laboratory procedures for culture and isolation of microbial agents. The students are expected to be proficient and competent in veterinary diagnostic microbiology at the end of rotation. Total clinic hours 43. Typically offered Fall Spring Summer.

CPB 88503 - Clinical Pathology I

Credit Hours: 1.00. This is one of three concurrent courses (CPB 88501, CPB 88502, CPB 88503) in which senior veterinary students will be enrolled. In addition to clinical pathology, students must be enrolled in microbiology and diagnostic pathology (necropsy). The main goal of this rotation is to insure that each participant is at a level of competency that every graduating senior should have attained. Through a combination of self study and small group periods in a classroom as well as on a multi-headed microscope, a set of core objectives will be explored. These objectives have been chosen as a representation of basic clinical pathology skills that students should have mastered to practice veterinary medicine competently. In addition, an approved journal article or comparable piece of literature will be evaluated and summarized. An objective examination at the end of the rotation will test the student's knowledge of the objectives. Total clinic hours 43. Typically offered Fall Spring Summer.

CPB 88600 - Diagnostic Pathology

Credit Hours: 3.00. Advanced training in diagnostic approaches to identification of the causes and pathogenesis of disease in mammals. Total clinic hours 129. Typically offered Fall Spring Summer.

CPB 88700 - Avian Medicine

Credit Hours: 3.00. This course is designed for senior veterinary students to receive advanced training in avian disease diagnosis and health management in commercial poultry flocks. Critical poultry infectious and non-infectious diseases will be discussed. The student will visit production facilities for layers, broilers, turkeys, or ducks. Vaccination and medication programs for these species will be discussed. Necropsy experience will be gained from poultry, game bird, and pet bird accessions to the Animal Disease Diagnostic Laboratory (ADDL). Total clinic hours 129. Typically offered Fall Spring Summer.

CPB 88800 - Microbiology II

Credit Hours: 3.00. This course is designed for senior veterinary students to gain advanced training in clinical microbiology in relation to clinical diseases. Microbial diseases of veterinary importance and zoonotic significance will be addressed. Students will actively pursue selected microbiology accessions to the Animal Disease Diagnostic Laboratory (ADDL) in depth by applying problem-based learning approach, using correct laboratory procedures, and searching related literature to reach microbiological diagnosis and conclude the cases. Written reports, oral presentations, case discussion will be highlighted in the rotation to enrich the learning experience and insure the proficiency and competency in veterinary clinical microbiology. Total clinic hours 129. Typically offered Fall Spring Summer.

CPB 88900 - Clinical Pathology II

Credit Hours: 3.00. This advanced clinical pathology rotation is designed to take the core skills mastered in CPB 88503 and expand on them. Through daily interaction to the consulting office on clinical cases, students will learn to critically evaluate cytologic and hematologic specimens as well as laboratory data. Activities that the student will engage in include the resident's journal club, weekly clinical pathology rounds, large animal clinical pathology rounds and other small group sessions with residents and pathologists. The goal for the rotation is to begin building a broad base of experience to continue building on in the future. Total clinic hours 129. Typically offered Fall Spring Summer.

Computer and Information Technology

CNIT 10500 - Introduction To C Programming

Credit Hours: 3.00. This course is an introduction to computer programming using the "C" language. The emphasis is on structured programming principles, and understanding the basic concepts that apply to engineering problems. Among topics covered in this course are: problem solving using top down design, using flowcharts to explain the program logic, selection

structure, repetition structure, bitwise operations, arrays, pointers, strings, passing arguments, and sequential files. Typically offered Summer Fall Spring.

CNIT 10700 - Computers And Software Packages

Credit Hours: 1.00 to 4.00. Prerequisites vary with course content. Does not carry credit toward degree requirements in Computer Technology.Topics and skills associated with specific computer(s) and/or specific software package(s). Level of coverage varies according to audience. Various applications packages may be offered under this title. Typically offered Fall Spring Summer.

CNIT 11100 - Computer Literacy

Credit Hours: 1.00. Introduction to computers and applications for students admitted to the Horizons program. Typically offered Fall Spring.

CNIT 13600 - Personal Computing Technology And Applications

Credit Hours: 3.00. This course provides an intermediate coverage of PC technology and problem solving. Topics include computer hardware, operations and ethics, and operating systems and environments. Students will gain hands-on skills with applications such as desktop and file management; word processing; spreadsheets; presentation graphics; electronic mail; personal information management; and internet browsing, searching, and publishing. Typically offered Fall Spring Summer.

CNIT 14100 - Internet Foundations, Technologies, and Development

Credit Hours: 3.00. (CGT 14100) This course explores the history, architecture and development of the World Wide Web. Current tagging and scripting languages are covered in a tool independent environment. Topics also include authoring tools, design, graphic and multimedia formats, and commerce, implementation and security issues. PC literacy required. Typically offered Summer Fall Spring.

CNIT 15500 - Introduction to Object-Oriented Programming

Credit Hours: 3.00. This course introduces fundamental software development concepts common to most programming languages. Topics include: problem solving and algorithm development, debugging, programming standards, variable, data types, operators, decisions, repetitive structures, modularity, array, user interface construction, software testing and debugging. A broad range of examples will be used throughout the course to show how each programming concept applies to real life problems. Typically offered Fall Spring Summer.

CNIT 15501 - Introduction To Software Development Concepts

Credit Hours: 3.00. This course introduces fundamental software development concepts common to most programming languages. Topics include problem solving and algorithm development, debugging, programming standards, variables, data types, operators, decisions, repetitive structures, modularity, arrays, user interface construction, software testing and debugging. A broad range of examples will be used throughout the course to show how each programming concept applies to real life problems. Typically offered Fall Spring Summer.

CNIT 17500 - Visual Programming

Credit Hours: 3.00. This course introduces event-driven application development and programming using a visual programming environment. Topics include problem solving and program design, control structures, objects and events, user interface construction, documentation, and program testing. Credit may be established in only one of: CPT 15500 or CPT 17500 or CPT 25000. PC literacy required. Typically offered Fall Spring Summer.

CNIT 17600 - Information Technology Architectures

Credit Hours: 3.00. A conceptual and technological survey of information technology architectures inclusive of operating systems, network operating systems, distributed systems architectures, and distributed application architectures. Interoperability between these architectural components is explored. Current technology and trends in each architectural element are reviewed. PC literacy required. Typically offered Fall Spring Summer.

CNIT 18000 - Introduction To Systems Development

Credit Hours: 3.00. This course introduces information systems development. Topics include types of information systems, system development, database management systems, and problem solving. Students will read/create UML, ERD, and data flow diagrams to model information system objects, data, processes, and logic. Labs emphasize modeling and SQL/QBE querying to prepare students for later systems, programming, and database classes. Given user requirements students will design, construct, and test a personal computer information system. PC literacy required. Typically offered Summer Fall Spring.

CNIT 19900 - Topics In Computer And InformationTechnology

Credit Hours: 1.00 to 3.00. Hours and subject matter arranged by staff. Individual study under directed leadership of professor. Primarily for students with special aptitudes. Permission of instructor required. Typically offered Summer Fall Spring.

CNIT 22700 - Introduction To Bioinformatics

Credit Hours: 2.00. Survey course in Bioinformatics for information technology specialists including topics such as: virtual bio-instrumentation, data reduction and mining algorithms and tools, data visualization, pattern matching, modeling and simulation, computational methods, and collaborative application environments. Typically offered Summer Fall Spring.

CNIT 23500 - Management Information Systems And Collaboration Technology

Credit Hours: 3.00. This course introduces management information systems, project management topics and technologies, and collaboration technologies. PC literacy required. Typically offered Fall Spring Summer.

CNIT 24000 - Data Communications And Networking

Credit Hours: 3.00. This course provides a comprehensive introduction to data communications and networks. Topics include communication standards and concepts, protocols, the Open Systems Interconnect (OSI) model, point-to-point communication, and local area networks. Business issues from both provider and user perspectives are discussed. Current technology and trends in each architectural element are reviewed. Typically offered Summer Fall Spring.

CNIT 24200 - System Administration

Credit Hours: 3.00. This course provides a comprehensive introduction to system administration. Topics include authentication and authorization, directory services, system management and system security. Emphasis is placed on enterprise level systems. Typically offered Summer Fall Spring.

CNIT 25500 - Programming For The Internet

Credit Hours: 3.00. This course introduces software development concepts common to modern object-oriented programming languages. Topics include: intermediate data types, decisions, repetitive structures; methods; arrays and collections; encapsulation; inheritance, and polymorphism; exception handling; data persistence; Database Management System (DBMS) connectivity; user interface construction; software testing and debugging; and working in teams. Typically offered Fall Spring Summer.

CNIT 25501 - Object-Oriented Programming Introduction

Credit Hours: 3.00. This course introduces software development concepts common to modern object-oriented programming languages. Topics include: intermediate data types, decisions, repetitive structures; methods; arrays and collections; encapsulation, inheritance, and polymorphism; exception handling; data persistence; Database Management System (DBMS)

connectivity; user interface construction; software testing and debugging; and working in teams. Typically offered Fall Spring Summer.

CNIT 26700 - Introduction To C++ Language Programming

Credit Hours: 3.00. This course is an introduction to C++ language programming for persons with prior programming experience. Course topics include data types, control flow, operators and expressions, and an introduction to class construction including other object-oriented concepts and constructs. Applications are designed for business, manufacturing, or technology, depending on audience. Typically offered Fall Spring Summer.

CNIT 27200 - Database Fundamentals

Credit Hours: 3.00. A study of relational database concepts. These concepts include data design, modeling, and normalization; the use of Structured Query Language (SQL) to define, manipulate, and test the database; programmatic access to a database and practical issues that database developers must handle. Typically offered Fall Spring Summer.

CNIT 27600 - Systems Software And Networking

Credit Hours: 3.00. Introduction to a wide range of topics in the networking field. Topics include: systems and network administration support practices, desktop and server support, security, disaster recovery, ethics, change management, help desks, networks, network operating systems, and directory services. The students will gain hands-on experience in the laboratory with installing and configuring network operating systems and application software. Typically offered Fall Spring.

CNIT 28000 - Systems Analysis And Design Methods

Credit Hours: 3.00. Comprehensive introduction to information systems development. Topics include the systems analyst, the systems development life cycle, methodologies, development technology, systems planning, project management, systems analysis, systems design, systems implementation, and systems support. Introduction to tools and techniques for systems development. Typically offered Fall Spring Summer.

CNIT 28500 - Topics In Programming Languages

Credit Hours: 3.00. A programming course in one or more programming languages not covered in other CPT courses. Application of structured or event-driven program design, construction, debugging, testing, and documentation techniques. Topics, projects, and languages vary with course offering. Typically offered Summer Fall Spring.

CNIT 29500 - Object-Oriented Programming

Credit Hours: 3.00. This course focuses on using object-oriented programming languages in the development of modern, business applications. Topics include object-oriented design, encapsulation, object interfaces, inheritance, aggregation, abstract classes, polymorphism, data structures, and exception handling. Typically offered Summer Fall Spring.

CNIT 29900 - Topics In Computer And Information Technology

Credit Hours: 1.00 to 6.00. Hours and subject matter to be arranged by staff. Individual study under directed leadership of professor. Primarily for students with special aptitudes. Permission of instructor required. Typically offered Fall Spring Summer.

CNIT 30500 - Information Technology

Credit Hours: 3.00. A survey of contemporary trends in information technology, including applications, languages, hardware, software, and communications. Integration of information and systems. Emphasis on database management and administration. Typically offered Fall Spring.

CNIT 31500 - Systems Programming

Credit Hours: 3.00. This course introduces concepts of lower level systems programming in C/C++ on a UNIX/Linus operation system platform. Command level development, algorithms, data structures, iteration and recursion, algorithms and analysis will be covered. Typically offered Fall Spring Summer.

CNIT 32100 - Enterprise Social Media And Global Information Technology

Credit Hours: 3.00. This course focuses on enterprise social media and global information technology. Topics include social media software applications such as communication, collaboration, multimedia and entertainment software, globalization, global information technology issues, cultural differences, understanding the role of culture and communicating across cultures. An emphasis will be placed on how companies are integrating enterprise social media applications and the impact of these technologies on the globalization of information technology. Typically offered Fall Spring Summer.

CNIT 32500 - Object-Oriented Application Development

Credit Hours: 3.00. This course focuses on using object-oriented programming languages in the development of modern, business applications. Topics include object-oriented design, encapsulation, object interfaces, inheritance, aggregation, abstract classes, polymorphism, data structures, and exception handling. Typically offered Fall Spring Summer.

CNIT 34000 - UNIX Administration

Credit Hours: 3.00. This course focuses on the tasks and issues involved in the administration of UNIX systems. Topics include installation, networking, software management, scripting, and user management. In the laboratory portion of the course, students implement and maintain UNIX systems. Typically offered Summer Fall Spring.

CNIT 34200 - Advanced System And Network Administration

Credit Hours: 3.00. This course focuses on the tasks and issues involved in the installation of distributed computing systems. Topics include the administration of network operating systems and network system interoperability. In the laboratory portion of the course, students implement and maintain a comprehensive network service infrastructure. Typically offered Summer Fall Spring.

CNIT 34500 - Internetwork Design And Implementation

Credit Hours: 3.00. This is an advanced course in network architecture. Students learn to design and implement local and wide area networks capable of simultaneous transport of real-time traffic and multiprotocol data over packet-switched and circuit-switched networks. An emphasis is placed on the integration of diverse communications technologies, while considering the effects of engineering decisions on overall performance, from both business and technology perspectives. Typically offered Summer Fall Spring.

CNIT 34600 - Wireless Networks

Credit Hours: 3.00. This course introduces wireless networking. Topics include fundamental wireless communication concepts, wireless local area networks (LANs), and cellular systems. Wireless specific protocol elements are addressed in typical application environments. Data communications in multiple wireless environments are emphasized. In the laboratory section, students implement wireless solutions and integrate them into wired LAN environments. Typically offered Fall Spring.

CNIT 35500 - Software Development For Mobile Computers

Credit Hours: 3.00. This is an advanced programming course that teaches students the skills necessary to develop applications for mobile computing devices (e.g. Smartphones and tablet computers). Combining theory and practice, this course gives students hands-on experience with the latest technologies, tools and techniques used to develop mobile software solutions for business and entertainment. Typically offered Fall Spring Summer.

CNIT 36100 - Software Redesign Using Cobol

Credit Hours: 3.00. An introduction to COBOL programming with an emphasis on redesign of legacy COBOL applications to extend their useful lifetime in contemporary organizations. Topics include user interface redesign, structured design, object-oriented programming, and transition from conventional files to databases. Students learn to analyze existing programs to isolate legacy code problems, develop and test solutions, and integrate solutions into software libraries. Typically offered Fall Spring Summer.

CNIT 37200 - Database Programming

Credit Hours: 3.00. This course explores advanced database programming techniques for enterprise-wide databases and their implementation. It uses programmatic extensions to Structured Query Language (SQL) supported by today's enterprise-class Relational Database Management Systems (RDBMS). Topics include advanced data manipulation, storage considerations, data transformation techniques to enhance interoperability of data, stored procedure and trigger design and implementation; and query optimization. Typically offered Fall Spring.

CNIT 37600 - Information Storage And Management

Credit Hours: 3.00. This course provides a comprehensive introduction to information storage technology. It prepares students to make more informed decisions about data storage and also to learn advanced concepts, technologies, and products. Topics include the architectures, features, and benefits of intelligent storage systems; networked storage technologies such as FC-SAN, NAS, and IP-SAN; and long-term archiving solutions such as CAS. Other topics include business continuity, back-up and recovery, virtualization, security, and management. Students will gain hands-on experience with installing and configuring storage management technologies. Typically offered Fall Spring Summer.

CNIT 38000 - Advanced Analysis and Design

Credit Hours: 4.00. This course is an advanced study of system analysis and design methods and techniques used by systems analysts to develop information systems. Object-oriented tools and the Unified Modeling Language (UML) will be used for describing object structure and behavior, and use cases will be used for modeling functional processes. Topics include rapid development concepts, application architecture and system design, transition from object-oriented analysis and models to components and services, graphical user interface design, web interface design, prototyping, and commercial software package integration. Emphasis is also placed on the use of an object-oriented CASE tool. This course surveys other important skills for the systems analyst, such as fact-finding (requirements discovery), communications, project management, and cost-benefit analysis. . Typically offered Spring Summer Fall.

CNIT 38301 - Packaged Application Software Solutions

Credit Hours: 3.00. This course introduces knowledge, skills, tools, and techniques used to select and implement packaged

application software solutions, both small and large (including ERP). Topics will include the make-verses-buy decision, critical success factors for packages, economic analysis, requirements analysis, identifying vendors and products, request for proposals, analysis of vendor proposals, decision analysis, implementation service providers, contracting for software and service, implementation project planning, life-cycle architecture, software installation and configuration, business process redesign organizational change management, integration with legacy system, customization verses adaptation, data conversion, system and application testing, training and support, system cutover and post go-live considerations. The course will focus on best practices, and consequences of less than best practices. This course will benefit students with career aspirations as systems analysts, business analysts, consultants, data and database administrators, and IT managers. Typically offered Fall Spring Summer.

CNIT 39000 - Supervised Practicum

Credit Hours: 1.00 to 3.00. An instructor-directed practicum designed to combine University study with work experience directly related to the student's plan of study. Designed to be scheduled during a regular semester. Credit awarded upon the completion of department-approved project. Maximum of three credit hours may be applied to the CPT bachelor degree. Typically offered Summer Fall Spring.

CNIT 39200 - Enterprise Data Management

Credit Hours: 3.00. This course examines advanced design techniques and physical issues relating to enterprise-wide data management. Topics include advanced design concepts, enhanced modeling and constructs, objects and unstructured and semi-structured data in databases, data management in non-business contexts, implementation of an enterprise data architecture, and data quality and stewardship. . Typically offered Fall Spring.

CNIT 39900 - Topics In Computer And Information Technology

Credit Hours: 1.00 to 4.00. Hours and subject matter to be arranged by staff. Primarily for students with special aptitudes. Typically offered Summer Fall Spring.

CNIT 40500 - Software Development Methodologies

Credit Hours: 3.00. This course explores methodologies and practices commonly used in contemporary software development projects. Topics include programming standards, code ownership and accountability, source code management and version control, productivity and quality metrics, software testing, and software process maturity models. Typically offered Fall Spring.

CNIT 42000 - Basic Cyber Forensics

Credit Hours: 3.00. This course introduces students to the fundamentals of cyber forensics and cyber-crime scene analysis. The

various laws and regulations dealing with computer forensic analysis are discussed. Students are introduced to the emerging international standards for cyber forensic analysis, as well as a formal methodology for conducting computer forensic investigations. Typically offered Summer Fall Spring.

CNIT 42100 - Small Scale Digital Device Forensics

Credit Hours: 3.00. This course will help students understand the issues, techniques, and vulnerabilities of small scale digital device forensics. Emphasis will be placed on the forensically sound acquisition, preservation, analysis and presentation of small scale digital devices as evidence. Specific investigations will cover devices such as Personal Digital Assistants (PDA's), Cell Phones, and Smart Phones. Typically offered Summer Fall Spring.

CNIT 42500 - Software Development For Mobile Devices II

Credit Hours: 3.00. This programming course teaches students the skills necessary to develop complex applications for mobile computing devices (e.g. smartphones and tablet computers). This course gives students hands-on experience developing mobile applications that use advanced features found on the latest mobile computing devices. Typically offered Fall Spring Summer.

CNIT 43500 - Advanced Network Services

Credit Hours: 3.00. This course covers the concepts and technologies required to deploy advanced network services such as telephony and television over modern data networks. The underlying network structure and enabling services will be detailed along with a comprehensive analysis of protocols and services required to deploy such services. Typically offered Summer Fall Spring.

CNIT 44500 - Advanced Internetwork Routing And Switching

Credit Hours: 3.00. This course extends routing and switching knowledge with specific attention given to emerging trends. This course focuses on the concepts of traffic shaping, advanced exterior gateway routing protocols, label switching technologies, and quality of service. The necessary perspectives of integration of these topics into enterprise networks are addresses in both lecture and laboratory. Typically offered Summer Fall Spring.

CNIT 44600 - Advanced Wireless Networks

Credit Hours: 3.00. This course is an advanced course in wireless networking. Building on knowledge gained from the introductory wireless local area network course, this course addresses wireless network design and implementation on a large scale. Topics include mesh networking, broadband wireless access, backhauling, WiMAX and cellular systems. The laboratory

portion of the course includes implementing and simulating these technologies in an outdoor setting. Typically offered Summer Fall Spring.

CNIT 45000 - Enterprise Application Development

Credit Hours: 3.00. This course explores advanced application development techniques in a large enterprise-wide setting. Topics include component development and reuse, distributed object technologies, multi-tier applications, data marshalling, transaction processing, concurrency problems and resolutions, load balancing and tuning, and application installation and deployment issues. Typically offered Summer Fall Spring.

CNIT 45500 - Network Security

Credit Hours: 3.00. This course explores business, conceptual, and technological aspects of network security for voice and data networks. The course deals with the analysis, design, implementation, and management issues surrounding effective network security. Key concepts and technology include virus protection, firewalls, authentication, encryption, wireless security, security protocols, physical security, and network security architecture and policy development. Typically offered Fall Spring Summer.

CNIT 45600 - Wireless Security And Management

Credit Hours: 3.00. This course is an advanced course concerning security and management issues as they apply to wireless networking. Students will gain knowledge on the problems and solutions the wireless industry face when implementing large scale networks. Issues addressed include encryption weaknesses, security methodology tradeoffs, large scale network management techniques and systems, and advanced wireless network architecture. The laboratory portion of the course enforces the learning outcomes with hands-on experiences in implementing secure, manageable complex wireless networks. Typically offered Summer Fall Spring.

CNIT 45800 - Biomedical Informatics

Credit Hours: 3.00. This course explores the tools and objectives of research in the medical and life sciences industry relevant to the skills of information technology. The driving outcome of this course is for students to understand the domain demands inherent to information systems in healthcare, bioinformatics and computational life sciences, with respect to their role in commercialism, therapeutic decision support and discovery support systems. Topics include information technology application in support of health care delivery, a brief overview of healthcare delivery, the history of healthcare informatics, an overview of the state of current systems and the professional opportunities in Health Informatics. In bioinformatics, introduce the concepts of genomics and proteomics, biotechnology, biological databases and file structures, common computational methods for exploiting biological databases, integrating computational methods within the life sciences industry, and a survey of successful computational life science applications. Typically offered Fall Spring Summer.

CNIT 46000 - High Performance Computing Systems

Credit Hours: 3.00. This course provides an introduction to high performance, cluster, and grid computing from a systems perspective. The driving outcome for this course is for students to understand and apply high performance computing concepts, architectures, and software components to develop and operate a high performance computing environment. Topics include: high performance computer architectures, network architectures for High Performance Computing (HPC), commodity and open-source cluster architectures, and software systems. Typically offered Fall Spring Summer.

CNIT 46100 - Parallel Data Systems

Credit Hours: 3.00. This course provides an introduction to the techniques and technologies used in high performance computing for developing, using and managing high performance data systems. Topics covered in this course will focus on aspects of the design, implementation, and use of high performance storage systems progressively from the hardware layer through the operating system up to the application level. Topics will include: commodity hardware and novel architectural storage components; the architecture and use of parallel file systems, including PVFS2 and Lustre; reliability and scheduling; virtualization and fault tolerant strategies for Petascale computing; system architectures for data intensive computing and workflows; parallel I/O systems; and grid and cloud computing architectures. The driving outcome for this course is for students to understand and apply advanced high performance computing concepts, architectures, and software components to develop and operate a high performance computing environment. Typically offered Fall Spring Summer.

CNIT 46500 - Senior Software Development Project

Credit Hours: 3.00. This capstone course integrates the software development technologies and techniques taught in prior courses. Over the duration of the semester, students work as a team to develop an automated system of real value and quality. Class lectures explore project-related topics such as project planning and management, user and management expectations, system architecture and design, and quality management. Typically offered Fall Spring.

CNIT 47500 - Electronic Commerce and Business Implementation

Credit Hours: 3.00. This course is an in-depth study of electronic commerce and electronic business implementation. The focus is on e-business topics and concepts including business models, electronic payment systems, infrastructure, implementation concerns, design criteria, solution of business problems through case studies, and related Web topics. Students will develop web-based applications that support e-business activities. Typically offered Fall Spring.

CNIT 48000 - Managing Information Technology Projects

Credit Hours: 3.00. This course introduces the application of knowledge, skills, tools, and techniques that project managers use to plan, staff, estimate, and manage information technology projects. Special emphasis is placed on learning and applying the concepts of managing scope, risk, budget, time, expectations, quality, people, communications, procurement, and externally

provided services. Students will apply project management technology and techniques to business problems. Typically offered Fall Spring.

CNIT 48700 - Database Administration

Credit Hours: 3.00. This course explores tools and techniques for managing an organization's database technology. Topics include database architecture, database technology installation, database creation and maintenance, Database Management System (DBMS) operation and troubleshooting, and database performance tuning. In the laboratory, students engage in activities performed by a typical database administrator. Typically offered Fall Spring Summer.

CNIT 48800 - Data Warehousing

Credit Hours: 3.00. The design and implementation of data warehouses (including data marts and operational data stores) are studied using current database technologies. Topics include data modeling for warehouses, data warehousing infrastructure and tool selection, data exploration, data synthesis and reduction, organizational metadata, data warehouse administration, and other contemporary issues. Typically offered Fall Spring Summer.

CNIT 48900 - Advanced Topics In Database Technology

Credit Hours: 3.00. This course will provide students with a chance to explore contemporary issues in the database arena. These issues may be related to new or breakthrough concepts, technologies, and techniques. Typically offered Fall Spring.

CNIT 49000 - Senior Project

Credit Hours: 1.00 to 3.00. Team industrial experience for seniors who undertake a significant controlled project experience for an actual client and problem. Permission of instructor required. Typically offered Fall Spring Summer.

CNIT 49900 - Topics In Computer And Information Technology

Credit Hours: 1.00 to 3.00. Hours and subject matter to be arranged by staff. Possible individual study under directed leadership of professor. Permission of instructor required. Typically offered Fall Spring Summer.

CNIT 51100 - Foundations In Homeland Security Studies

Credit Hours: 3.00. An interdisciplinary course addressing prevention, mitigation, preparation, response, and recovery from catastrophic events that threaten private and public sector resources and infrastructures. Course contents will include: characteristics of security; personal/corporate perspectives; identification of assets; assessing cost/benefits of protecting assets; risk assessment and risk management; crisis decision making; emergency management resources and response infrastructures; best practices in emergency management and risk and crisis communication; business continuity; and the importance of a collaborative response. Case studies include the 9-11 attacks and Hurricane Katrina. External experts will present and career opportunities will be discussed. Permission of instructor required. Typically offered Fall.

CNIT 51200 - Managing Resources And Applications For Homeland Security

Credit Hours: 3.00. An interdisciplinary course providing examples and practice in applying and managing the resources, including technologies, used in the private and public sectors for homeland security programs. Course contents will include: terrorism; corporate security; biosecurity; health care preparedness; personal/community preparedness; risk transfer; and information security and privacy. Additional content includes discussion of local, state, and federal preparedness programs issues in the public/private sectors that are designed to ensure survival during a continuum of emergency events, and continued practice in using collaborative application of team building skills. Permission of instructor required. Typically offered Spring.

CNIT 55000 - Organizational Impact Of Information Technology

Credit Hours: 3.00. An enterprise view of the organizational impact of information technology as the most effective means for achieving "better, faster, cheaper operations" in today's highly competitive business environment. Examines how information technology has enabled new organizational forms and changes in business processes, products, markets, delivery systems, ways of working, and people management issues and challenges. Permission of instructor required. Typically offered Fall Spring Summer.

CNIT 55100 - Information Technology Economics

Credit Hours: 3.00. Examines the economics of information systems and information technology as it relates to business performance. Topics include strategic information technology planning, alignment with business planning, value assessment, and performance measurement. Special emphasis is placed on issues relevant to strategic information technology infrastructure management, both for the information technology unit as well as the business as a whole. Permission of instructor required. Typically offered Fall Spring Summer.

CNIT 55200 - Information Technology Project Management

Credit Hours: 3.00. Explores the necessary skills and knowledge to successfully initiate, plan, manage, control, and report on information technology projects. Special emphasis is placed on learning the PMBOK and its practices concerning integration management, scope management, time management, cost management, quality management, human resource management, communications management, risk management, and procurement management. Practical examples are used to demonstrate the

concepts and techniques, plus hands-on experience is received by working on a case study. Permission of instructor required. Typically offered Fall Spring Summer.

CNIT 55300 - Quality Management In Information Technology

Credit Hours: 3.00. This course explores quality and productivity models used to ensure quality in information technology systems development processes. Special emphasis is on learning and understanding process metrics and measurement, as well as initiatives such as Total Quality Management, Continuous Process Improvement, Six Sigma, and the Software Engineering Institute Capability Maturity Model. . Permission of instructor required. Typically offered Fall.

CNIT 55500 - Advanced Network Security

Credit Hours: 3.00. Advanced conceptual and technological aspects of network security for voice and data networks. Deals with the advanced analysis, design, implementation, and management issues surrounding effective network security. Technology research and presentation of results, as well as security technology implementation, are required course outcomes. Permission of department required. Typically offered Summer Fall Spring.

CNIT 55600 - Basic Computer Forensics

Credit Hours: 3.00. Covers the fundamentals of the maturing discipline of computer forensics. The focus of the course is on gaining a broad understanding of the field of study and how technology and law interact to form this forensic science. Emerging standards and current and future issues related to the field are also explored. Examines law and public policy, the computer forensic methodology, report presentation, and expert witness testimony, as well as anti-forensic techniques that can be used to obfuscate evidence. Students are exposed to theory and practice with lab exercises, thought and term papers, and a practical, as well as written, final exam. Typically offered Summer Fall Spring.

CNIT 55700 - Advanced Research Topics In Cyber Forensics

Credit Hours: 3.00. Provides students at the advanced degree level the opportunity to expand their knowledge of cyber forensics. Students are expected to have fundamental understanding of cyber forensics and digital forensic science. The emphasis is on directed learning and scholarly inquiry. Possible research topics range from law and public policy to software and/or hardware development. Permission of instructor required. Typically offered Summer Fall Spring.

CNIT 55800 - Bioinformatics Computing And Systems Integration

Credit Hours: 3.00. This is a graduate-level course for students interested in the application of computational methods and information technology in the pharmaceutical, biotechnology, and life sciences arena. An overall understanding of information

technology and systems is assumed, as well as an in-depth knowledge of one or more areas of information technology. Permission of instructor required. Typically offered Fall Spring.

CNIT 55900 - Data Warehousing

Credit Hours: 3.00. The design and implementation of data warehouses (including data marts and operational data stores) are studied using current database technologies. Topics include data modeling for warehouses, data warehousing infrastructure and tool selection, data exploration, data synthesis and reduction, organizational metadata, data warehouse administration, and other contemporary issues. Preference is given to students having graduate status in the College of Technology with a CIT concentration. Permission of instructor required. Typically offered Spring.

CNIT 56000 - Advanced High Performance Computing Systems

Credit Hours: 3.00. This course is a graduate level course that covers advanced topics in high performance, cluster, and grid computing in detail from a systems perspective. Topics covered in this course will focus on aspects of the design, implementation, and use of high performance computing systems at each level of the system, including: commodity hardware and novel architectural components, such as graphics processing units; operating systems for HPC systems, including low-noise OS and light-weight kernels; system reliability and job scheduling; virtualization systems and fault tolerance for HPC; data intensive computing and workflows; parallel I/O systems; and grid and cloud computing architectures. Experience in Linux systems administration is a prerequisite for this course. Typically offered Fall Spring.

CNIT 56100 - Advanced Parallel Data Systems

Credit Hours: 3.00. This course is a graduate level course that covers advanced topics in high performance, cluster, and grid computing in detail from a systems perspective. Topics covered in this course will focus on aspects of the design, implementation, and use of high performance storage systems progressively from the hardware layer through the operating system up to the application level. Topics will include: commodity hardware and novel architectural storage components; the architecture and use of parallel file systems, including PVFS2 and Lustre; reliability and scheduling; virtualization and fault tolerant strategies for Petascale computing; system architectures for data intensive computing and workflows; parallel I/O systems; and grid and cloud computing architectures. Experience in Linux systems administration is a prerequisite for this course. Typically Fall Spring.

CNIT 56500 - Information Security Management

Credit Hours: 3.00. Information Security Management explores the issues surrounding the alignment of business and information security. More precisely, once the context of information security is understood in terms of the business and the problems with the current state of Information Security Management are identified, the course pursues solutions to those problems in terms of people, policy, process, procedures, and technology. The product produced as a result of this pursuit is an Enterprise Security Architecture, mapping business needs to technology implementation. The enterprise security architecture produced is dynamic

and maintainable, thereby assuring traceability and accountability. Permission of instructor required. Typically offered Fall Spring.

CNIT 58100 - Workshop In Computer Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Summer Fall Spring.

CNIT 59000 - Special Problems In Computer Technology

Credit Hours: 1.00 to 6.00. Independent study of a special problem under the guidance of a member of the staff. Does not substitute for either M.S. thesis or M.S. project credit. Permission of instructor required. Typically offered Summer Fall Spring.

CNIT 59800 - Directed MS Project

Credit Hours: 1.00 to 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of instructor required. Typically offered Summer Fall Spring.

CNIT 62300 - Contemporary Computer Technology Problems

Credit Hours: 3.00. Theory and practice in the development of comprehensive solutions to problems in industrial, technical, and human resource development environments. Solutions based on emerging procedures will be emphasized. Permission of instructor required. Typically offered Summer Fall Spring.

CNIT 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Computer Graphics Technology

CGT 10101 - Foundations Of Computer Graphics Technology

Credit Hours: 2.00. This course provides a foundational overview of computer graphics. The topics include the applications of computer graphics in today's world, basic technical elements of computer graphics, a review of current and future career opportunities in the field, and areas of potential research and study in computer graphics technology. Typically offered Fall Spring Summer.

CGT 11000 - Technical Graphics Communications

Credit Hours: 3.00. This course is an introduction to the graphic language used to communicate design ideas using CAD. Topics include sketching, multiview drawings, auxiliary views, pictorial views, working drawings, dimensioning practices, and section views. Typically offered Fall Spring Summer.

CGT 11100 - Designing For Visualization And Communication

Credit Hours: 3.00. An introductory design course for computer graphics majors. Students develop an understanding of the basic design elements and principles, composition, and typography through exercises and projects. The focus is on visual thinking, exploring the relationship between type and image, and developing multiple solutions to a given problem. Typically offered Fall Spring Summer.

CGT 11200 - Sketching For Visualization And Communication

Credit Hours: 3.00. This course applies fundamental computer graphics concepts of visualization, communication, and creativity within a sketching metaphor. Exercises and projects in graphic theory, problem solving, and sketching skill development provide students with activities that focus on further development within the discipline. A variety of sketching techniques are used to gather critical information and transform data into effective communication instruments. Typically offered Fall Spring Summer.

CGT 11400 - Introduction Of Graphics For Aerospace And Aviation Applications

Credit Hours: 3.00. Introductory course in computer graphics applications for aerospace, aviation, and related professions. Experiences focus on visualization, sketching, graphics standards and problem solving strategies. The course will expose students to CAD, PLM, and other related technologies. Typically offered Fall Spring Summer.

CGT 11600 - Geometric Modeling For Visualization And Communication

Credit Hours: 3.00. A core introductory computer graphics course that provides entry-level experiences in geometric modeling. Students develop geometric analysis and modeling construction techniques and processes to produce accurate computer models for graphic visualization and communication. Typically offered Fall Spring Summer.

CGT 11800 - Fundamentals Of Imaging Technology

Credit Hours: 3.00. This course provides a foundation for the development and use of raster and vector images for a variety of industries. Full-color images and illustrations are produced using computer technologies, with a focus on both technical and aesthetic aspects. Topics include color theory and perception, surface and lighting analysis, rendering techniques, and technical characteristics. Typically offered Spring Fall.

CGT 12000 - Electrical And Electronic Drafting

Credit Hours: 2.00. A basic course in electrical and electronic drafting, utilizing multiview and isometric drawing, sectioning, and dimensioning practices. Documentation of design through schematic diagrams, wiring diagrams, and printed circuit board layout. Application of graphics standards for electronic, power, and industrial control circuitry. Typically offered Fall Spring.

CGT 14100 - Internet Foundations,Technologies And Development

Credit Hours: 3.00. (CNIT 14100) The course explores the history, architecture, and development of the World Wide Web. Current tagging and scripting languages are covered in a tool-independent environment. Topics also include authoring tools, design, graphic and multimedia formats, and commerce, implementation, and security issues. PC literacy required. Typically offered Fall Spring.

CGT 16300 - Graphical Communication And Spatial Analysis

Credit Hours: 2.00. An introductory course in computer graphics applications for mechanical- and aeronautical-related professions. Experiences focus on visualization, sketching, graphic standards, and problem-solving strategies for engineering design. The course will emphasize the proper use of parametric solid modeling for design intent. Typically offered Fall Spring.

CGT 16400 - Graphics For Civil Engineering And Construction

Credit Hours: 2.00. An introductory course in the area of computer graphics documentation for civil engineering- and construction-related professions. Experiences focus on accepted industry graphic standards and their technical visual applications. The course emphasizes creation and distribution of graphics to enable communication. Typically offered Fall Spring.

CGT 21100 - Raster Imaging For Computer Graphics

Credit Hours: 3.00. Digital images are produced using a variety of computer technologies. Advanced color theory, surface rendering, and light control are emphasized in relation to technical illustration, hardware characteristics, and software capabilities. Typically offered Fall Spring Summer.

CGT 21500 - Computer Graphics Programming I

Credit Hours: 3.00. This course focuses on programming fundamentals, logic, and problem solving necessary for advancement into upper level CGT courses. A cross-section of languages and technologies will be introduced and demonstrated. Typically offered Fall Spring.

CGT 21600 - Vector Imaging For Computer Graphics

Credit Hours: 3.00. Full-color vector illustrations for a variety of uses are produced using computer methods. Color theory, surface analysis, and rendering techniques are emphasized as they apply to vector-based illustrations. Typically offered Fall Spring Summer.

CGT 22100 - Graphic Representation Of Architectural Documents

Credit Hours: 3.00. In this course students learn to use a modern software. Typically offered Fall Spring.

CGT 22600 - Introduction To Constraint-Based Modeling

Credit Hours: 3.00. This course explores the techniques used in the construction and manipulation of constraint-based solid models and assemblies. Emphasizes extracting data from databases. Downstream applications of data and the impact on overall product design processes are explored. Typically offered Fall Spring Summer.

CGT 24100 - Introduction to Computer Animation

Credit Hours: 3.00. This course introduces the knowledge base on which digital animation and spatial graphics technology are founded and developed. Emphasis will be placed on developing a working knowledge of the mechanics of 3D geometric formats, spline-based modeling with polygon mesh & NURBS, procedural mapping of raster images, simplified polygon modeling, rendering methods, hierarchical linking, and kinematic fundamentals. Typically offered Fall Spring Summer.

CGT 24200 - Technical Graphics For Supervision

Credit Hours: 2.00. An introduction to commonly encountered technical drawing practices; multiview representation, isometric pictorial, reading drawings, dimensioning practices, and working drawings. Emphasis is on computer graphics as technical communication through freehand sketching. Typically offered Fall Spring.

CGT 24500 - Game And Simulation Development

Credit Hours: 3.00. This course concentrates on the design of interactive activities in the areas of entertainment gaming, edutainment, training, and marketing. Activities will focus heavily on preproduction and game play design. Topics will include concept development, psychological aspects of gaming, game play, and technical implementation issues. Requires of class projects. Typically offered Summer Fall Spring.

CGT 25100 - Principles Of Creative Design

Credit Hours: 3.00. This course is an exploration of conceptualization and problem solving using the integration of type and image as both visual and verbal communication. Topics such as systems of organization, visual hierarchy, creativity, typography, color, and navigation are introduced and explored. Typically offered Fall Spring Summer.

CGT 25600 - Principles Of User Experience Design

Credit Hours: 3.00. This course introduces students to the process of user-centered design of computer systems humans interact with. Students learn how to draw upon principles of usability and user interface design rooted in human psychology and user research in order to conceptualize, prototype, and evaluate computer systems. Topics include processes such as user research, conceptual design, prototyping, and evaluation and concepts such as visual hierarchy, usability, information architecture, navigation, and more. The course is platform-independent and encourages students to experiment with new and emerging technologies. Typically offered Fall Spring Summer.

CGT 26200 - Introduction To Construction Graphics

Credit Hours: 3.00. Study of graphic solutions to problems conditioned by traditional and emerging construction document standards. Construction document creation is based on current architectural engineering and construction (AEC) standards with a focus on residential settings. Introductory 2D documentation will progress into 3D modeling techniques. Typically offered Fall Spring Summer.

CGT 29000 - Computer Graphics

Credit Hours: 1.00 to 3.00. Course topics will be determined by the CGT faculty. Hours and subject matter shall be arranged by

the instructor and approved by the CGT curriculum committee. This course will not be used for independent study. Typically offered Fall Spring.

CGT 29100 - Industrial Practice I

Credit Hours: 1.00. This course certifies completion of computer graphics work experience as the first session of the Computer Graphics Technology Cooperative Education Program. A written report of the experience is required. Admission to the Computer Graphics Technology Cooperative Education Program. Typically offered Fall Spring Summer.

CGT 29200 - Industrial Practice II

Credit Hours: 1.00. This course certifies completion of computer graphics work experience as the second session of the Computer Graphics Technology Cooperative Education Program. A written report of the experience is required. For cooperative education program students only. Typically offered Fall Spring Summer.

CGT 30800 - Prepress Production And Design

Credit Hours: 3.00. This course focuses on the process of designing, creating, and preparing documents for commercial printing. Students will develop proficiency with publishing software. Topics include page layout, font and image management, color, printing processes, papers, bindings and proofing methods. Projects emphasize designing single and multi-page documents for business and advertising such as identities, flyers, brochures, forms, catalogs, newsletters and booklets. Typically offered Summer Fall Spring.

CGT 30900 - Internship In Computer Graphics Technology

Credit Hours: 2.00 or 3.00. Internship course in computer graphics technology. Practical experience totaling at least 240 hours in computer graphics technology. Permission of department required. Typically offered Summer Fall Spring.

CGT 31000 - Drawing, Acting And Scripts For Animation

Credit Hours: 3.00. This course analyzes the symbiotic relationship between thinking and physical action, between emotion and its expression. Students will explore the visual storytelling process for film, animation, video games or multimedia. Students will learn the history of and gain needed drawing skills to create storyboards, animatics, along with the learning the importance to the production process. Students will learn how animation scripts are developed as well as how visual stories are told through technical elements such as composition, lighting, framing and perspective. Students will explore how to tap into their creativity and create interesting original animations. Typically offered Summer Fall Spring.

CGT 31100 - Experimental Methods And Practices In Computer Graphics Technology

Credit Hours: 3.00. This course explores scientific and professional methods used in computer graphics occupations. Exercises and projects are focused on developing competency and knowledge of investigative methods relative to CGT. Engagement opportunities in designing and conducting applied research are pursued to identify and enable students to make good decisions relative to selecting their undergraduate research pursuits. Typically offered Fall Spring Summer.

CGT 31500 - Computer Graphics Programming II

Credit Hours: 3.00. A continuation of the study of computer graphics programming concepts with an emphasis on interactive graphics and application development. Topics include polygon tessellation, vector imaging, interactive programming techniques, application development, and game development. Typically offered Fall Spring.

CGT 31600 - Industrial Applications of Computer Graphics Technology

Credit Hours: 1.00 to 3.00. This course includes specialized topics, skills, and applied problem solving associated with Computer Graphics Technology. The level of coverage varies according to the audience. Several variable topics may be offered under this title. Permission of instructor required. Typically offered Fall Spring.

CGT 32100 - Three-Dimensional Computer Modeling II

Credit Hours: 3.00. The importance of tone, texture, color, and entourage is stressed in the rendering of architectural interiors and exteriors. Typically offered Fall Spring.

CGT 32300 - Virtual Product Integration

Credit Hours: 3.00. Integration of product data and product definition formats throughout the enterprise with an emphasis on the use of PLM data sets and digital design information. Includes common design processes within the product lifecycle in critical corporate settings, including design, manufacturing, service, training, and marketing. Typically offered Fall Spring Summer.

CGT 32600 - Graphics Standards For Product Definition

Credit Hours: 3.00. Introduction to product data exchange and interoperability standards, ANSI and NIST product documentation

standards, product modeling standards, methodologies for technology selection, implementation, and evaluation. This course supports the product archival and communication processes in a PLM environment. Typically offered Summer Fall Spring.

CGT 34000 - Digital Lighting And Rendering for Computer Animation

Credit Hours: 3.00. The development of a working knowledge of perspective display of three-dimensional models and the resulting effects of projected light sources on shade, shadow, color, texture, and atmospheric effects in architecture, product illustration, and animation. Emphasis will be placed on lighting design, analysis, and photorealistic simulation for commercial graphic applications. Typically offered Fall Spring Summer.

CGT 34100 - Motion for Computer Animation

Credit Hours: 3.00. An applied course covering three-dimensional computer graphic animation for graphics specialists and professionals involved in the use of technical design, time and motion study, surface texture mapping, digital lighting, color, and the technology required to produce computer animations for commercial applications in manufacturing design, marketing, and training. Typically offered Fall Spring Summer.

CGT 34500 - Game And Simulation Development

Credit Hours: 3.00. This course concentrates on the design of interactive activities in the areas of entertainment gaming, edutainment, training and marketing. Activities will focus heavily on preproduction and game play design. Topics will include concept development, psychological aspects of gaming, game play, and technical implementation issues. Typically offered Fall Spring Summer.

CGT 34600 - Digital Video And Audio

Credit Hours: 3.00. Covers the use of digital technologies for video and audio in multimedia, hypermedia, and animation products. Students examine the methods for creating, sampling, and storing digital video and digital audio and the constraints placed on these media assets when used for media-based products. Emphasis is placed upon the technology of digital video and audio, including formats, data rates, compressors, and the advantages and disadvantages of the different technologies. Typically offered Fall Spring Summer.

CGT 35100 - Interactive Multimedia Design

Credit Hours: 3.00. This course introduces the many facets of interactive multimedia design and production. Students are introduced to authoring programs used for information delivery, with special attention focused on the integration of various media assets for communication. There is also concentration on the storage, management, and retrieval of media assets in a

production environment. Considerable time is spent on the systematic design of interactive media products to meet specified goals of communication. Typically offered Fall Spring Summer.

CGT 35300 - Principles Of Interactive And Dynamic Media

Credit Hours: 3.00. This course explores the development of interactive and dynamic media components for web and interactive media products. The course examines the design, creation and integration of 2D animation, 2D games, text, sound, video, programming, and databases for use in web and other interactive media. Typically offered Fall Spring Summer.

CGT 35600 - Web Programming, Development And Data Integration

Credit Hours: 3.00. A course focusing on the development of dynamic content and applications to facilitate information distribution. The course stresses development strategies for managing the rapidly changing information of corporations and organizations for just-in-time distribution, using authoring programs to create interactive multimedia products that utilize database management systems, file systems, and XML to provide a method for visualizing and manipulating that data. Significant time is spent on intermediate to advanced programming and scripting. Typically offered Fall Spring Summer.

CGT 36000 - Applications Of Construction Documentation I

Credit Hours: 3.00. Standards applied to the creation and distribution of documentation within the construction enterprise. Construction documents are created as products of a computer model. Residential modeling is followed by an introduction to light commercial documentation. Topics include a study of blueprint reading and 5D building information modeling (BIM) estimation of material extracted from a model. Typically offered Summer Fall Spring.

CGT 39000 - Computer Graphics

Credit Hours: 1.00 to 3.00. Course topics will be determined by the CGT faculty. Hours and subject matter will be arranged by the instructor and approved by the CGT curriculum committee. Typically offered Summer Fall Spring.

CGT 39300 - Industrial Practice III

Credit Hours: 1.00. Completion of computer graphics work experience as the third session of the Computer Graphics Technology Cooperative Education Program. A written report of the experience is required. For cooperative education program students only. Typically offered Fall Spring Summer.

CGT 39400 - Industrial Practice IV

Credit Hours: 1.00. Complete a computer graphics work experience as the fourth session of the Computer Graphics Technology Cooperative Education Program. A written report of the experience is required. For cooperative education program students only. Typically offered Fall Spring Summer.

CGT 41100 - Contemporary Problems In Applied Computer Graphics

Credit Hours: 3.00. Groups will identify, design, qualify, manage, create, and present a final project relative to existing or emerging issues within applied computer graphics. Activities and experiences will explore related topics such as project planning and management, user expectations, interpersonal communications skills, and quality management. The course concludes with faculty, peers, and practicing professionals evaluating oral, written, and media presentations of final projects. Typically offered Fall Spring.

CGT 41600 - Senior Design Project

Credit Hours: 3.00. This capstone course requires students to engage in a substantive endeavor directed at solving problems related to computer graphics. Activities include the creation and management of graphic systems and media assets per the requirements of the senior design proposal. Students are required to demonstrate professional attitudes and attributes in the timely completion and presentation of their project. Typically offered Fall Spring Summer.

CGT 42300 - Product Data Management

Credit Hours: 3.00. This course provides an understanding of the types of data generated and used in the product lifecycle, the current tools and methodologies in the management of that data, and system analysis and implementation techniques for using PDM as the backbone supporting a company's product development and implementation activities. Interaction between various enterprise systems is also discussed. Typically offered Fall Spring Summer.

CGT 42600 - Industry Applications Of Simulation And Visualization

Credit Hours: 3.00. This course focuses on developing mathematically accurate physical-visual simulations of mechanisms, systems, and assemblies. Topics include physical system analysis; coordinate systems; inverse kinematics; linear, rotational, and reciprocating motion. Simulations will be created using modeling technology, programmed scripting, and diverse software. Typically offered Fall Spring Summer.

CGT 44200 - Production for Computer Animation

Credit Hours: 3.00. An applied course covering advanced spline modeling techniques, lighting techniques, applied shading, motion dynamics and controllers, particle systems, application customization programming, and pre-production development and planning. Study of emerging advancements in computer animation and spatial graphic technologies will be included. Typically offered Fall.

CGT 44300 - Scripting For 3D Animation

Credit Hours: 3.00. This course provides the basic knowledge and skills required to use scripting languages found in 3D animation software. Emphasis is on implementing application extensions for real-world production problems and pipelines. Discussions and projects include, extending the software in areas of modeling, animation, rendering, data I/O, and scene management. Laboratory exercises include developing working macros, UI customization, utilities, and scripted plug-ins. Typically offered Summer Fall Spring.

CGT 44400 - The History And Technique Of Visual Effects In Film

Credit Hours: 3.00. This lecture-based course presents the history and technique of special or visual effects in film from the 19th Century (George Me'lie's) to the current digital age of visual effects. Emphasis is placed on the use of effects in fantasy, science fiction, and horror genres. These effects can range from the recreation of historical venues, to fictional characters and to worlds not yet seen. This course serves not only to address this facet of the history of film and cinema, but also the techniques and technology of visual effects including practical effects, miniatures, stop-motion, makeup, mechanical effects, optical effects, motion control, and the digital realm. Typically offered Summer Fall Spring.

CGT 44500 - Video Game Design And Development

Credit Hours: 3.00. This course examines video game design, theory, and development from aesthetic, psychological, and technical perspectives. Students will gain applied experience with a commercial game development platform. Advanced game development techniques will be taught in this course. Typically offered Fall Spring Summer.

CGT 44600 - Post-Production And Special Effects For Computer Animation

Credit Hours: 3.00. A variety of commercial applications of technical animation and spatial graphics are analyzed and produced, with special emphasis upon client development, design, organization, scripting, storyboarding, technical production, management, and evaluation. Typically offered Spring.

CGT 45000 - Professional Practices

Credit Hours: 3.00. Preparation for professional employment in computer graphics professions. Topics covered include creative and publishing law, contracts, copyrights, corporate and freelance employment considerations; portfolio planning; and interviewing. Arranged interviews and portfolio reviews. Typically offered Summer Fall Spring.

CGT 45100 - Multimedia Application Development

Credit Hours: 3.00. This course focuses on the development of applications that manipulate media assets. Significant time is spent on intermediate to advanced programming and scripting as well as the synchronization of aural and graphical components. Students are required to plan, design, and implement a major project, and a final presentation is required. Typically offered Fall Spring.

CGT 45600 - Advanced Web Programming, Development And Data Integration

Credit Hours: 3.00. This course presents the advanced technologies available for use on the World Wide Web and within corporate intranet environments. Emphasis and discussion is focused on the advantages and disadvantages of these technologies as well as on implementation to create unique solutions for business and industry. Strategies for planning, development, and implementation will be discussed and demonstrated. Significant time is spent on advanced programming and scripting as well as manipulation and visualization of data from various sources, including robust database management systems. Students are required to plan, design and implement a major project. Typically offered Fall Spring.

CGT 46000 - Building Information Modeling For Commercial Construction

Credit Hours: 3.00. The study of commercial jobsite planning and coordination. Trade coordination, visualization, and communication are emphasized. Activities include collision detection reports, construction animations, and professional presentations. Typically offered Summer Fall Spring.

CGT 46200 - Applications Of Construction Documentation II

Credit Hours: 3.00. Creating, archiving, integrating, qualifying and utilizing computer-generated, three-dimensional architectural models in a light commercial construction enterprise. Topics include components of MEP, fire protection, blueprint reading and 4D BIM scheduling. Credit cannot be obtained for both CGT 36200 and CGT 46200. Typically offered Fall Spring Summer.

CGT 49000 - Computer Graphics

Credit Hours: 1.00 to 3.00. Senior-level course topics will be determined by the CGT faculty. Hours and subject matter shall be

arranged by the instructor and approved by the CGT curriculum committee. This course will not be used for independent study. Typically offered Fall Spring.

CGT 49100 - Special Topics in Computer Graphics

Credit Hours: 1.00 to 6.00. A variable title, variable content course pertaining to problems and research in graphical methods and representation. Permission of instructor required. Typically offered Fall Spring Summer.

CGT 49500 - Industrial Practice V

Credit Hours: 1.00. Complete a computer graphics work experience as the fifth session of the Computer Graphics Technology Cooperative Education Program. The cooperation education certificate is awarded after completion of this session and is recorded on the student's official transcript. For cooperative education program students only. Typically offered Fall Spring Summer.

CGT 50100 - Seminar In Computer Graphics Technology

Credit Hours: 0.00 to 3.00. A variable topics course that addresses contemporary problems and issues related to M.S. students in Computer Graphics Technology. Permission of instructor required. Typically offered Fall Spring Summer.

CGT 51100 - The Development Of Graphics In Technology

Credit Hours: 3.00. An introduction to the historical development of visual science in western civilization and its effect on computer graphics techniques and practices. Topics include the historical, contemporary, and future developments in computer graphics. Emphasizes the study of visual science and the significance of computer graphics as a communications medium. Typically offered Fall Spring Summer.

CGT 51200 - Human Factors Of Computer Interface Design

Credit Hours: 3.00. Addresses an array of human factors issues related to human computer interaction and the graphic user interface. Theoretical and practical relationships are drawn between aesthetics and the cognitive sciences in the development of primarily multimedia and hypermedia products. Methods to validate design solutions are learned through controlled usability testing and assessment through small and large prototype projects. Typically offered Fall Spring Summer.

CGT 51300 - Interactive Multimedia Development And Research

Credit Hours: 3.00. A survey of the interactive multimedia development process, knowledge base, and applications in business and industry. Particular attention is paid to research issues surrounding theoretical, technological, and interactive techniques, and validating those approaches through applied research. Emphasis is placed on the interdisciplinary nature of the development of new media tools. Typically offered Fall Spring Summer.

CGT 51400 - Product Lifecycle Management

Credit Hours: 3.00. A survey of the graphical knowledge base with business and industry applications that support the product lifecycle management process is presented. Graphical applications used in the development of a product from an initial concept through its disposal are covered. Current and past application topics are reviewed in both theoretical and technological aspects and are validated through applied research. Emphasis is placed on the interdisciplinary nature of product lifecycle management through industrial case studies. Typically offered Fall.

CGT 51500 - Introduction To Virtual Environments

Credit Hours: 3.00. The goal of this course is to provide students deep exposure to the most prominent and important research within the fields of virtual reality, games, and any application area where virtual worlds are constructed or inhabited. Students will also study experiential, cultural, and phenomenological aspects of habitation of virtual environments. Students will conduct or contribute to original research, prepare a manuscript, and build their own virtual worlds as applicable. All students are expected to publish the results of their course research. Typically offered Fall.

CGT 51600 - Collaborative Virtual And Augmented Environments

Credit Hours: 3.00. A study of the field of collaborative virtual and augmented environments in shared, multi-user, same-site and multi-site immersive environments. Students will gain knowledge in the following research areas: multi-user interaction, collaborative virtual and augmented environments, and latest software and hardware tools. In this collaborative environment, students not only interact within the same virtual environment but collaborate between physically different environments through distributed environments. Knowledge of 3D computer graphics fundamentals, openGL, and C/C++, or consent of instructor. Typically offered Spring.

CGT 51700 - Product Development Using Virtual Environments

Credit Hours: 3.00. This course presents the concepts of product development using virtual reality and haptic devices in the development and manufacture of products. Students learn how this technology is currently being used in industry and anticipated technological advancements. Some of the major topic areas covered are: virtual reality technologies, product design and development processes, virtual environments and virtual prototyping, 3D modeling, design analysis and visualization, simulation visualization, multimodal user interface in virtual environments, and real-world applications of product development. Knowledge of 3D computer graphics fundamentals. Typically offered Spring.

CGT 51800 - Augmented Reality

Credit Hours: 3.00. Augmented Reality, a form of presenting virtual information within a perspective of the real world. This course instructs students in the foundations, practice and use of AR (Augmented Reality) as well as the technology required to produce an AR visualization. The concepts covered in this class include: physical tracking systems, computer vision, image processing techniques, 3D virtual environment visualization and calibration, display systems for AR and usage of AR in multimedia & tech culture. Some experience in Unity 3D prefered. Typically offered Fall.

CGT 51900 - Projects In Graphics

Credit Hours: 3.00. This course instructs students in current methods of conducting research on computer graphics and the content development process. Topics covered in the course include biofeedback, user experience, measurement and analysis, development pipelines, publication strategies and methodologies. LaTeX document preparation, simulation, and qualitative approaches to conducting research in the field of computer graphics. Typically offered Spring.

CGT 52000 - Computer Graphics Programming

Credit Hours: 3.00. This course provides a working knowledge of computer graphics programming using OpenGL and C++. OpenGL is the platform independent industrial standard APL and the leading edge technology for computer graphics application design. It has been used in the gaming industry, as well as in research and for scientific visualizations. The course focuses on creating real-time and interactive applications and is structured into several blocks; OpenGL introduction, modeling, texturing, transformations, lighting, and interactive application design. Students will develop various applications through the course focusing different aspects of computer graphics programming. Typically offered Fall Spring Summer.

CGT 52100 - Advanced Real-Time Computer Graphics

Credit Hours: 3.00. This course focuses on a working knowledge of real-time rendering and shaders using GPI. Students will learn how to program advanced computer graphics techniques and how to benefit from the existing graphics hardware in an efficient way. The main focus is on programming modern graphical processing units (GPUs) using the GLSL, CG and OpenGL. Students will learn what the data-flow programming model is, and how to write vertex, geometry, tessellation, and fragment shaders. Another output is using texturing and lighting on the low level of the GPU and the next step is to provide animations using vertex shaders. Advanced texturing techniques such as bump mapping or environment mapping will be explained. Permission of instructor required. Typically Fall Spring Summer.

CGT 54000 - Current Topics In 3D Animation

Credit Hours: 3.00. This course addresses recent research and development in 3D animation. Permission of instructor required. Typically offered Spring.

CGT 58100 - Workshop In Computer Graphics Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Summer Fall Spring.

CGT 59000 - Special Problems In Computer Graphics Technology

Credit Hours: 1.00 to 6.00. Independent study of a special problem under the guidance of a member of the staff. Does not substitute for either M.S. thesis or M.S. project credit. Permission of instructor required. Typically offered Summer Fall Spring.

CGT 59800 - Directed MS Project

Credit Hours: 1.00 to 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of instructor required. Typically offered Summer Fall Spring.

CGT 60000 - Spatial Ability Research And Assessment

Credit Hours: 3.00. This course examines spatial ability research through the 20th century; examining the various contributions of psychometric, developmental, differential, and information processing researchers as it applies to computer graphics. Additionally, students examine the various assessment devices that have been used to assess spatial ability and teaching interventions for improving it. Students will develop a research brief based upon the literature reviewed in the course. Prerequisite: CGT 51100. Typically offered Summer Fall Spring.

CGT 61000 - Visual Intelligence And Perception

Credit Hours: 3.00. This course focuses on the fundamentals of perception and cognition relative to vision and its implications to the field of computer graphics technology and the creation of graphics. Students will examine the foundations of human perception of form, shape, color, and motion, developing an understanding of why and how humans perceive visual information. Permission of instructor required. Typically offered Fall Spring Summer.

CGT 61100 - Computer Graphics Production Pipeline And Project Management

Credit Hours: 3.00. This course provides an examination of computer graphics project management principles coupled with production pipeline principles related to graphics. Students will be expected to (a) define the stages of a project, (b) demonstrate competency in managing projects, processes, and people, and (c) define a production pipeline for their area of study. Students will conduct an in-depth analysis of some aspect of a pipeline, perform assessment and/or a pilot research study, and propose methods of pipeline improvement relative to their area of study. Prerequisites: CGT 51100. Typically offered Fall Spring Summer.

CGT 62000 - Graphics Processing Unit Computing

Credit Hours: 3.00. This course provides a working knowledge of general-purpose graphics processing unit computing (GPGPU) using CUDA, OpenCL, and C++. OpenCL and CUDA are the platform independent industrial standard API and leading edge technology for GPGPU. The course focuses on utilizing, GPU for advanced tasks of scientific computing on parallelization of creating real-time and interactive applications and is structured into several blocks; parallel programming and synchronization tasks, GPU architecture, CUDA programming model, the OpenCL programming model. Permission of instructor required. Typically offered Fall Spring Summer.

CGT 62300 - Contemporary Problems In Computer Graphics

Credit Hours: 3.00. This course provides students an opportunity to apply current methods of design and development to emerging topics in digital media. Students are instructed using an experiential learning model in which student teams lead development projects oriented around problem domains that are too new or narrow to have acquired a large center of gravity within the research literature. Typically offered Fall.

CGT 68100 - Workshop In Computer Graphics Technology

Credit Hours: 0.00 to 6.00. This variable topics course focuses on advanced study of technical and professional research topics, primarily for doctoral students. Permission of instructor required. Typically offered Fall Spring Summer.

CGT 69000 - Research Projects In Computer Graphics Technology

Credit Hours: 1.00 to 6.00. This course provides a means of independent study of a special problem under the guidance of a graduate faculty member who holds a terminal degree. It is assumed that projects in this course are research projects independent of one's doctoral research. Although not required, it is likely that a major result of the course will be a conference or journal publication. This course does not substitute for dissertation research credit on the plan of study. Permission of instructor required. Typically offered Fall Spring Summer.

CGT 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Computer Sciences

CS 11000 - Introduction To Computers

Credit Hours: 3.00. Computer applications and how they can be used for solving problems in everyday life. The Internet with an emphasis on obtaining information from the World Wide Web, use of a database with an emphasis on data storage and retrieval, spreadsheets, word processing, presentation software, integration of multiple software packages. May not be taken for credit by Computer Science majors. Typically offered Summer Fall Spring.

CS 14900 - Web Programming

Credit Hours: 3.00. HyperText Markup Language, JavaScript, Active Server Pages, Java Serves Pages, Java servlets, Cascading Style Sheets, Extensible Markup Language (XML), website security. May not be taken for credit by majors in Computer Sciences. Typically offered Summer Fall Spring.

CS 15800 - C Programming

Credit Hours: 3.00. Introduction to structured programming in C. Data types and expression evaluation. Programmer-defined functions including passing parameters by value and by address. Selection topics include if/else/else-if, conditional expressions, and switch. Repetition topics include while, do-while, for, and recursion. External file input and output. Arrays, analysis of searching and sorting algorithms, and strings. Pointers and dynamic memory allocation. Students are expected to complete assignments in a collaborative environment. CS 15800 may be used to satisfy College of Science requirement of participation in at least one team-building and collaboration experience. Typically offered Summer Fall Spring.

CS 15900 - Programming Applications For Engineers

Credit Hours: 3.00. Fundamental principles, concepts, and methods of programming (C and MATLAB), with emphasis on applications in the physical sciences and engineering. Basic problem solving and programming techniques; fundamental algorithms and data structures; and use of programming logic in solving engineering problems. Students are expected to complete assignments in a collaborative learning environment. Typically offered Summer Fall Spring.

CS 17700 - Programming With Multimedia Objects

Credit Hours: 4.00. Introduction to computers and programming: number representations, primitive data types and operations, basic control structures, programming applets and applications using graphical user interfaces, programming for detecting events and performing actions, processing multimedia objects such as images and sounds. Throughout the course, examples are drawn from a variety of fields in the natural sciences. Not open to CS majors with a grade of C or better in CS 18000. Not open to non-CS majors with a grade of C or better in any course in computer programming. Typically offered Fall Spring.

CS 18000 - Problem Solving And Object-Oriented Programming

Credit Hours: 4.00. Problem solving and algorithms, implementation of algorithms in a high level programming language, conditionals, the iterative approach and debugging, collections of data, searching and sorting, solving problems by decomposition, the object-oriented approach, subclasses of existing classes, handling exceptions that occur when the program is running, graphical user interfaces (GUIs), data stored in files, abstract data types, a glimpse at topics from other CS courses. Intended primarily for students majoring in computer sciences. Credit cannot be obtained for both CS 18000 and any of 15600, CS 15800 and CS 15900. Not open to students with credit in CS 18100 or CS 24000. Typically offered Fall Spring.

CS 18200 - Foundations Of Computer Science

Credit Hours: 3.00. Logic and proofs; sets, functions, relations, sequences and summations; number representations; counting; fundamentals of the analysis of algorithms; graphs and trees; proof techniques; recursion; Boolean logic; finite state machines; pushdown automata; computability and undecidability. Typically offered Spring Fall.

CS 18300 - Professional Practice I

Credit Hours: 0.00. Professional Practice. Permission of instructor required. Typically offered Fall Spring Summer.

CS 18400 - Professional Practice II

Credit Hours: 0.00. Professional Practice. Permission of instructor required. Typically offered Fall Spring Summer.

CS 19000 - Topics In Computer Sciences

Credit Hours: 1.00 to 5.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

CS 19100 - Freshman Resources Seminar

Credit Hours: 1.00. This course is intended to integrate freshman majors in computer sciences into the department, help them adjust to university life, and assist them in developing academic and intellectual survival skills. Weekly recitation sections enable the students to work in teams. Strongly recommended for freshmen. The credit may be used only toward free electives. Typically offered Fall.

CS 19700 - Freshman Honors Seminar

Credit Hours: 1.00. A seminar dealing with the history, context, and future of computer science. Open only to students in the Computer Sciences Honors Program. The credit may be used only toward free electives. Typically offered Spring.

CS 23500 - Introduction To Organizational Computing

Credit Hours: 3.00. People and organizations, decision-making, information systems, telecommunications, desktop systems, integration tools, collaboration and groupware, multimedia, authoring multimedia documents, emerging technologies. May not be taken for credit by Computer Science majors. Typically offered Summer Fall Spring.

CS 24000 - Programming In C

Credit Hours: 3.00. The UNIX environment, C development cycle, data representation, operators, program structure, recursion, macros, C preprocessor, pointers and addresses, dynamic memory allocation, structures, unions, typedef, bit-fields, pointer/structure applications, UNIX file abstraction, file access, low-level I/O, concurrency. Typically offered Fall Spring.

CS 25000 - Computer Architecture

Credit Hours: 4.00. Digital logic: transistors, gates, and combinatorial circuits; clocks; registers and register banks; arithmetic-logic units; data representation: big-endian and little-endian integers; ones and twos complement arithmetic; signed and unsigned values; Von-Neumann architecture and bottleneck; instruction sets; RISC and CISC designs; instruction pipelines and stalls; rearranging code; memory and address spaces; physical and virtual memory; interleaving; page tables; memory caches; bus architecture; polling and interrupts; DMA; device programming; assembly language; optimizations; parallelism; data pipelining. Typically offered Fall Spring.

CS 25100 - Data Structures And Algorithms

Credit Hours: 3.00. Running time analysis of algorithms and their implementations, one-dimensional data structures, trees, heaps, additional sorting algorithms, binary search trees, hash tables, graphs, directed graphs, weighted graph algorithms, additional topics. Typically offered Fall Spring.

CS 25200 - Systems Programming

Credit Hours: 4.00. Low-level programming; review of addresses, pointers, memory layout, and data representation; text, data, and bss segments; debugging and hex dumps; concurrent execution with threads and processes; address spaces; file names; descriptors and file pointers; inheritance; system calls and library functions; standard I/O and string libraries; simplified socket programming; building tools to help programmers; make and make files; shell scripts and quoting; unix tools including sed, echo, test, and find; scripting languages such as awk; version control; object and executable files (.o and a.out); symbol tables; pointers to functions; hierarchical directories; and DNS hierarchy; programming embedded systems. Typically offered Fall Spring.

CS 28400 - Professional Practice III

Credit Hours: 0.00. Professional Practice. Permission of instruction required. Typically offered Fall Spring Summer.

CS 28401 - Professional Practice Part-Time

Credit Hours: 0.00. Professional Practice Part-Time. The instructor determines the adequacy of the student's preparation for the work assignment proposed by the prospective employer for the student. Permission of Instructor required. Typically offered Fall Spring Summer.

CS 29000 - Topics In Computer Sciences

Credit Hours: 1.00 to 5.00. Topics vary. Permission of instructor required. Typically offered Summer Fall Spring.

CS 29100 - Sophomore Development Seminar

Credit Hours: 1.00. Presentations by corporate partners about careers in computer science. Presentations by faculty about careers in academia and research. Students learn about upper-division courses, tour research laboratories, and attend job fairs. Typically offered Fall.

CS 30700 - Software Engineering I

Credit Hours: 3.00. An introduction to the methods and tools of software engineering; software life cycle; specification and

design of software, software testing, cost and effort estimation; laboratory exercises with design, testing, and other tools. Typically offered Fall Spring.

CS 31400 - Numerical Methods

Credit Hours: 3.00. Iterative methods for solving nonlinear equations; direct and iterative methods for solving linear systems; approximations of functions, derivatives, and integrals; error analysis. Typically offered Spring.

CS 33400 - Fundamentals Of Computer Graphics

Credit Hours: 3.00. Fundamental principles and techniques of computer graphics. The course covers the basics of going from a scene representation to a raster image using OpenGL. Specific topics include coordinate manipulations, perspective, basics of illumination and shading, color models, texture maps, clipping and basic raster algorithms, fundamentals of scene constructions. CS 31400 is recommended. Typically offered Fall.

CS 34800 - Information Systems

Credit Hours: 3.00. File organization and index structures; object-oriented database languages; the relational database model with introductions to SQL and DBMS; hierarchical models and network models with introductions to HDDL, HDML, and DBTG Codasyl; data mining; data warehousing; database connectivity; distributed databases; the client/server paradigm; middleware, including ODBC, JDBC, CORBA, and MOM. Typically offered Fall.

CS 35200 - Compilers: Principles And Practice

Credit Hours: 3.00. Should not be taken concurrently with CS 35400. The theory and practice of programming language translation, compilation, and run-time systems, organized around a significant programming project to build a compiler for a simple but nontrivial programming language. Modules, interfaces, tools. Data structures for tree languages. Lexical analysis, syntax analysis, abstract syntax. Symbol tables, semantic analysis. Translation, intermediate code, basic blocks, traces. Instruction selection, CISC and RISC machines. Liveness analysis, graph coloring register allocation. Supplemental material drawn from garbage collection, object-oriented languages, higher-order languages, dataflow analysis, optimization, polymorphism, scheduling and pipelining, memory hierarchies. Typically offered Fall Spring.

CS 35300 - Principles Of Concurrency And Parallelism

Credit Hours: 3.00. Important concepts, models, algorithms, abstractions, and implementation aspects of concurrent and parallel programs. Topics include: techniques used to describe concurrent programs (e.g., threads, events, co-routines, continuations), abstractions for shared-memory and message-passing programs, relaxed memory models, livestock and deadlock detection, lock-

free algorithms, data races and atomicity, scheduling techniques, process calculi, and software transactions. Typically offered Spring.

CS 35400 - Operating Systems

Credit Hours: 3.00. Should not be taken concurrently with CS 35200. Introduction to operating systems. Computer system and operating system architectures, processes, inter-process communication, inter-process synchronization, mutual exclusion, deadlocks, memory hierarchy, virtual memory, CPU scheduling, file systems, I/O device management, security. Typically offered Fall Spring.

CS 35500 - Introduction To Cryptography

Credit Hours: 3.00. An introduction to cryptography basics: Classic historical ciphers including Caesar, Vigenere and Vernam ciphers; modern ciphers including DES, AES, Pohlig-Hellman, and RSA; signatures and digests; key exchange; simple protocols; block and stream ciphers; network-centric protocols. Typically offered Fall Spring.

CS 38100 - Introduction To The Analysis Of Algorithms

Credit Hours: 3.00. Techniques for analyzing the time and space requirements of algorithms. Application of these techniques to sorting, searching, pattern-matching, graph problems, and other selected problems. Brief introduction to the intractable (NP-hard) problems. Typically offered Fall Spring.

CS 38600 - Professional Practice IV

Credit Hours: 0.00. Professional Practice. Permission of instructor required. Typically offered Fall Spring Summer.

CS 39000 - Topics In Computer Sciences

Credit Hours: 1.00 to 5.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

CS 39100 - Junior Resources Seminar

Credit Hours: 1.00. This seminar course engages a number of outside speakers who typically present information on the role of research in computer science, how the research components of computer science relate to each other, approaches to software

development in industry, different types of application development paradigms, technological trends, and societal, ethical, and legal issues. The credit may be used only toward free electives. Typically offered Spring.

CS 39700 - Honors Seminar

Credit Hours: 0.00. A seminar for all sophomores, juniors, and seniors in the Computer Sciences Honors Program. Meets eight times each semester under the supervision of the Honors coordinator. The meetings focus on honors research projects, helping students to identify appropriate projects and form groups, and providing a forum for juniors and seniors to report on their projects as required in the honors program. Typically offered Fall.

CS 40700 - Software Engineering II

Credit Hours: 3.00. Because of the nature of the project, CS 40700 is an extension of CS 40600. The emphasis is on the development of a large software system in a team environment. Knowledge of methods and tools acquired in CS 40600 are put to use in a carefully controlled and guided project. Some advanced topics such as reliability estimation and methods, and tools for the design and verification of parallel programs are covered during the lectures. Typically offered Spring.

CS 40800 - Software Testing

Credit Hours: 3.00. Preliminaries: errors and testing; software quality, requirements, behavior, and correctness; testing, debugging, verification; control flow graphs, dominators; types of testing; Test selection: from requirements, finite state models, and combinatorial designs; regression testing and test minimization; Test adequacy assessment: control and data flow; mutation based; testing tools. Typically offered Fall.

CS 42200 - Computer Networks

Credit Hours: 3.00. Undergraduate-level introduction to computer networks and data communication. Low-level details of media, signals, and bits: time division and frequency division multiplexing; encoding; modulation; bandwidth, throughput, and noise. Packet transmission: Local Area Network (Ethernet, FDDI) and Wide Area Network technologies (ATM); wireless networks; network interconnection with repeaters, bridges, and switches; DSU/CSU; xDSL and cable modems. Internetworking: router-based architecture; IP addressing; address binding with ARP; datagram encapsulation and fragmentation; UDP and TCP, retransmission; protocol ports; ICMP and error handling. Network applications: client/server concept; port demultiplexing; program interface to protocols (API); use by clients and servers; domain name system; TELNET; Web technologies including HTTP, CGI, Java; RPC and middleware; network management. Typically offered Fall Spring.

CS 42600 - Computer Security

Credit Hours: 3.00. A survey of the fundamentals of information security. Risks and vulnerabilities, policy formation, controls and protection methods, database security, encryption, authentication technologies, host-based and network-based security issues, personnel and physical security issues, issues of law and privacy. Typically offered Fall Spring.

CS 43400 - Advanced Computer Graphics

Credit Hours: 3.00. Advanced concepts and techniques of computer graphics. The course covers, in complete detail, going from a scene representation to a raster image without using OpenGL or other graphics packages. The course develops a complete graphics implementation in which the students implement every aspect of the graphics pipeline. This involves a substantial software project in C/C++. Typically offered Spring.

CS 44800 - Introduction To Relational Database Systems

Credit Hours: 3.00. An in-depth examination of relational database systems including theory and concepts as well as practical issues in relational databases. Modern database technologies such as object-relational and Web-based access to relational databases. Conceptual design and entity relationship modeling, relational algebra and calculus, data definition and manipulation languages using SQL, schema and view management, query processing and optimization, transaction management, security, privacy, integrity management. Typically offered Fall Spring.

CS 45600 - Programming Languages

Credit Hours: 3.00. Concepts for structuring data, computation, and whole programs. Object-oriented languages, functional languages, logic- and rule-based languages. Data types, type checking, exception handling, concurrent processes, synchronization, modularity, encapsulation, interfaces, separate compilation, inheritance, polymorphism, dynamic binding, subtyping, overloading, beta-reduction, unification. Typically offered Spring.

CS 47100 - Introduction to Artificial Intelligence

Credit Hours: 3.00. Students are expected to spend at least three hours per week gaining experience with artificial intelligence systems and developing software. Basic problem-solving strategies, heuristic search, problem reduction and AND/OR graphs, knowledge representation, expert systems, generating explanations, uncertainty reasoning, game playing, planning, machine learning, computer vision, and programming systems such as Lisp or Prolog.

CS 47300 - Web Information Search And Management

Credit Hours: 3.00. This course teaches important concepts and knowledge of information retrieval for managing unstructured

data such as text data on Web or in emails. At the same time, students will be exposed to a large number of important applications. Students in the course will get hands on experience from homework and a course project. The first part of the course focuses on general concepts/techniques such as stemming, indexing, vector space model, and feedback procedure. The second part of the course shows how to apply the set of techniques on different applications such as Web search, text categorization, and information recommendation. Typically offered Fall.

CS 47800 - Introduction to Bioinformatics

Credit Hours: 3.00. (BIOL 47800) Bioinformatics is broadly defined as the study of molecular biological information, targeting particularly the enormous volume of DNA sequence and functional complexity embedded in entire genomes. Topics will include understanding the evolutionary organization of genes (genomics), the structure and function of gene products (proteomics), and the dynamics of gene expression in biological processes (transcriptomics). Inherently, bioinformatics is interdisciplinary, melding various applications of computational science with biology. This jointly taught course introduces analytical methods from biology, statistics and computer science that are necessary for bioinformatics investigations. The course is intended for junior and senior undergraduates from various science backgrounds. Our objective is to develop the skills of both tool users and tool designers in this important new field of research. Typically offered Fall.

CS 48300 - Introduction To The Theory Of Computation

Credit Hours: 3.00. Turing machines and the Church-Turing thesis; decidability; halting problem; reducibility; undecidable problems; decidability of logical theories; Kolmogorov complexity; time classes; P, NP, NP-complete; space classes; Savitch's theorem, PSPACE-completeness, NL-completeness; hierarchy theorems; approximation theorems; probabilistic algorithms; applications of complexity to parallel computation and cryptography. Typically offered Fall Spring.

CS 48700 - Professional Practice V

Credit Hours: 0.00. Professional Practice. Permission of instructor required. Typically offered Fall Spring Summer.

CS 49000 - Topics In Computer Sciences For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading and reports in various fields. Permission of instructor required. Typically offered Fall Spring Summer.

CS 49700 - Honors Research Project

Credit Hours: 3.00. One semester of the project may be counted as one of the seven computer science courses at or above the 300 level required for the bachelor's degree. One more semester, if approved by the honors coordinator, can be used as a free elective.

A group research project directed by Computer Sciences faculty members. Each group must submit a technical report describing its work and the results obtained. Typically offered Fall Spring.

CS 50100 - Computing For Science And Engineering

Credit Hours: 3.00. Credit in this course may not be used toward a graduate degree in Computer Sciences. Computational concepts, tools, and skills for computational science and engineering scripting for numerical computing, scripting for file processing, high performance computing, and software development. Project may be required. Typically offered Fall.

CS 50200 - Compiling And Programming Systems

Credit Hours: 3.00. Basic principles of compilers and compiler design; control of translation, loading, and execution; symbolic coding systems; lexical and syntactic analysis, design and operation of assemblers and macroprocessors; design of interpretive systems. Students are expected to complete a large programming project as part of the course. Typically offered Fall.

CS 50300 - Operating Systems

Credit Hours: 3.00. Basic principles of operating systems: addressing modes, indexing, relative addressing, indirect addressing, stack maintenance; implementation of multitask systems; control and coordination of tasks, deadlocks, synchronization, mutual exclusion; storage management, segmentation, paging, virtual memory; protection, sharing, access control; file systems; resource management; evaluation and prediction of performance. Students are expected to spend at least three hours per week gaining hands-on experience in using and modifying a small operating system. Typically offered Fall Spring.

CS 50500 - Distributed Systems

Credit Hours: 3.00. Foundations for building reliable distributed systems, including failure and system models, and basic communication and agreement problems; crash failures, recovery, partition, Byzantine failures; asynchronous systems, failure detectors, communication channels, wireless and sensor networks; software clocks, causality, and cuts. Examples of problems include reliable broadcast consensus, leader election, group communication, and replication. Permission of department required. Typically offered Spring.

CS 51000 - Software Engineering

Credit Hours: 3.00. Software life cycles, requirements engineering, software design, design of distributed systems, verification and validation, software architecture, process metrics and models, and research methods in software engineering. Typically offered Spring.

CS 51400 - Numerical Analysis

Credit Hours: 3.00. (MA 51400) Iterative methods for solving nonlinear equations; linear difference equations, applications to solution of polynomial equations; differentiation and integration formulas; numerical solution of ordinary differential equations; roundoff error bounds. Typically offered Fall.

CS 51500 - Numerical Linear Algebra

Credit Hours: 3.00. Direct and iterative solvers of dense and sparse linear systems of equations, numerical schemes for handling symmetric algebraic eigenvalue problems, and the singular-value decomposition and its applications in linear least squares problems. Typically offered Spring.

CS 51501 - Parallelism In Numerical Linear Algebra

Credit Hours: 3.00. This course examines both theoretical and practical aspects of numerical algorithm design and implementation on parallel computing platforms. In particular, it provides an understanding of the tradeoff between arithmetic complexity and management of hierarchical memory structures, roundoff characteristics if different from the sequential schemes, and performance evaluation and enhancement. Applications are derived from a variety of computational science and engineering areas. Typically offered Fall Spring.

CS 52000 - Computational Methods In Optimization

Credit Hours: 3.00. A treatment of numerical algorithms and software for optimization problems with a secondary emphasis on linear and nonlinear systems of equations: unconstrained and constrained optimization; line search methods; trust region methods; Quasi-Newton methods; linear programming; calculating derivatives; quadratic programming; global optimization, including simulated annealing. Typically offered Spring.

CS 52500 - Parallel Computing

Credit Hours: 3.00. Parallel computing for science and engineering applications: parallel programming and performance evaluation, parallel libraries and problem-solving environments, models of parallel computing and run-time support systems, and selected applications. Typically offered Spring.

CS 52600 - Information Security

Credit Hours: 3.00. (CSCI 52600) Basic notions of confidentiality, integrity, availability; authentication models; protection models; security kernels; secure programming; audit; intrusion detection and response; operational security issues; physical security issues; personnel security; policy formation and enforcement; access controls; information flow; legal and social issues; identification and authentication in local and distributed systems; classification and trust modeling; and risk assessment. Typically offered Fall.

CS 53000 - Introduction To Scientific Visualization

Credit Hours: 3.00. Teaches the fundamentals of scientific visualization and prepares students to apply these techniques in fields such as astronomy, biology, chemistry, engineering, and physics. Emphasis is on the representation of scalar, vector, and tensor fields; data sampling and resampling; and reconstruction using multivariate finite elements (surfaces, volumes, and surfaces on surfaces). Typically offered Fall.

CS 53100 - Computational Geometry

Credit Hours: 3.00. Computational geometry studies how to compute with and reason about geometric objects. The subject is playing an increasingly important role in computer graphics, game software, geometric modeling, geographic information systems, and many other applications. Course topics include convex hull, segment manipulations, triangulations, range searching, Voronoi diagrams, window queries, Delaunay triangulation, and duality. Some key algorithms are implemented. Questions of floating-point accuracy and robust algorithm design are considered throughout the course. Typically offered Fall Spring.

CS 53500 - Interactive Computer Graphics

Credit Hours: 3.00. (ME 57300) The principles of computer graphics and interactive graphical methods for problem solving. Emphasis placed on both development and use of graphical tools for various display devices. Several classes of graphics hardware considered in detail. Topics include pen plotting, storage tubes, refresh, dynamic techniques, three dimensions, color, modeling of geometry, and hidden surface removal. Part of the laboratory involves use of an interactive minicomputer graphics system. Knowledge of programming required. Typically offered Fall.

CS 53600 - Data Communication And Computer Networks

Credit Hours: 3.00. Data communications: communication hardware technologies including local area and longhaul network hardware, circuit and packet switching, interfaces between computer and network hardware, and performance issues. Network architecture: protocol software and conceptual layering, reliable delivery over an unreliable channel, transport protocols, virtual circuits, datagrams, internetworking as a fundamental design concept, the client-server paradigm, naming and name binding, name servers, addressing and address resolution, routing and routing algorithms, congestion and flow control techniques, network file systems, distribution of computation, and DARPA internet protocols (TCP/IP) as examples of protocol organization. Typically offered Fall.

CS 54100 - Database Systems

Credit Hours: 3.00. Fundamentals for the logical design of database systems. The entity-relationship model, semantic model, relational model, hierarchical model, network model. Implementations of the models. Design theory for relational databases. Design of query languages and the use of semantics for query optimization. Design and verification of integrity assertions, and security. Introduction to intelligent query processing and database machines. Typically offered Fall.

CS 54200 - Distributed Database Systems

Credit Hours: 3.00. Fundamental issues in distributed database systems that are motivated by the computer networking and distribution of processors and databases. The theory, design, specification, implementation, and performance of distributed database systems. Typically offered Spring.

CS 54300 - Introduction To Simulation And Modeling Of Computer Systems

Credit Hours: 3.00. Simulation: discrete event simulation, process oriented simulation, generating random numbers, simulation languages, simulation examples of complex systems. Nondeterministic models: random variables, Poisson process, moment generating functions, statistical inference and data analysis. Modeling: elementary queuing models, networks of queues, applications to performance evaluation of computer systems. Typically offered Fall.

CS 54701 - Information Retrieval

Credit Hours: 3.00. Basic principles and practical algorithms used for information retrieval and text mining: statistical characteristics of text, several important retrieval models, text categorization, recommendation system, clustering, federated text search, link analysis, etc. Typically offered Fall Spring.

CS 55500 - Cryptography

Credit Hours: 3.00. (CSCI 55500) Concepts and principles of cryptography and data security. Cryptography (secret codes): principles of secrecy systems; classical cryptographic systems, including Vigenere and Vernam ciphers; the Data Encryption Standard (DES); public-key encryption; privacy-enhanced email; digital signatures. Proprietary software protection; information theory and number theory; complexity bounds on encryption; key escrow; traffic analysis; attacks against encryption; basic legal issues; e-commerce; and the role of protocols. Typically offered Spring.

CS 56500 - Programming Languages

Credit Hours: 3.00. An exploration of modern or unconventional concepts of programming languages, their semantics, and their implementations; abstract data types; axiomatic semantics using Hoare's logic and Dijkstra's predicate transformers; denotational semantics; functional, object-oriented, and logic programming; concurrency and Owicki-Gries theory. Example languages include ML, Ada, Oberon, LISP, PROLOG, and CSP. Typically offered Spring.

CS 56900 - Introduction To Robotic Systems

Credit Hours: 3.00. (ECE 56900) The topics to be covered include: basic components of robotic systems; selection of coordinate frames; homogeneous transformations; solutions to kinematic equations; velocity and force/torque relations; manipulator dynamics in Lagrange's formulation; digital simulation of manipulator motion; motion planning; obstacle avoidance; controller design using the computed torque method; and classical controllers for manipulators. Typically offered Fall.

CS 57300 - Data Mining

Credit Hours: 3.00. (CSCI 57300) Data Mining has emerged at the confluence of artificial intelligence, statistics, and databases as a technique for automatically discovering summary knowledge in large datasets. This course introduces students to the process and main techniques in data mining, including classification, clustering, and pattern mining approaches. Data mining systems and applications are also covered, along with selected topics in current research. Offered in alternate years. Typically offered Fall.

CS 57800 - Statistical Machine Learning

Credit Hours: 3.00. This introductory course will cover many concepts, models, and algorithms in machine learning. Topics include classical supervised learning (e.g., regression and classification), unsupervised learning (e.g., principle component analysis and K-means), and recent development in the machine learning field such as variational Bayes, expectation propagation, and Gaussian processes. While this course will give students the basic ideas and intuition behind modern machine learning methods, the underlying theme in the course is probabilistic inference. Typically offered Fall.

CS 57900 - Bioinformatics Algorithms

Credit Hours: 3.00. Review of Genomes, DNA, RNA, proteins, proteomes. Biological Sequences: dynamic programming; pairwise global, local, and semi-global alignments of genes and proteins; constant, affine, and general gap penalties; RNA alignments; BLOSUM and PAM scoring matrices. Multiple alignment of proteins: approximation algorithms; iterative and progressive alignment methods. Database search for sequences: BLAST and variants. Phylogentic Trees: distance-based methods, ultrametric and additive distance functions; parsimony, and maximum likelihood methods. Whole Genome Alignment: suffix trees and suffix arrays. Systems Biology: Module discovery in biological networks, spectral algorithms for graph clustering. Network alignment: quadratic programming formulations and graph matching. Genetic Variation: haplotype inference, the perfect phylogeny problem and chordal graphs. Additional topics such as next-generation sequencing, analysis of multidimensional data from flow cytometry, and gene expression data, if time permits. Typically offered Fall.

CS 58000 - Algorithm Design, Analysis, And Implementation

Credit Hours: 3.00. Basic techniques for designing and analyzing algorithms: dynamic programming, divide and conquer, balancing. Upper and lower bounds on time and space costs, worst case and expected cost measures. A selection of applications such as disjoint set union/find, graph algorithms, search trees, pattern matching. The polynomial complexity classes P, NP, and co-NP; intractable problems. Typically offered Fall Spring.

CS 58400 - Theory Of Computation And Computational Complexity

Credit Hours: 3.00. The theory of general purpose programming systems. Recursive and partial-recursive functions; recursive and recursively enumerable sets. The Church-Turing thesis. The recursion theorem, Rogers' translation theorem, Rice's undecidability theorem. The general theory of computational complexity: there are no general solutions to natural optimization problems. Complexity for specific models of computation: the polynomial complexity classes P, NP, and PSPACE; NP-hard and PSPACE-hard problems, inherently exponential problems. Typically offered Spring.

CS 59000 - Topics In Computer Sciences

Credit Hours: 1.00 to 5.00. Directed study for students who wish to undertake individual reading and study on approved topics. Permission of instructor required. Typically offered Fall Spring.

CS 59100 - Seminar

Credit Hours: 1.00. A weekly seminar presented by faculty and invited speakers, normally in a specific area. Typically offered Fall Spring.

CS 60300 - Advanced Topics In Distributed Systems

Credit Hours: 3.00. (CSCI 60300) Design and control of distributed computing systems (operating systems and database systems). Topics include principles of naming and location, atomicity, resource sharing, concurrency control and other synchronization, deadlock detection and avoidance, security, distributed data access and control, integration of operating systems and computer networks, distributed systems design, consistency control, and fault tolerance. Prerequisite: CS 50300, CS 54200. Typically offered Spring.

CS 61400 - Numerical Solution Of Ordinary Differential Equations

Credit Hours: 3.00. Numerical solution of initial-value problems by Runge-Kutta methods, general one-step methods, and

multistep methods; analysis of truncation error, discretization error, and rounding error; stability of multistep methods; numerical solution of boundary- and eigen-value problems by initial-value techniques and finite difference methods. Prerequisite: CS 51400. Typically offered Fall.

CS 61500 - Numerical Methods For Partial Differential Equations I

Credit Hours: 3.00. (MA 61500) Finite element method for elliptic partial differential equations; weak formulation; finite-dimensional approximations; error bounds; algorithmic issues; solving sparse linear systems; finite element method for parabolic partial differential equations; backward difference and Crank-Nicolson time-stepping; introduction to finite difference methods for elliptic, parabolic, and hyperbolic equations; stability, consistency, and convergence; discrete maximum principles. Prerequisite: CS 51400, MA 52300. Typically offered Spring.

CS 62600 - Advanced Information Assurance

Credit Hours: 3.00. Advanced topics in information assurance, including selections from the following: penetration testing, formal verification of systems, formal models of information flow and protection, distributed system authentication, protocol design and attack, computer viruses and malware, intrusion and anomaly detection models, multi-level security, active defenses, investigation and forensics, network firewalls, anonymity and identity, e-commerce support, and database security models and mechanisms. Offered every third semester. Prerequisite: CS 52600, CS 55500. Typically offered Fall Spring.

CS 63500 - Capturing And Rendering Real-World Scenes

Credit Hours: 3.00. Advanced techniques for automated modeling and visualization of complex environments, such as rooms, buildings, urban scenes, and landscapes. Topics covered are at the confluence of computer graphics, computer vision and engineering, and include: capture technologies, acquisition device calibration, view registration, panoramic images, 3D reconstruction from images, view morphing, 3D image warping, lightfield modeling and rendering, visual hulls, point-based modeling and rendering, view dependent texture mapping, and application development issues and examples. Prerequisite: CS 58000, CS 53500 or a solid foundation in computer graphics, programming proficiency in C or C++ and basic linear algebra. Typically offered Spring.

CS 63600 - Internetworking

Credit Hours: 3.00. Principles of Internetwork architecture and communication protocols underlying interoperable systems. Topics include universal interconnection, Internet addressing and routing, address binding, control of Internet congestion and flow, examples of Internet protocol suites (TCP/IP and XNS), round trip time estimation, naming and name resolution, Internet applications programs, and the ISO/OSI model. Prerequisite: CS 50300. Typically offered Fall.

CS 63800 - Multimedia Networking And Operating Systems

Credit Hours: 3.00. For graduate students in computer sciences who have a background in networking and operating systems and are interested in research in networked multimedia systems. The course consists of a selection of networking and operating system topics for realizing high performance, predictable, scalable, flexible, and secure multimedia systems. Topics may vary to reflect timely research issues and the current interests of the instructor(s). Students are expected to complete a term project. Presentations also may be required. Undergraduate background in computer science required. Prerequisite: CS 53600 or CS 50300. Typically offered Fall Spring.

CS 64100 - Multimedia Database Systems

Credit Hours: 3.00. Prepares students for research in multimedia database systems. Students are exposed to a variety of emerging innovative techniques to store, manipulate, communicate, visualize, and reason with multimedia systems. Prerequisite: CS 54100 or CS 54200. Typically offered Fall Spring.

CS 65500 - Advanced Cryptology

Credit Hours: 3.00. Advanced topics in cryptography and cryptanalysis, including selections from the following: Steganographic methods, Cryptanalytic techniques, including differential cryptanalysis, and chosen plaintext attacks. Message digest algorithm construction. Digital cash. Quantum cryptography. N-key systems. Minimal and zero-knowledge systems. Protocol design and failure. Verification of algorithms. Key generation and management. Traffic analysis. VPN construction and operation. Politics, espionage, and law enforcement concerns. Offered every third semester. Prerequisite: CS 52600, CS 55500. Typically offered Fall Spring.

CS 66100 - Formal Compiling Methods

Credit Hours: 3.00. Application of concepts developed in formal language and automata theory to the design of programming languages and their processors. Models of syntactic analysis, including canonical precedence, LR(k) and LL(k) parsing methods and variants; efficiency of each. Synthesis techniques, including symbol tables, storage administration, parameter mechanisms, garbage collection; optimization considerations. Models of synthesis, including level, affix, attributed grammars; prospects of fully automating compiler design. Applicative vs. procedural languages and their implementations based on semantic definition of a language (LISP, Lucid) and on proof-like techniques (PROLOG, equational systems); merits of such approaches. Prerequisite: CS 50200. Typically offered Spring.

CS 66200 - Pattern Recognition And Decision-Making Processes

Credit Hours: 3.00. (ECE 66200) Introduction to the basic concepts and various approaches of pattern recognition and decision-making processes. Topics include various classifier designs, evaluation of classifiability, learning machines, feature extraction, and modeling. Prerequisite: ECE 30200. Typically offered Fall.

CS 69000 - Seminar On Topics In Computer Sciences

Credit Hours: 0.00 to 5.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

CS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

CS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Construction Engineering and Management

CEM 19100 - Construction Internship I

Credit Hours: 0.00. First of three work periods required for students in the construction engineering and management program. The off-campus location for each work period is designated by the construction organization that sponsors the construction internship. Student intern receives compensation from the sponsor during each work period. A typical first internship period emphasizes the field-based activities of the sponsor. Recommended, but not required, to be preceded by CE 22000. Available to CEM students only. Typically offered Summer Fall Spring.

CEM 20100 - Life Cycle Engineering And Management Of Constructed Facilities

Credit Hours: 3.00. This course introduces concepts relating to the engineering and construction of facilities throughout their life cycle. Topics that will be explored include the nature of the construction industry, construction contracts, legal and management organization of construction companies, basics of the design and construction process, as well as an introduction to the role of estimating and project scheduling. Cost, time, safety and quality concepts of construction management relationships will also be discussed. Prerequisite: First Year Engineering Curriculum must be completed. Typically offered Fall Spring.

CEM 28000 - Construction Engineering Professional Development I

Credit Hours: 2.00. This course will prepare the student for professional practice in construction engineering including information on Careers and Issues in Construction; History and Culture of the U.S. Construction Industry; Engineering Ethics

and Preparation for Leadership. Information and assistance is also provided related to Minors and selections associated with the Plan of Study; Students Organizations; Opportunities for Construction Research and Community Outreach at Purdue. Guest speakers with be utilized to enhance the experience. The guest speakers include industry partners as well as faculty and staff. There will be an emphasis on written and oral communication. Typically offered Spring.

CEM 29000 - Construction Engineering Seminar

Credit Hours: 1.00. An orientation course to prepare the student for professional practice in construction engineering including information on Careers and Issues in Construction; History and Culture of the U.S. Construction Industry; Engineering Ethics and Preparation for Leadership. Information and assistance is also provided related to Specialty Options for Plans of Study; Students Organizations; Opportunities for Construction Research and Community Outreach at Purdue. Typically offered Spring.

CEM 29100 - Construction Internship II

Credit Hours: 0.00. Second of three internship periods and a continuation of that described for CEM 19100. Typically, experience emphasizes the office-based activities of the sponsor. Typically offered Summer Fall Spring.

CEM 30100 - Project Control And Life Cycle Execution Of Constructed Facilities

Credit Hours: 3.00. This course continues an introduction to construction management and engineering concepts for future engineers, contractors and owner representatives involved at different stages in the life-cycle of constructed facilities. Specifically, this course focuses on the principles, tools, and procedures used in the construction industry for project selection and financing, advanced planning and scheduling techniques, resource management, and project monitoring. Typically offered Fall Spring.

CEM 30200 - Practical Applications For Construction Engineering

Credit Hours: 3.00. This course teaches practical applications of the theories, tools and skills taught in CEM 20100 and CEM 30100. Construction processes will be studied through hands on exercises working with actual contract plans and specifications and computerized project scheduling of the sample project that is the focus of the class. Topics that will be explored are Contract Format, Understanding Contract Specifications. Permission of department required. Typically offered Spring.

CEM 32100 - Construction Engineering Materials Lab

Credit Hours: 1.00. The nature and performance of materials under load stress. Important engineering materials for evaluation of physical and mechanical properties include ferrous and nonferrous metals, plastics, bituminous materials, Portland cement, aggregates, concrete, timber, and particulate systems. Typically offered Fall.

CEM 32400 - Human Resource Management In Construction

Credit Hours: 3.00. Introduce a broad set of fundamental topics regarding management of people in engineering and construction organizations in the U.S. Subjects include labor-management relations (laws, regulations and practices affecting construction workers and organizations); worker motivation, productivity, and training; roles and practices of managers; construction safety; management of quality. Typically offered Fall.

CEM 39100 - Construction Internship III

Credit Hours: 0.00. Third, and last, of required internships. It typically emphasizes the project management activities of the sponsor. Actual assignments to a student may vary from sponsor to sponsor. Typically offered Summer Fall Spring.

CEM 42500 - Construction Practice Project

Credit Hours: 3.00. The capstone senior design course for construction engineering and management majors. Working in teams in a realistic engineering practice environment, students use an actual construction project to accomplish open-ended project planning and systems design. Course covers construction project strategy, cost estimating and bidding, constructability analysis, project scheduling, contract conditions, project organization, site analysis and development, safety and quality management, and information systems design. Comprehensive written submittals and oral presentations require integration of knowledge gained in previous courses and in construction internships. Typically offered Fall.

CEM 45000 - Building Systems In Construction

Credit Hours: 3.00. The primary objective of this course is to familiarize students with the terminology, planning and execution of constructed Mechanical, Electrical and Plumbing (MEP) systems. Permission of department required. Typically offered Spring.

CEM 45500 - Temporary Structures In Construction

Credit Hours: 3.00. This course will cover the design and construction of various temporary structures and systems used in building and transportation construction. The course describes not only design issues of temporary structures such as formwork, falsework, bracing, earth retention systems, scaffolding, cofferdams, and so forth by providing lectures and design examples, but it also covers business aspects associated with the design and construction of temporary structures in the real world such as business practice, legal aspects, and design philosophy. Typically offered Spring.

CEM 48500 - Legal Aspects Of Construction Engineering

Credit Hours: 3.00. This course will cover legal principles and landmark cases relevant to civil and construction engineering. Specific subjects covered include contracts, torts, agency, professional liability, labor laws, insurance, expert testimony, arbitration, patents and copyrights, sureties and ethics. Typically offered Spring.

CEM 49700 - Construction Engineering Projects

Credit Hours: 0.00 to 4.00. Topics vary. Permission of department required. Typically offered Summer Fall Spring.

Consumer Sciences and Retailing

CSR 10000 - Introduction To CSR

Credit Hours: 1.00. A workshop to familiarize students with the CSR department, department majors, advising resources, and major requirements. Special emphasis on basic freshman survival skills. Typically offered Fall.

CSR 10100 - The Global Consumer 2050

Credit Hours: 2.00. This course will focus on the tools students will need to be successful in the diverse world of the future. Permission of department required. Typically offered Fall.

CSR 12000 - Introduction To Apparel Industry

Credit Hours: 3.00. Introductory course that explores all facets of the apparel industry from its historical beginnings to concept of design and product development, to marketing, to manufacturing, to distribution, to retailing. Throughout the course, the student will learn about the career opportunities within the apparel industry. Typically offered Fall.

CSR 19000 - First Year Seminar

Credit Hours: 1.00. A one-credit (each semester) first-year honors seminar consists of guest speakers and discussions of broad intellectual issues. Admitted high school students who have either a 1200 combined SAT score (equivalent ACT score) and graduate in top 10 percent of class and letter of invitation from the CFS dean. Typically offered Fall Spring.

CSR 19700 - First Year Honors Seminar

Credit Hours: 1.00. A one-credit (each semester) first-year honors seminar consisting of guest speakers and discussions of broad issues within Consumer and Family Sciences. Permission of department required. Typically offered Fall Spring.

CSR 20000 - Professional Development In Consumer Science

Credit Hours: 1.00. Professional Development in Consumer Sciences & Retailing is a required course that will provide the necessary techniques to manage job search skills and career development for both current and future professional needs. The covered topics will expose students to on-campus resources, opportunities to gain key networking skills, and establish their professional identity to better prepare students for the current job market. Typically offered Fall Spring.

CSR 20900 - Introduction To Retail Management

Credit Hours: 3.00. Retail career paths, management training, merchandise control, organization and service structure, and a comparison of store types. Typically offered Fall Spring.

CSR 21500 - Textiles

Credit Hours: 2.00. A basic textiles course dealing with the properties of textile fibers and fabrics and their impact on product performance and consumer satisfaction. Emphasis on retail, apparel, and interior design applications. Typically offered Spring.

CSR 21501 - Textiles Laboratory

Credit Hours: 1.00. Laboratory work to accompany CSR 21500. Typically offered Spring.

CSR 22000 - Apparel Design I

Credit Hours: 3.00. Introductory course that deals with the evolution of apparel design through the principles of flat pattern design, three-dimensional draping, and computer-aided design (CAD for pattern design). Fundamentals for apparel design. Students create designs for a basic, sleeveless, collarless top. Typically offered Fall.

CSR 22100 - Apparel Design II

Credit Hours: 3.00. Continued development of apparel design from concept to finished product through the application of flat pattern design, draping, and computer-aided design. Building on the introductory course to create apparel wear design that includes sleeves, collars, blouses/shirts, dresses, pants, and skirts. Introduction to pattern grading manually and through CAD, and marker for apparel production. Typically offered Spring.

CSR 22200 - CAD For Apparel Pattern Design

Credit Hours: 3.00. Study of computer-aided-design for apparel pattern making, pattern grading, and marker making for the manufacture of apparel and other sewn products. Operation of CAD systems from Gerber Technology AccuMark PDS & GMS, and PDM (Product Data Management) are incorporated in this course. Typically offered Fall.

CSR 22300 - Apparel Assembly

Credit Hours: 3.00. Experimentation of basic professional techniques for apparel assembly utilizing both domestic and industrial equipment. Course includes apparel construction, fitting, and finishing of a variety of garments. Students gain insight into the relationship between creative design and quality of a finished product. Typically offered Spring.

CSR 25500 - Apparel Showcase

Credit Hours: 2.00. Production of annual apparel showcase of apparel original designs and artwork of Apparel Design majors. All students in the Apparel Design major work on teams to produce the annual event. Typically offered Spring.

CSR 28200 - Customer Relations Management

Credit Hours: 3.00. A course that provides insight into the structure and working of customer relations management and its role in business and government agency. Analysis of how consumer needs, complaints, and education are handled. Customer relations' management in the real world and techniques used in managing customer relations toward the goal of maximizing customer satisfaction. This course has a real world focus and is more applied than the usual introductory course. Typically offered Fall Spring.

CSR 29000 - Seminar On Current Issues

Credit Hours: 1.00 or 2.00. Class will focus on current consumer science issues facing households and businesses. The emphasis

is placed on exploring current research issues in consumer sciences. Admittance into the CSR Honors Program. Typically offered Fall Spring.

CSR 29700 - Introduction To Honors Research

Credit Hours: 1.00. Introduces students to the design and implementation of an honors research project. Typically offered Fall Spring.

CSR 30000 - Field Experience In Retail Management

Credit Hours: 1.00. Approved in-service training, a total of 140 hours; development of activities plan; and report of activities. Recommended for semesters 3,4,5, or 6. Advance approval of director and employer and attendance at pre- and post-organizational meeting is required. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 30700 - Field Experience In Selling And Sales Management

Credit Hours: 1.00. Approved in-service training and supervised work experience in selling and sales management. Total of 140 hours required with in-depth report and analysis of activities. Permission of department required. Typically offered Fall Spring Summer.

CSR 30800 - Independent Business I

Credit Hours: 3.00. A study of the financial processes involved in successful operation of a small business. Typically offered Fall Spring.

CSR 30900 - Leadership Strategies

Credit Hours: 3.00. Provides knowledge of humanistic processes that contribute to development of effective leadership. Typically offered Spring.

CSR 31500 - Relationship Selling

Credit Hours: 3.00. This course focuses on long term relationship selling. The course is organized around a seven step selling process which has proven to be effective. The course adds to this process some principles of marketing and business strategy. The

elements are necessary for the success of professional salesperson both in successful prospecting and making strategic choices as to how to allocate their time within the territory. Important to the learning process is actually practice of principles. Students will do various exercises of principles such as prospecting and negotiation. At the end of the semester, students will hone the skills learned through the semester with a series of roll plays designed to put them in position of both seller and buyer. Typically offered Fall Spring.

CSR 32200 - Field Experience In Apparel Design And Technology

Credit Hours: 1.00 to 3.00. Approved in-service in the apparel industry and any related sewn product company and/or theatrical production. This field experience is intended to provide the opportunity for a student to apply skills and expertise gained through the study in apparel design courses. Required report of daily responsibilities plus a final report. Minimum of 140 hours of work per credit hour; Required 2 credits minimum. Advanced approval of director and employer; and attendance at organization meeting. Permission of department required. Typically offered Fall Spring.

CSR 32300 - Visual Merchandising

Credit Hours: 3.00. Creative experimentation, production, and analysis of promotional formats for merchandising of product in a retail setting. Study of the elements and principles of design and their application for promotion of retail merchandise and/or services. Typically offered Spring.

CSR 32700 - History Of Fashion

Credit Hours: 3.00. Exploration of the historical development of western world fashion from the ancient world through the 21st century. Students learn to understand the impact and influence of society, culture, art, work, economics, politics, and technology on the style of fashion - past, present, and future. Typically offered Spring.

CSR 32800 - Apparel Art And Design

Credit Hours: 3.00. Exploration and experimentation of creative rendering of apparel design through the use of various media. Opportunity for the students to develop their own unique style of illustrating fashion. Typically offered Fall.

CSR 33100 - Consumer Behavior

Credit Hours: 3.00. An interdisciplinary survey of consumer behavior theory focused on psychological, sociological, and cultural influences on consumer choice and use of products and services. Credit will not be given for both CSR 33100 and PSY 28500. Typically offered Spring.

CSR 33200 - Cross-Cultural Marketing And International Retailing

Credit Hours: 3.00. Examination of marketing/retail practices used to target domestic and global consumer market segments. Development of successful retail and marketing strategies is stressed. Typically offered Fall Spring.

CSR 34200 - Personal Finance

Credit Hours: 3.00. The class covers a comprehensive discussion of investments, consumer credit, insurance and retirement issues. The goal is to show how these components are interconnected in order to create a complete picture of financial health of an individual. Typically offered Spring Summer Fall. CTL:IPO 1811 Personal Finance

CSR 34400 - Fundamentals Of Negotiations

Credit Hours: 3.00. This course is designed to be relevant to the broad spectrum of bargaining "problems" that are traditionally faced by the manager, sales personnel and financial advisors. The course explores the processes of bargaining and negotiation as social and managerial activities. Special emphasis will be given to the areas of interpersonal and interpersonal and intergroup conflict, in addition to the interpersonal influence techniques and the tactics and strategies involved with improved bargaining and negotiation. The major purpose of the course is for each student to gain insight into his or her own negotiating style and to become a more effective negotiator, as well as a more astute observer of social process. The course will involve extensive use of cases, role-plays, and related participative activities, enhanced by rigorous self-review and introspection. Typically offered Fall Spring Summer.

CSR 35500 - Apparel Showcase

Credit Hours: 1.00. Planning of annual apparel showcase of apparel original designs and artwork of Apparel Design majors. All juniors and seniors in the Apparel Design major work with co-leaders to plan the annual event. This course will be an avenue to work with special projects as requested by outside interest groups. Typically offered Fall.

CSR 38600 - Risk Management

Credit Hours: 3.00. The course includes principles of insurance, analysis and evaluation of risk exposures, legal aspects of insurance, insurance needs and analysis, policy selection, and insurance company selection and due diligence. Types of insurance that are studied include: property and casualty, health, life, long-term care, disability and general business liability. Typically offered Fall.

CSR 39000 - Undergraduate Special Problems

Credit Hours: 1.00 to 6.00. Individual participation, supervised reading, laboratory or field experiments, or research in special areas of the field. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 39100 - Undergraduate Structured Problems

Credit Hours: 1.00 to 3.00. Group participation in an organized class, a structured workshop, or research problem in a particular area of the field. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 39500 - Special Projects

Credit Hours: 1.00 to 6.00. Individual participation in supervised undergraduate project. Open to qualified upperclassmen. Permission of department required. Typically offered Fall Spring Summer.

CSR 39700 - Directed Honors Research

Credit Hours: 1.00 to 3.00. Directed independent honors research for CFS Honors Program students. Students must select a faculty advisor for the course. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 39800 - International Special Topics

Credit Hours: 1.00 to 6.00. Course taken during an International experience that is recognized by the University. Permission of department required. Typically offered Summer Fall Spring.

CSR 39900 - Undergraduate Special Topics In CSR

Credit Hours: 1.00 to 6.00. Various topics that may change from semester to semester are presented by CSR faculty. Permission of department required. Typically offered Summer Fall Spring.

CSR 40100 - Buying Of Merchandise

Credit Hours: 3.00. Principles of volume buying applicable to department, chain, specialty, and independent stores. Typically offered Fall Spring.

CSR 40300 - Retail Management Internship

Credit Hours: 3.00. A supervised full-time internship in retail and related industries. This experience will enable students to further develop their professional interests and skills. Prior field experience and completion of application and pre-approval of internship by internship director and attendance at pre- and post-organization meetings is required. Permission of department required. Typically offered Summer.

CSR 40400 - Strategic Issues For Sales And Retailing

Credit Hours: 3.00. Analysis of selected retail organizations and their channel partners through in-depth discussion of contemporary paradigms in strategic marketing for both sales and retailing perspectives and their applications to management. Typically offered Fall Spring Summer.

CSR 40600 - E-Retailing

Credit Hours: 3.00. To provide understanding of the technological and retail infrastructure that underlines doing retailing over the internet. Build an understanding of business strategies over the net. To identify management issues and consumer issues in e-retailing. Typically offered Fall.

CSR 40900 - Promotional Strategies

Credit Hours: 3.00. Study of promotional techniques and strategies used by sellers to present a company or its product to target markets. Emphasis placed on planning a promotional campaign. Typically offered Fall Spring.

CSR 41500 - Sales Force Management

Credit Hours: 3.00. An introduction to sales force management. An examination of the sales force management process, including principles of recruiting and selecting, training, compensation, motivation, supervision, and evaluation. Planning skills, including sales force deployment and the role of the sales force in sales forecasting, are also covered. Typically offered Fall Spring.

CSR 41800 - Selling And Sales Management Capstone

Credit Hours: 3.00. A capstone course in advanced professional selling taught in a seminar format and designed to prepare students for the transition from student to professional. Students are introduced to practioner-focused issues involved in long-term, major B2B account sales and an emphasis is placed on professional presentation skills. Students will complete a senior group research project and a major account sales project. Professional dress code from business-casual to full-business attire required based on the scheduled day-to-day activity. Typically offered Fall Spring.

CSR 42100 - Apparel Design III

Credit Hours: 3.00. Creation of apparel product line or collection from concept to consumer. Application of principles of apparel design from rendering, technical sketches, pattern design, pattern grading, marker making, and construction of several apparel garments from the line or collection. Typically offered Fall.

CSR 42300 - Apparel Portfolio/Professional Development

Credit Hours: 3.00. Exploration of employment-seeking skills including cover letters and resume writing, networking, job-seeking organization and interview practice. Creation and development of various forms of computer generated art for the portfolio including fashion illustration, textile design, story boards, and line brochures as well as stationary and business card design. Typically offered Spring.

CSR 48000 - Financial Counseling and Planning Internship

Credit Hours: 2.00 or 3.00. Supervised internship in the financial services industry. The experience will enable students to develop their professional interest and skills. Attendance at a pre-planning meeting required. Permission of department required. Typically offered Summer Fall Spring.

CSR 48100 - Ethics And Compliance in Financial Counseling & Planning

Credit Hours: 2.00. Examination of the ethical and compliance issues in the basic areas of investments, risk management, taxation, retirement and estate planning. Typically offered Spring.

CSR 48400 - Consumer Investment And Savings Decisions

Credit Hours: 3.00. A survey of consumer investment alternatives, with emphasis on financial assets. Typically offered Spring.

CSR 48500 - Case Studies In Financial Planning

Credit Hours: 3.00. Financial planning principles and practice. Course utilizes a case study approach toward financial planning for upper- and middle-income households. Business calculator required. Typically offered Spring.

CSR 48600 - Retirement Planning and Employee Benefits

Credit Hours: 3.00. Analysis of employee benefit plans, retirement needs analysis, and types of retirement plans including employer sponsored plans and participant directed plans. Typically offered Fall Spring.

CSR 49000 - Independent Study

Credit Hours: 1.00 to 4.00. Independent study. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 49700 - Honors Research Project

Credit Hours: 1.00 to 4.00. The completion of the independent honors research project for CFS Honors Program students. Must have an approved Honors Project Proposal. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 59000 - Special Problems In Consumer Sciences And Retailing

Credit Hours: 1.00 to 4.00. Credit variable. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 60000 - Introduction To Research In Consumer Sciences And Retailing

Credit Hours: 3.00. Introduction to research development, evaluation and analysis in the consumer sciences and retail management. Emphasis on preliminary stages of the research process including critical reading, preparation of literature reviews, scholarship standards, and preliminary proposals for research. Required of all graduate students entering CSR. Typically offered Fall.

CSR 63100 - Consumer Behavior Theories

Credit Hours: 3.00. An examination of research methods, principles, and theories of social science as they apply to the study of consumer behavior and marketing sciences. Prerequisite: STAT 50100, STAT 50200, or PSY 60000, PSY 60100. Typically offered Fall Spring.

CSR 68100 - Consumption Theories

Credit Hours: 3.00. Analysis of theories of consumption with emphasis on their relation to current practices and to the history of economic thought. Permission of instructor required. Typically offered Summer Spring.

CSR 68200 - Analytical Tools For Consumer Economists

Credit Hours: 3.00. Economic and analytical skills needed to interpret and conduct research in family and consumer economics. Focuses on consumer theory and includes theory of the firm, price theory, and welfare economics. Prerequisite: ECON 25100, ECON 25200 and 3 credit hours at the lower division undergraduate level in Economics. Enrolled in Selling & Sales Mgmt, Retail Management, Apparel Design & Tech or Financial Counsel & Planning. Typically offered Fall.

CSR 69000 - Independent Study In Consumer Sciences And Retailing

Credit Hours: 1.00 to 6.00. Topic and credit to be arranged. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 69500 - Behavioral Research Design

Credit Hours: 3.00. Analysis and critical evaluation of behavioral and economic research design and development of research proposals. Permission of department required. Typically offered Spring.

CSR 69700 - Final Non-Thesis Paper

Credit hours: 1.00 to 3.00. The curriculum of consumer behavior and family and consumer economics has evolved in the past decades with the changing market trend to currently encompassing specializations for meeting the diverse and integrated needs of individual consumers, their families, and communities. The non-thesis option is called to respond to the increasing market demand for professionals who are able to solve practical issues in the field in addition to mere epistemological pursuits. This proposed new course is designed for the students from this option to organize their learnings in the option in a way that provides propositions and strategies for addressing their topics of interest. Hence, this course should be taken during the last semester of the student's Master's program. The students will work with their major advisors for the topic and design of the study. Prerequisites: The students should take this course during the last semester of their non-thesis master's program. It is preferably

taken after the students have completed the recommended core courses. Permission of Instructor required. Typically offered Fall Spring Summer.

CSR 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

CSR 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Dance

DANC 10100 - Modern Dance I

Credit Hours: 2.00. An introduction to the techniques and principles of modern dance. Typically offered Fall Spring.

DANC 10200 - Ballet I

Credit Hours: 2.00. An introduction to the techniques and principles of classical ballet. Typically offered Fall Spring.

DANC 10300 - Jazz Dance I

Credit Hours: 2.00. An introduction to the principles of jazz dance techniques: alignment, isolations, rhythmic patterns, and basic locomotion. Typically offered Fall Spring.

DANC 13000 - Fundamental Principles Of Dance Technique

Credit Hours: 2.00. This course is designed to provide conceptual and experiential understanding of the integration of functional anatomical principles applied to dance technique. Through dance exercises the students will learn to re-pattern movement so that it is efficient, effective, and aesthetic. Typically offered Summer Fall Spring.

DANC 13500 - World Dance Forms

Credit Hours: 2.00. Introduction to and participation in selected dance forms from various cultures and historical periods. Dance will be explored as cultural identity, personal expression, worship, ritual, and political power through lectures, readings, DVD viewings, demonstrations, and movement sessions. Typically offered Fall Spring.

DANC 14000 - Dance Improvisation

Credit Hours: 1.00. A study of the elementary principles used in the design of modern dance movements. Typically offered Fall Spring.

DANC 14400 - Contact Improvisation

Credit Hours: 1.00. This course is both a physical practice and philosophical exploration of the contemporary partnering dance form Contact Improvisation. This form uses movement, touch, momentum and weight-sharing to explore dancing with other people. We will find moments of balance, inversion and flight by learning to support and be supported by other bodies. We will focus on connections and sensorial awareness as we practice rolling, lifting, falling, jumping, catching and finding the body's center. Typically offered Fall Spring.

DANC 20100 - Modern Dance II

Credit Hours: 2.00. A continuation and refinement of the modern dance techniques and principles addressed in DANC 10100. Typically offered Fall Spring.

DANC 20200 - Ballet II

Credit Hours: 2.00. A continuation of the principles and techniques of classical ballet addressed in DANC 10200. Typically offered Fall Spring.

DANC 20300 - Jazz Dance II

Credit Hours: 2.00. A continuation and refinement of the jazz dance concepts and movement vocabulary addressed in DANC 10300. Typically offered Fall Spring.

DANC 23000 - Biomechanical Approaches To Ballet Movement

Credit Hours: 2.00. This course will provide conceptual and experiential understanding of biomechanical approaches to ballet technique. Through studio, lecture, movement exercises and assignments, the students will learn to perform ballet movement with ease, strength and economy of motion. Typically offered Spring.

DANC 24000 - Fundamentals Of Dance Composition

Credit Hours: 3.00. An introduction to the theory and practice of the principles and utilization of choreographic tools; movement exploration, manipulation of basic dance elements, development of movement themes, and application of compositional dance forms. Typically offered Fall Spring.

DANC 24500 - Practicum In Dance Performance And Production

Credit Hours: 1.00 or 2.00. Open through audition. The study and practice of dance rehearsal, performance, and basic concert production techniques, culminating in a main-stage dance concert. Permission of instructor required. Typically offered Fall Spring.

DANC 24600 - Intermediate Choreography

Credit Hours: 1.00. A study of selected principles underlying the design of group performance in modern dance. Permission of instructor required. Typically offered Spring Fall.

DANC 25000 - Dance Appreciation

Credit Hours: 3.00. Understanding and appreciation of dance as an art form. Topics include compositional forms; movement styles; elements of dance; and influential choreographers, dancers, and theorists representative of various historical periods and aesthetic points of view. Typically offered Fall Spring.

DANC 30100 - Modern Dance III

Credit Hours: 2.00. A continuation and refinement of the modern dance techniques and principles addressed in DANC 20100. Emphasis placed on expressive qualities of movement. Typically offered Fall Spring.

DANC 36800 - Dance Sound Design

Credit Hours: 1.00. The study and application of sound design for dance, with emphasis on creation of sound scores for Modern Dance concerts. Instructor permission required. Typically offered Fall Spring.

DANC 49000 - Special Problems In Dance

Credit Hours: 1.00 to 3.00. Individual readings, topics, or projects in dance. Permission of instructor required. Typically offered Fall Spring.

Earth Atmospheric and Planetary Sciences

EAPS 10000 - Planet Earth

Credit Hours: 3.00. An introduction to the Geosciences-Earth science, oceanography, atmospheric science and astronomy. The course emphasizes topics (earthquakes, volcanoes, ocean pollution, climate change, severe weather, etc.) that are of general interest and relevance, and the interconnections between various Earth processes. Typically offered Fall Spring. CTL:IPS 1730 Earth Science

EAPS 10200 - Earth Science For Elementary Teachers

Credit Hours: 3.00. Fundamental earth science concepts appropriate for future elementary teachers are presented. Typically offered Fall Spring.

EAPS 10400 - Oceanography

Credit Hours: 3.00. Origin of the oceans and marine life. Seafloor spreading and marine geology; currents, waves, and tides; marine organisms and ecology; beaches and nearshore life. Man's use and abuse of the sea, including contemporary problems and future opportunities. The role of oceans in climate and evolution of the biosphere. Recommended for both science and nonscience majors. Typically offered Fall Spring.

EAPS 10500 - The Planets

Credit Hours: 3.00. This course deals with current knowledge of the physical, chemical, and geological nature of the planets and their atmospheres derived in part from data provided by manned and unmanned space probes and other techniques. Similarities and differences between the earth and other planets are described and discussed within the role of planetary formation. Typically offered Fall Spring.

EAPS 10600 - Geosciences In The Cinema

Credit Hours: 3.00. An introduction to earth and atmospheric sciences based on depictions in popular and documentary cinema. Topics will include: earthquakes, volcanoes, severe weather, dinosaurs, climate change, evolution, meteor impacts, and earth's interior. Lectures will focus on discussion of the relevant science, separating fact from fiction, and disaster management. Assignments will consist of viewing of films and answering questions about the science contained therein. Typically offered Fall Spring.

EAPS 10700 - American Landscapes

Credit Hours: 3.00. An introduction to geology and to the geologic history of the United States. The purpose is to understand and appreciate the wide range of beautiful and sometimes spectacular landscapes in different regions as illustrated, in most lectures, by slides. Typically offered Fall Spring.

EAPS 10900 - The Dynamic Earth

Credit Hours: 3.00. This course covers the formation and development of the solid earth, atmosphere, hydrosphere, and biosphere. The course studies the whole earth as a system of many interacting parts and focuses on the changes within and between these parts. This course is intended for all majors in earth and atmospheric sciences. Typically offered Fall.

EAPS 11100 - Physical Geology

Credit Hours: 3.00. Geologic processes and the development of land forms. Laboratory covers the study of minerals and rocks, the interpretations of topographic and geologic maps, and field investigations. Typically offered Summer Fall Spring. CTL: Physical Geology

EAPS 11200 - Earth Through Time

Credit Hours: 3.00. The history of the planet Earth from its beginnings to the present. This course will explore the causes and effects of processes that have changed the Earth's surface and subsurface through time, the impacts of these changes on the evolution of life, and how scientist interpret Earth history from the geologic record. The laboratory will provide hands-on

experience in interpreting various geologic and fossil records. This course may be taken on its own, or as a year-long lab series with EAPS 11100. EAPS 11100 and EAPS 11200 will fulfill the two course sequence laboratory experience outside the major department. Typically offered Spring.

EAPS 11300 - Introduction To Environmental Science

Credit Hours: 3.00. (NRES 29000, AGRY 29000) An introduction to environmental science, including issues such as climate change, energy resources, air and water pollution, toxic waste disposal, soil erosion, natural hazards, and environmental planning. Includes extensive in-class discussion of case studies. Typically offered Fall.

EAPS 11500 - Dinosaurs

Credit Hours: 3.00. Dinosaur discovery, preservation, excavation, and extinction, and current research on the Mesozoic animals that dominated earth for 125 million years. Early 19th century discoveries illustrate how personalities and scientific-religious dogma influenced original reconstruction and classification. Concepts of geologic time, stratigraphy, continental drift, paleontology, and evolution trace a lineage from archosaurs to dinosaurs and the coeval flying and marine reptiles and birds. The Cope-Marsh feud and great dinosaur hunts. Dinosaur anatomy and lifestyles, with emphasis on climatic, food chain, and metabolic controls. Each major taxon is described and amply illustrated. Changing views of dinosaurs as depicted in films, TV, and fictional literature. Typically offered Fall Spring.

EAPS 11600 - Earthquakes And Volcanoes

Credit Hours: 3.00. A survey class on earthquakes and volcanoes. Topics include earthquake hazards and forecasting, the use of seismic waves to investigate the earth's interior, volcanoes and tectonics, volcanic hazards, and the influence of volcanoes on climate. Examples of recent and historic earthquakes and volcanic eruptions are presented. Typically offered Spring.

EAPS 11700 - Introduction To Atmospheric Science

Credit Hours: 3.00. The weather/climate system. Solar variability and Milankovitch Theory. Atmospheric scales of motion. Chemistry of greenhouse gases and aerosols. Fundamental laws of meteorological dynamics and radiation. Weather systems, air masses and fronts. Severe storms, hurricanes and tornadoes. (Required for atmospheric sciences majors.). Typically offered Spring.

EAPS 11800 - Introduction To Earth Sciences

Credit Hours: 3.00. Introduction to a range of topics in Earth Science, including: Origin and geological history of Earth, including geological records of climate and evolution; Earth materials (minerals and rocks); Chemical and physical composition and

structure of the Earth; Rock weathering, erosion, and sedimentary processes; Geological timescale; Geologic structures including their map and field expression; Tectonic processes; The hydrological cycle with emphasis on groundwater and physical and chemical oceanography; Energy and mineral resources; Astrobiology. (Required for Geology and Geophysics and Earth and Space Science Teaching majors.) Typically offered Spring.

EAPS 12000 - Introduction To Geography

Credit Hours: 3.00. An introduction to the systematic study of location and spatial variation of natural features. Elements of place, time, distance, and area are considered in relation to man's perception of environment, his organization of cultural activities, and his utilization of natural resources. A one-day field trip is required. Typically offered Fall Spring.

EAPS 13700 - Freshman Seminar In Earth And Atmospheric Sciences

Credit Hours: 1.00. Seminar presented by guests in different fields of the Earth and Atmospheric Sciences to expose students to the range of topics included in the department and in possible career paths. Typically offered Fall Spring.

EAPS 13800 - Thunderstorms And Tornadoes

Credit Hours: 3.00. Not open to juniors and seniors majoring in atmospheric science. An elementary treatment of the physical structure of the atmosphere and the dynamical conditions that lead to the development of convective clouds, thunderstorms, and severe weather (including tornadoes, hail, wind, rain, lightning, and flash floods). This course will also focus on storm climatology, the socioeconomic impact of severe weather, as well as prediction, detection, warnings, and safety procedures. Analysis of severe weather events will include tornado movies and case studies of ground/aerial surveys of storm damage. Typically offered Fall.

EAPS 17100 - History Of Life

Credit Hours: 3.00. An introduction to the origin and evolution of life through geologic time, from the simplest one-celled organisms to humans, with emphasis placed on the basic evolution and geologic principles that enable us to understand the history of life. Typically offered Fall Spring.

EAPS 18300 - Cooperative Work Experience I

Credit Hours: 0.00. Cooperative Work Experience. Must be accepted for the program by the department cooperative education representative. For Cooperative Education Program students only. Typically offered Fall Spring Summer.

EAPS 18400 - Cooperative Work Experience II

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

EAPS 19100 - Introductory Topics In Earth And Atmospheric Science

Credit Hours: 1.00 to 3.00. Introductory special topics in earth and atmospheric sciences. Permission of instructor required. Typically offered Fall Spring Summer.

EAPS 19700 - EAS Freshman Honors Special Assignment

Credit Hours: 1.00. Selected interdisciplinary topics available for supervised reading, research, or reports. Permission of department required. Typically offered Fall Spring.

EAPS 22100 - Survey Of Atmospheric Science

Credit Hours: 3.00. (NRES 23000) An introductory course for both science and nonscience students. A general study of the atmosphere, basic meteorological principles, and weather systems. Relationships of the changing atmosphere to climate ozone depletion, and other contemporary issues. Typically offered Summer Fall Spring.

EAPS 22500 - Science Of The Atmosphere

Credit Hours: 3.00. An overview of the physics and dynamics of the atmosphere. Quantitative study of the energy balance of the atmosphere, condensation and precipitation processes, atmospheric motion and global circulation, severe storms, atmospheric chemistry. Contemporary issues such as human impact on climate, ozone depletion, numerical weather prediction and climate simulation, and modern measurement systems. Not available to students with credit in EAPS 22100. Intended for Science and Engineering majors only. Prior course work in calculus is required. Typically offered Spring.

EAPS 22600 - Introduction To Atmospheric Science Research

Credit Hours: 1.00. Students work on two different research projects designed by EAPS faculty. Research topics are complimentary to topics covered in EAPS 22500 and may include observational analysis, numerical modeling, or both. Each module includes introducing the research problem and learning pertinent software and statistical analysis, performing the research and discussing outcomes, student-designed revising or extending of the experimental design to explore results of interest, and presenting the findings to the class and interested EAPS faculty. Typically offered Fall.

EAPS 23000 - Laboratory In Atmospheric Science

Credit Hours: 1.00. A laboratory course that introduces the fundamentals of atmospheric science through quantitative exercises. The theoretical exercises include the vertical structure of the atmosphere, the Earth's energy budget, atmospheric moisture, saturation and stability, clouds and precipitation and atmospheric motion. Data and map analysis exercises include mid-latitude cyclones, thunderstorms and tornadoes, hurricanes and controls of climate. Prior or current course work in introductory atmospheric science is required. This course may not be taken for credit by students in the atmospheric science option of the Department of Earth and Atmospheric Sciences. Typically offered Summer Fall Spring.

EAPS 24300 - Earth Materials I

Credit Hours: 4.00. Elements of crystallography, physical and chemical properties of rock-forming minerals, and minerals of economic importance. Origin and occurrence of minerals. Prior course work in dynamic earth or physical geology is required. Typically offered Fall.

EAPS 24400 - Earth Materials II

Credit Hours: 4.00. The study of common igneous, sedimentary, and metamorphic rocks. The origin and occurrence of rocks, weathering, and alteration processes. Prior course work in earth materials or mineralogy is required. Typically offered Spring.

EAPS 28400 - Cooperative Work Experience III

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

EAPS 30100 - Oil !

Credit Hours: 3.00. Petroleum is a common thread that interweaves Geoscience with the Political-Economic history of the 20th century. Its dominance in current society has major repercussions on our current and future society and environment. The unequal distribution of petroleum and natural gas, coupled with innovative geologists and engineers, has set the stage for the modern geo-political world. This course is a unique survey into the multitude of aspects of petroleum -- from its formation to "resource wars". Typically offered Fall.

EAPS 30900 - Computer-Aided Analysis For Geosciences

Credit Hours: 3.00. Application of computer analysis techniques including error analysis, line and surface fitting, spatial and temporal correlations, contouring, interpolation, and map projections. These methods are discussed in terms of specific geologic applications. All exercises and examples are developed using commercial mathematical software package. A three-hour-per-week computer laboratory tutorial provides hands-on experience with the techniques discussed in class. Prior course work in computer programming is required. Typically offered Spring.

EAPS 31200 - Capstone Environmental Science For Elementary Education

Credit Hours: 2.00 or 3.00. Provides elementary education majors with an integrated science capstone experience using environmental themes and drawing on material covered in prerequisite science classes. Typically offered Fall Spring Summer.

EAPS 31300 - Applied Geomorphology

Credit Hours: 3.00. This course covers those aspects of surface processes and land form and landscape development of importance in applied environmental geology. With an emphasis on understanding process dynamics and acquiring skills and techniques used in applied work, the course will examine soil erosion by water and wind, surface water runoff, landslides, slope stability, mass movement, streams and rivers, channel stability and sediment transport. Two required one-day field trips. Prior course work in dynamic earth or physical geology is required. Typically offered Fall.

EAPS 31900 - Exploring Earth Through Time

Credit Hours: 3.00. The course will explore the history of the Earth from its beginning 4.5 billion years ago to the present. Our understanding and insight into the history of the Earth has greatly expanded during the last several decades. Emphasis will be placed on the relationships of tectonic processes that shaped the surface of the Earth and the evolution of the Earth's biosphere. The course will also examine how the role of evolution of life has played in the history of the atmosphere and oceans. Typically offered Spring.

EAPS 32000 - Physics Of Climate

Credit Hours: 3.00. Open to majors in the Schools of Science, Agriculture, and Engineering. To understand climate we describe and synthesize physical processes in the atmosphere and their coupling to the ocean, ice, and land. We quantitatively explore climatology with an equal balance of physical principles and scrutiny of available modern data. Topics include: visualization of atmospheric/land surface/oceanographic climatological data sets; theories of climate dynamics; and climate change. Beginning with radiative balance and simple energy balance models, the course progresses toward understanding the effects of radiative-convective forcing and rotation on the fluid envelopes. Analysis of data in an interactive computer-enabled environment is an important part of the course. By the end of this course, the student should know how the Earth System behaves at large scales and grasp the physical understandings of why. Typically offered Spring.

EAPS 32500 - Aviation Meteorology

Credit Hours: 3.00. This course is designed for students who have an interest in topics in meteorology applied to aviation operations with emphasis on meteorological hazards for instrument flight. Topics covered include obtaining and evaluating weather data, review of synoptic meteorology, map analysis, the ICAO standard atmosphere, pressure and altimetry, atmospheric thermodynamics, moisture and stability, low-IFR operations, aircraft icing, turbulence, thunderstorms and associated hazards, and interpretation and use of radar and satellite imagery. Prior course work in introductory atmospheric science and pre-calculus is required. Typically offered Spring.

EAPS 32700 - Climate, Science And Society

Credit Hours: 3.00. This course will examine the broad problems of climate change by examining the relationship between science, politics, and society by using climate change as a lens through which to examine larger issues. Students will be encouraged to identify similar themes in their own experiences as emerging scientists, engineers and global leaders. Adequate preparation to write essays and perform basic arithmetic calculations needed. Prior knowledge of climate change science is not necessary. Typically offered Fall Spring.

EAPS 34300 - Optical Mineralogy

Credit Hours: 3.00. Introduction to the theory of optical crystallography and its relationship to the optical properties of non-opaque crystalline substances, particularly minerals. Laboratory work is concerned with examination and characterization of minerals in grain mounts and thin-sections. Typically offered Fall.

EAPS 35100 - Structural, Tectonic, And Basin Analysis

Credit Hours: 4.00. Recognition, description, and origin of deformational and sedimentary structures. Analysis of folds, faults, metamorphic facies, paleocurrents, and deposystems. Emphasis on the relationship between tectonics, basin development, and sedimentation in eastern North America. The course is centered on application of field techniques to understanding the regional geology of Tennessee. A 10-day field investigation in Tennessee is required. Regional synthesis of structural, sedimentary, geophysical, and geochemical data sets from the southern Applachian orogenic belt. Typically offered Fall.

EAPS 35200 - Structural Geology

Credit Hours: 3.00. Analysis of stress, strain, deformation mechanisms and microstructures, joints, faults, folds, foliation, igneous structures, gravity structures and tectonics of orogenic belts. Typically offered Spring.

EAPS 35300 - Earth Surface Processes

Credit Hours: 3.00. Introduction to a variety of topics in sediment transport and deposition, emphasizing linkages between active processes, landscape evolution, and the rock record. Topics include: introductory fluid mechanics; sediment transport by water, ice, and wind, and the development of fluvial bedforms, glacial landscapes, and sand dunes; groundwater geochemistry and the development of karst and caves. Each major topic is accompanied by field projects that emphasize local geologic history. A weekend field trip is required. (Required for Geoscience and Earth Science teaching majors.) Typically offered Fall.

EAPS 35400 - Plate Tectonics

Credit Hours: 3.00. This course will explore plate tectonic processes from the scale of plate motions to the individual stresses that deform rocks. Emphasis will be focused on sources of stress and how this stress is manifested in the lithosphere through faulting, folding, earthquake generation, and place motions. Seismic waves and what information they provide about the interior of the Earth will be discussed. Additionally, extensional, compressional, and transform plate boundaries will be covered. This course is an introduction to geophysical processes and serves as a stepping-stone to upper level geophysics course such as EAPS 35200 and EAPS 45000. Typically offered Fall Spring.

EAPS 37500 - Great Issues - Fossil Fuels, Energy And Society

Credit Hours: 3.00. Prosperity of the 20th century was based on abundant and cheap energy; during the 21st century we will be faced with difficult challenges. Our society will face higher energy prices, decline of petroleum based fuels supplies, increased environmental effects of fossil fuels usage, and the challenge of solving the technological problems of developing alternative fuels. This course will review the structure, economics, and geopolitical issues faced by fossil fuel industries and the mitigation strategies that will be needed to change to low fossil fuel use society based on low polluting renewable energy sources. Counts for Great Issues course in College of Science for Juniors and Seniors. Typically offered Fall Spring.

EAPS 38100 - Geology For Engineers I

Credit Hours: 3.00. Principles of physical, structural, and historical geology applied to engineering. Rocks and rock-forming minerals; engineering properties of rocks; weathering, soil formation, and soil classification; topographic and geologic maps; aerial photographs, subsurface investigation; field methods and engineering applications. Field investigations are required. Typically offered Fall.

EAPS 38500 - Principles Of Engineering Geology

Credit Hours: 3.00. Application of geology to evaluation of design and construction problems relating to dams, highways, tunnels, and reservoirs; review of construction material sources and their utilization. A field investigation is required. Prior course work in mineralogy, petrology or geology for engineers is required. Typically offered Spring.

EAPS 38600 - Cooperative Work Experience IV

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

EAPS 39000 - Geologic Field Methods

Credit Hours: 3.00. Introduction to geologic mapping principles on quadrangle (7 1/2 min., 15 min., 1:250,000 scales) maps. Application of aerial photography, GPS, and GIS techniques. Emphasis on construction of cross sections, measurement of stratigraphic sections, and preparation of geologic reports. Several weekend field exercises will be required. Typically offered Spring.

EAPS 39100 - Topics In Earth And Atmospheric Sciences

Credit Hours: 1.00 to 4.00. Intermediate special topics in the earth and atmospheric sciences. Permission of instructor required. Typically offered Fall Spring Summer.

EAPS 40300 - Physical Oceanography

Credit Hours: 3.00. This course is designed for upper-level undergraduates in science and engineering who have an interest in an advanced-level introduction to physical oceanography. Topics include physical and chemical properties of the ocean, geophysical structure of the sea, and oceanic stability. Global heat, salt, and water balance. Advective and convective circulation of the oceans. Ocean current systems and deep circulation. Surface waves and tides. Prior course work in multivariate calculus and second semester physics is required. Typically offered Fall Spring.

EAPS 40900 - Application Of Computers To Meteorology

Credit Hours: 3.00. This course is designed for students in the atmospheric sciences who have limited programming experience. Basic principle of programming will be taught, including the use of loops, conditional statements, and subroutines using various programming languages or analytical software. Examples will be orientated towards meteorological applications, and include the visualization of meteorological data and the use of NetCDF files. Numerical techniques such as linear interpolation, finite differencing, and numerical integration will also be taught. Typically offered Fall Spring.

EAPS 41900 - Internship In Environmental Geosciences

Credit Hours: 1.00 to 6.00. This course provides students with an opportunity to gain practical work experience in environmental geoscience. The student works with a faculty advisor to set up an internship consisting of the equivalent of at least six weeks of

full-time employment with a government agency, business, or consulting company. Internships typically involve field, laboratory, and office work. A portion of the internship may be part-time work during a regular semester, but at least three consecutive weeks must be full-time work. One credit hour per week of unpaid internship. Six week internship. Prior course work in upper level EAPS courses is required. Permission of department required. Typically offered Fall Spring Summer.

EAPS 42000 - Global Change Modeling

Credit Hours: 3.00. Understanding, monitoring, and modeling global environmental change. Each session examines the response of the interrelated earth systems to different geological, ecological, atmospheric, oceanic, or societal impacts. Topics include global warming, major biogeochemical cycles, atmospheric ozone, coevolution of life and climate, asteroid impacts, and ecological disruptions. The laboratory uses object-oriented modeling software and current NASA satellite data. No prior knowledge of computer programming is required. Typically offered Spring.

EAPS 42100 - Atmospheric Thermodynamics

Credit Hours: 3.00. (AGRY 43100) Structure and composition of the atmosphere. Thermodynamics of dry and moist air, including adiabatic and pseudo-adiabatic processes, hydrostatic stability, and air mass determination. Prior course work in introductory atmospheric science, second semester physics or thermodynamics is required. Typically offered Fall.

EAPS 42200 - Atmospheric Dynamics I

Credit Hours: 3.00. (AGRY 43200) A study of the general system of equations governing mass and momentum changes in the atmosphere; special horizontal wind representations, thermal wind relationships; circulation, vorticity, divergence, and vertical motion. Prior course work in atmospheric thermodynamics and differential equations is required. Typically offered Spring.

EAPS 42300 - Atmospheric Dynamics II

Credit Hours: 3.00. (AGRY 43300) An extension of EAPS 42200, with emphasis on perturbation theory and hydrodynamics stability, air mass and frontal theory, barotropic and baroclinic models, wave cyclone theory, and numerical weather prediction. Typically offered Fall.

EAPS 43100 - Synoptic Laboratory I

Credit Hours: 1.00. (AGRY 44100) Analysis of vertical distributions of temperature and moisture with applications to adiabatic and pseudo-adiabatic processes, hydrostatic stability, and air mass determination. Prior course work in atmospheric thermodynamics is required. Typically offered Fall.

EAPS 43200 - Synoptic Laboratory II

Credit Hours: 1.00. Analysis of horizontal distributions of pressure, temperature, wind, vorticity, and vertical motions. Applications to synoptic-scale wave propagation. Prior course work in atmospheric thermodynamics and synoptic lab I is required. Typically offered Spring.

EAPS 43300 - Synoptic Lab III

Credit Hours: 1.00. (AGRY 44300) Diagnoses of midtropospheric wave propagation and growth. Analysis of surface pressure fields and fronts and their relationships to upper air features. Extensive use is made of teletype and facsimile weather information. Prior course work in atmospheric dynamics and synoptic lab II is required. Typically offered Fall.

EAPS 43400 - Weather Analysis And Forecasting

Credit Hours: 3.00. (AGRY 44400) In-depth study of contemporary weather analysis and forecasting techniques and problems. Extensive use is made of teletype and facsimile data and numerical weather prediction guidance provided by the National Meteorological Center. Typically offered Spring.

EAPS 44000 - Geochemistry Of Earth Elements

Credit Hours: 3.00. This course provides an overview of the processes controlling the distribution of elements within the earth's lithosphere, hydrosphere, atmosphere, and biosphere. The two lecture hours per week stress how elements' distributions within our planet are dictated by periodicity and affinity for reactions. These lectures are supplemented by a 3-hour problem-solving session used for discussion of quantitative problems assigned as homework. Prior course work in second semester chemistry and second semester physics is required. Typically offered Fall Spring.

EAPS 44400 - Cosmochemistry

Credit Hours: 3.00. Nucleosynthesis and chemical abundances. Origin, composition, and structure of the earth and extraterrestrial objects. Isotope geology, geo- and cosmo-chronology with particular emphasis upon the moon and meteorites. Typically offered Fall Spring.

EAPS 45000 - Physics And Chemistry Of Solid Earth

Credit Hours: 4.00. Physics of the earth's interior, including seismic velocity and density structure, seismic wave propagation, and gravitational and magnetic fields. Thermal history of the earth. Chemical and mineralogical composition of the earth, radioactivity, isotopes, and geochronology. Magma generation, crustal evolution, and tectonic models. Prior course work in chemistry, physics, calculus, earth materials, and plate tectonics is required. Typically offered Fall Spring.

EAPS 45500 - Geophysical Exploration

Credit Hours: 3.00. Introduction to the principles of geophysical exploration methods, including seismic, electrical, gravity, and magnetic techniques. Field studies require reduction and interpretation of data observed by students using professional instrumentation. Prior course work in dynamic earth or physical geology and second semester physics is required. Typically offered Fall.

EAPS 47300 - Invertebrate Paleontology

Credit Hours: 3.00. Introduction of invertebrate paleontology. Survey of basic biologic and geologic principles related to preservation, classification, paleoecology, and biogeography of invertebrates. Emphasis of laboratory is on a survey of the major groups of invertebrate groups encountered in the fossil record. Field project is required. Prior course work in historical geology is required. Typically offered Spring.

EAPS 47400 - Sedimentation And Stratigraphy

Credit Hours: 4.00. Systematic study of continental and marine depositional environments. Interpretation of sedimentary facies, structures, and microfacies. Principles and applications of stratigraphy, including applications of paleontology, field relations, paleomagnetism, well logs, seismic reflections, and chemistry. Field investigations may be required. Prior course work in earth materials, mineralogy and petrology is required. Typically offered Spring.

EAPS 48700 - Cooperative Work Experience V

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

EAPS 49000 - Field Geology In Rocky Mountains

Credit Hours: 6.00. Field studies in sedimentary, igneous, and metamorphic terrains. Studies may involve geologic mapping, stratigraphic section measuring, structural analysis and interpretation, geomorphic interpretation, and interpretation of geologic history. Field excursions include visits to several classical geologic localities in the Colorado Plateau, Great Basin, and Rocky Mountains with discussions and interpretations of features observed. Transportation fee plus room and board at field station

required. Rigorous field work requires physical conditioning. Six-week session, including field excursion. Prior course work in earth materials, surface processes, and plate tectonics is required. Permission of instructor required. Typically offered Summer.

EAPS 49400 - Earth And Atmospheric Sciences Undergraduate Seminar

Credit Hours: 1.00. An informal course, which features discussion of research in major areas of the earth and atmospheric sciences. Students are required to give an oral presentation. Permission of instructor required. Typically offered Fall Spring.

EAPS 49700 - Earth And Atmospheric Sciences Undergraduate Readings And Research

Credit Hours: 1.00 to 6.00. Supervised reading and/or research in various fields. Permission of instructor required. Typically offered Fall Spring Summer.

EAPS 50000 - Seminar On Graduate Study And Scientific Research

Credit Hours: 2.00. Group discussion of graduate study, particularly the nature of scientific research, in Earth and Atmospheric Sciences, based on detailed study of texts written for students of experimental medicine and forestry. Designed for students for whom graduate study is impending here or elsewhere. Typically offered Fall.

EAPS 50500 - Advanced Field Studies

Credit Hours: 3.00. Focuses on a study of a well-defined problem by using field methods. Review of literature on the problem, which is chosen in a given year, is carried out during the first half of the semester. After the field session, the field observations and their interpretation are discussed. A field report is required. Offered in alternate years. Typically offered Fall Spring.

EAPS 50800 - Electron Microprobe Analysis

Credit Hours: 2.00. Electron optics, generation of X-rays, X-ray spectrometry including counting systems. Wavelength dispersive and energy dispersive analysis; collection of X-ray intensity data and data statistics; selection of standards; limitations of microprobe analysis; fluorescence, absorption, and atomic number corrections; reduction of raw analytical data. Preparation of samples and use of microprobe as scanning electron microscope. Typically offered Fall Spring Summer.

EAPS 50900 - Data Analysis Techniques In Earth And Atmospheric Sciences

Credit Hours: 3.00. Application of statistical and numerical analysis techniques to geoscience data including error analysis, confidence intervals, least squares methods, correlation, filtering, spectral analysis, trend surface analysis, cluster analysis, interpolation, and surface fitting. These methods are discussed in terms of problems of sampling and map analysis inherent to geoscience investigations. Application of the computer to solve geoscience problems is emphasized. Typically offered Fall.

EAPS 51100 - Introduction To X-Ray Crystallography

Credit Hours: 3.00. (BIOL 51100) Analysis of two- and three-dimensionally ordered structures by optical, electron, and X-ray diffraction methods. Geometry of diffraction. Detection of diffraction. Intensity of diffracted waves. Symmetry of crystals. The phase problem. The heavy atom method. Isomorphous replacement. Direct methods. Molecular replacement. Helical diffraction. Typically offered Fall.

EAPS 51200 - Methods In X-Ray Crystallography

Credit Hours: 3.00. Advanced treatment of the use and limitations of single crystal and polycrystalline techniques in X-ray crystallography. Includes use of Laue, rotation, oscillation, Weissenberg, and precision X-ray goniometers and cameras as well as powder cameras and diffractometers. The emphasis will be on the use of this equipment for geoscience purposes. Typically offered Fall Spring.

EAPS 51300 - Aerogeology And Remote Sensing

Credit Hours: 3.00. Genesis and development of landforms. Elements of classical and modern landform models in explanation of planar surfaces and form families in temperate, tropical, and arid regions. Fluvial processes and related morphologic and morphometric problems. Landform development processes in eolian, volcanic, karst, glacial, and permafrost terrains. Introduction to field and laboratory techniques of geomorphic research. Applications of geomorphology in soil science, economic geology, engineering construction, urban and environmental problems. Laboratory includes a three-day field investigation. Typically offered Fall.

EAPS 51400 - Glacial And Quaternary Geology

Credit Hours: 3.00. Formation, dynamics, and regimen of glaciers. Erosional and depositional processes and landforms developed by alpine and continental glaciation. Glaciation of North America during the Ice Age, with emphasis on stratigraphy, soils, climates, biology, and physical changes resulting from glacial processes and environments. Application of glacial studies to agronomy, life sciences, climatology, oceanographic studies, and engineering problems. A one-day field investigation is required. Typically offered Spring.

EAPS 51900 - Applications Of Environmental Geosciences

Credit Hours: 3.00. This course provides practical project experience in the real-world applications side of environmental geology. Working as teams, students undertake environmental management and design projects that contribute to the solution of local-scale environmental problems. Projects will include engineering geology, hydrogeology, geophysics, and applied geomorphology. Permission of instructor required. Typically offered Spring.

EAPS 52000 - Theory Of Climate

Credit Hours: 3.00. A general introduction to the theory of climate at an intermediate level. A brief survey of physical climatology and paleoclimates. Theoretical development of climate models. Theories of climatic stability and climatic change. Typically offered Fall Spring.

EAPS 52100 - Atmospheric Chemistry

Credit Hours: 3.00. An introduction to the chemistry of the earth's atmosphere. Covers evolution of the earth's atmosphere, its physical and chemical structure, its natural chemical composition and oxidative properties, and human impacts, including increasing tropospheric ozone, decreasing stratospheric ozone, climate change, and acidic deposition. Typically offered Fall.

EAPS 52200 - Chemistry Of Earth's Upper Atmosphere

Credit Hours: 3.00. (CHM 582) Emphasis on chemical concepts that apply to the Earth's upper atmospheric regions and what may be learned from available measurements. An examination of the chemical composition and chemical processes of importance are covered. Topics include: stratospheric chemistry, chemistry in the mesosphere, chemistry in the thermosphere, the importance of positive and negative ion chemistry in the upper atmosphere, and the dynamics of transport of chemical species between the upper regions of the atmosphere. Typically offered Spring.

EAPS 52300 - Radar Meteorology

Credit Hours: 3.00. Origin and evolution of radar. Modern weather radar systems and their component parts. Propagation of microwave energy in the atmosphere. Rayleigh and Mie scattering theory, with application to scattering by precipitation. Utilization of radar systems in forecasting quantitative analyses and cloud physics research. Recent refinement and future potential. Prior coursework in synoptic meteorology labs and atmospheric physics is required. Typically offered Fall Spring.

EAPS 52500 - Boundary Layer Meteorology

Credit Hours: 3.00. (AGRY 53500) A study of the physical nature of the lowest layers of the atmosphere. The energy balance

concept and the turbulent transfer of heat, momentum, and water vapor are discussed in detail. Some specific microclimates are studied in this context. Typically offered Fall.

EAPS 52600 - Introductory Geofluid Dynamics

Credit Hours: 3.00. Provides a fluid dynamics background for graduate students interested in atmospheric sciences, oceanography, mantle convection, hydrology, turbulence, or pollution. Topics covered include: basic assumptions and deviations of Navier Stokes equations, conservation laws, vorticity, divergence, waves, and applications in atmosphere, ocean, and geophysics. Typically offered Spring Summer.

EAPS 53200 - Atmospheric Physics I

Credit Hours: 3.00. Cloud and precipitation physics and basic atmospheric radiative transfer. Introduction to computer aided problem solving. Typically offered Spring.

EAPS 53300 - Atmospheric Physics II

Credit Hours: 3.00. A continuation of EAPS 53200, covering the following selected advanced topics in atmospheric physics: gaseous absorption, Mie scattering, the equation of transfer, and radiative transfer in cloudy and hazy atmospheres. The application of radiative transfer in active and passive remote sensing. Advanced topics in atmospheric thermodynamics, such as heterogeneous systems, kinetic theory of gases, and planetary atmospheres. Basic ozone photochemistry applied to stratospheric and tropospheric pollution. Typically offered Fall.

EAPS 53400 - Tropical Meteorology

Credit Hours: 3.00. Tropical climatology; stability, convection, clouds, and precipitation processes; horizontal and vertical motions; life cycle and energetics of tropical cyclones; large-scale tropical circulations; interactions between small-scale and large-scale circulations; general circulations of the tropics; results of tropical experiments; outlook for future experiments. Prior course work in synoptic meteorology labs and atmospheric physics is required. Typically offered Fall Spring.

EAPS 53500 - Atmospheric Observations And Measurements

Credit Hours: 3.00. A course that introduces students to direct and remotely sensed observations of the atmosphere. Directly measured quantities discussed include temperature, pressure, moisture, wind, solar radiation, chemical properties of the atmosphere, etc. Remote sensing of cloud, precipitation, and air motion by weather radars, satellites, profilers, lidars, and other emerging technologies is reviewed. Students will gain experience in observation techniques and data interpretation, and will learn uncertainty and error assessment. Prior course work in atmospheric science and statistics is required. Typically offered Fall.

EAPS 53600 - Introduction To General Circulation

Credit Hours: 3.00. Introduction of the fundamental principles that govern the large-scale physical processes and circulation patterns of the global atmosphere. Topics include: the Intertropical Convergence Zone (ITCZ), Rossby waves, heat and moisture balances for the earth-atmosphere system, maintenance of the temperature and wind distributions, jet streams, El Nino, and intraseasonal oscillations. Prior course work in synoptic meteorology labs is required. Typically offered Fall.

EAPS 53800 - Cumulus Dynamics

Credit Hours: 3.00. Thunderstorm and tornado climatology. Stability concepts and convective theories; thunderstorm modeling. Application of potential flow theory to severe storm phenomena; cumulonimbus-environmental interactions. Rotational properties of severe thunderstorms. Tornado funnel observations and vortex theory. Prior course work in synoptic meteorology labs is required. Typically offered Spring.

EAPS 54200 - Economic Geology: Petroleum

Credit Hours: 3.00. Fundamental principles of the origin, migration, accumulation, exploration, and development of petroleum. Study of reservoir fluids, reservoir mechanics, and primary and secondary production techniques. Methods of prospect and leasehold evaluation and economic appraisal. Offered in alternate years. Typically offered Fall Spring.

EAPS 54300 - Advanced Petrology

Credit Hours: 3.00. Application of the methods of chemical thermodynamics to the analysis of the paragenesis of igneous and metamorphic rocks. Topics include the thermodynamics of minerals of common geological interest, characterization of the conditions of formation from the analysis of element partition and reactions between minerals and silicate melts, and mechanisms and rates of crustal and mantle processes inferred from the analysis of chemical gradients, reaction structures, and other records of chemical disequilibrium. Permission of instructor required. Typically offered Fall Spring.

EAPS 54400 - Structure And Composition Of The Earth's Crust

Credit Hours: 3.00. Deals with current knowledge of the geophysical structure of the earth's crust and the interpretation of the geophysical measurements in terms of petrology. Topics covered include: reflection and refraction crustal structure, crustal and upper mantle seismic anisotropy, petrology of oceanic dredge rocks, ophiolites, fault zone reflectivity, exposed continental crustal cross sections, crustal xenoliths, and evolution of the crust. Typically offered Spring.

EAPS 54600 - Sedimentary Petrology

Credit Hours: 3.00. Microfacies and chemistry of clastic, carbonate, and chemical sediments. Interpretation of depositional environments and diagenetic histories of sedimentary rocks from microscope, isotope, chemical, and other methods. Offered in alternate years. Prior course work in sedimentology and stratigraphy is required. Typically offered Spring.

EAPS 54900 - Isotope Geology

Credit Hours: 3.00. Stable and radioactive isotopes and the applications of the variations of isotopic abundances to the study of geologic problems, including geochronology, geothermometry, petrogenesis, and crustal evolution. Typically offered Fall Spring.

EAPS 55000 - Advanced Geophysical Field Studies.

Credit Hours: 1.00 to 3.00. Individual geophysical field investigations including organizing, conducting and reducing, and interpreting data under the guidance of a staff member. Permission of instructor required. Typically offered Fall Spring.

EAPS 55100 - Gravity Exploration

Credit Hours: 3.00. Theory and practice of the gravity method as applied to geological problems and subsurface exploration. Particular emphasis on isolation and enhancement of anomalies and gravity interpretation. Typically offered Fall.

EAPS 55200 - Magnetic Exploration

Credit Hours: 3.00. Principles of magnetic instrumentation and surveying, reduction of magnetic data, interpretation of magnetic anomalies, and application of the magnetic method of geologic problems and subsurface exploration. Typically offered Fall Spring.

EAPS 55300 - Seismic Exploration

Credit Hours: 3.00. Seismic reflection and refraction techniques applied to investigation of shallow earth structure. Propagation of body waves in layered media. Seismic field techniques, principles and application of seismic data processing techniques including correlation, convolution, filtering, deconvolution, and spectral analysis. Geologic interpretation of seismic record sections. Laboratory will include field investigations. Application of computer techniques will be emphasized. Prior course work in physical geology, seismology, and differential equations is required. Typically offered Spring.

EAPS 55400 - Topics In Geotectonics

Credit Hours: 2.00. Discussion of current research or advanced topics concerning the description, origin, and evolution of continents, ocean basins, and orogenic belts based on geochemical, geophysical, and geologic evidence. Specific topics to be selected on basis of student and staff interests and backgrounds. Typically offered Fall Spring.

EAPS 55500 - Global Tectonics

Credit Hours: 3.00. Large-scale motions and deformations of the earth's crust and mantle: present theories and historical development. Continental drift, marine geology, sea-floor spreading, plate kinematics, the driving mechanism of plate tectonics, mantle convection, subduction zones and hotspots, structure and composition of the earth, the evolution of plate tectonics and thermal history of the earth, and the earth in comparison to other planets and satellites. Prior course work in surface processes and plate tectonics is required. Typically offered Fall.

EAPS 55600 - Planetary Geology

Credit Hours: 3.00. The application of petrology and structural geology to other planets. Topics include: theories of star and solar system formation, orbital dynamics and Kepler's laws, petrology and geochemistry of meteorites, age dating techniques, structure and composition of the terrestrial, giant, and icy planets, planetary surfaces, planetary atmospheres, and theories of the formation of the moon. Offered in alternate years. Prior course work in earth materials is required. Typically offered Fall.

EAPS 55700 - Introduction To Seismology

Credit Hours: 3.00. Theory of propagation to seismic waves in elastic media. Solution of wave equations for compressional, shear, and surface waves. Analysis of travel-times, amplitudes, and attenuation of seismic waves in terms of ray and wave theory. Principles of the seismograph. Structure of the earth as determined by seismological studies. Investigation of the causes, effects, distribution, and characteristics of earthquakes. Earthquake prediction. Typically offered Fall.

EAPS 55900 - Topics In Seismology

Credit Hours: 1.00 to 3.00. This course covers current topics in seismology. Recent topics have included seismic structure of the crust and mantle, seismic anisotropy, and earthquake sources. Professor Nowack. Permission of instructor required. Typically offered Fall Spring.

EAPS 56000 - Seismotectonics And Lithospheric Deformation

Credit Hours: 3.00. This course explores plate tectonic processed from the scale of plate motions to the individual stresses that deform rocks. Emphasis is placed on sources of stress and how this stress is manifested in the lithosphere through faulting, folding, earthquake generation, and plate motions. Seismic waves and the information they provide about the interior of the Earth is discussed. Additionally, extensional, compressional, and transform plate boundaries are covered. Students are required to read, present, and discuss recent and important research papers relating to the lecture topics. Typically offered Fall semesters in alternating years.

EAPS 57000 - Paleoclimate Reconstruction

Credit Hours: 3.00. Paleoclimatology, the study of past climate states and climate change, is fundamental to understanding and predicting recent and future changes in Earth's climate. This course will explore how paleoclimatologists reconstruct and understand past climate through the investigation of biological, hydrological, and sedimentalogical archives. The course combines lectures with reading and discussion of the recent literature, and will emphasize informed critical evaluation of paleoclimate data and illustration of multi-disciplinary approaches to significant problems in contemporary paleoclimatology. Although no formal prerequisites are required, introductory-level familiarity with inorganic and organic chemistry, biology and calculus will benefit students in the class. Permission of instructor required. Typically offered Fall Spring.

EAPS 57200 - Paleoecology

Credit Hours: 3.00. Application of the principles of paleoecology to the interpretation of past environments, including an interdisciplinary treatment of pertinent concepts and techniques in paleontology, sedimentation, ecology, oceanography, geochemistry, and allied fields. Permission of instructor required. Typically offered Spring.

EAPS 57300 - Basin Analysis

Credit Hours: 3.00. Advanced study of tectonic evolution and stratigraphic history of sedimentary basins. Topics include formative mechanisms of different sedimentary basins; tectonic, eustatic, and climatic controls on basin stratigraphy; relationship of depositional systems to basin types; subsidence and thermal histories; and application of basin analysis to petroleum reservoir and ground water aquifer assessment. Required field trips. Offered in alternate years. Prior course work in sedimentology and stratigraphy is required. Typically offered Fall.

EAPS 57500 - Ancient Sedimentary Environments

Credit Hours: 3.00. Seminar course in depositional environments as recognized in the stratigraphic record. Each student will assemble a detailed bibliography and prepare and present to the class one or more in-depth reports on assigned topics, such as alluvial fans, fluvial environments, lakes, deserts, deltas, clastic shorelines, shallow-water carbonate environments, deep marine environments, or glacial environments. Students will also gain experience in literature search procedures, preparation of visual aids, oral presentation, and report writing. One weekend field trip may be required. Prior course work in sedimentology and stratigraphy is required. Typically offered Fall.

EAPS 57700 - Geologic Remote Sensing And Spectroscopy

Credit Hours: 3.00. The objectives of this course are: 1) to develop awareness and knowledge of the various types of remote sensing data that are used to study the evolution of the Earth's surface; 2) to understand how these tools work and the range of geologic topics that they are applied to; 3) to develop critical thinking skills essential for interpretation of multidimensional spatial data; 4) to provide a supervised research experience; 5) to strengthen scientific communication skills; and 6) to develop some of the fundamental practical skills (computer-based experience) that are needed to analyze these data. General background in geology, geophysics, and/or planetary science desirable. Typically offered Fall.

EAPS 57800 - Biostratigraphy

Credit Hours: 3.00. Stratigraphic and biologic concepts involved in establishing biostratigraphic and chronostratigraphic zonations. Application of zonal concepts to correlations and geochronology. Includes the role of biostratigraphy in petroleum exploration and production. Prior course work in invertebrate paleontology is required. Typically offered Spring.

EAPS 58000 - Geodynamics I

Credit Hours: 3.00. This course will provide students with a first order understanding of geophysical processes by developing analytical solutions to a variety of geophysical problems. Topics will include stress and strain, rheology, elasticity and flexure, faulting, and conductive heat transfer. We will develop governing analytical equations based on first order principles, such as the conservation of mass, energy, and momentum, and solve these equations for a number of boundary conditions. The development of these solutions will provide students with the background to understand the basis for more complex numerical solutions of geophysics problems. The course will also serve as a review for differential and integral calculus required to develop an analytical understanding of the natural world. Typically offered every other year in Fall or Spring.

EAPS 58100 - Structural And Engineering Geology Of Argillaceous Sediments

Credit Hours: 3.00. Structure, formation, and diagenesis of clay minerals, and engineering properties of argillaceous sediments. Geotechnical methods and plasticity are applied to analysis of natural deposits and geologic phenomena: glacial and lacustrine deposits, quick clays, debris flows, deltaic sediments, mudlumps, submarine slumps and flows, down-to-the-coast normal faults, mud volcanoes, shale diapirs, valley bulges, decollement tectonics. Prior course work in geology for engineers or surface processes, physical geology, and differential equations is required. Typically offered Fall Spring.

EAPS 58300 - Geology Of Landfills

Credit Hours: 3.00. This course consists of the application of the geological sciences to the siting, exploration and site evaluation for solid waste disposal landfills, plus the evaluation of existing landfill facilities as they pertain to soils, bedrock, stratigraphy,

landforms, geologic processes, and hydrogeology. Included are soil and rock exploration, laboratory testing, installation of ground water monitoring devices, and evaluation of contaminant transport. Both attenuation and confinement landfill systems are considered. Geological aspects of solid waste disposal regulations are reviewed and compared to those for hazardous waste disposal. Classroom discussions include evaluation of specific landfill examples and a semester project on a landfill evaluation. A one-day field investigation is required. Typically offered Fall.

EAPS 58400 - Hydrogeology

Credit Hours: 3.00. Investigates the qualitative and quantitative aspects of ground water location, occurrence, movement, evaluation, and development, and the influence of man upon this resource. Geologic and engineering aspects of ground water systems are discussed. Classroom teaching is complemented by problem sets and field trips. Typically offered Fall.

EAPS 58500 - Hydraulic Analysis Of Ground-Water Systems

Credit Hours: 3.00. Investigates the general theory and application of hydraulic testing and analysis of aquifer and aquitard properties for such parameters as porosity, permeability, hydraulic conductivity, transmissivity, storativity, specific yield, dispersivity, and others. Theory of porous media flow is taught with applications to hydraulic testing. Confined, unconfined, semi-confined, transient, and steady-state flows are analyzed. Pump tests, slug tests, tracer tests, and regional analyses of flow nets are stressed. Classroom teaching is complemented with numerous problem sets. Offered in alternate years. Prior course work in hydrogeology and differential equations is required. Typically offered Spring.

EAPS 58600 - Engineering Geology

Credit Hours: 3.00. Emphasis on application of geology to engineering works including dams, tunnels, shoreline protection, slope stability, building foundations, and urban planning. Related case histories of major projects emphasizing methods of investigation and interpretation. Consideration of collection and application of geological data required by designers for major engineering works; analysis of specific problems. Term paper and field investigation required. Prior course work in engineering geology is required. Typically offered Spring.

EAPS 58700 - Chemical Evolution Of Ground Water

Credit Hours: 4.00. Examines the processes by which ground waters acquire their solutes during passage from recharge to discharge zones and the influence of rock types on aquifer chemistry. Topics covered are mineral dissolution, ion exchange, organic complexing, and membrane properties of clays. Prior course work in chemistry and earth materials is required. Typically offered Fall.

EAPS 58800 - Analytical Hydrogeochemistry

Credit Hours: 4.00. A "hands-on" course teaching the proper way to take field samples for chemical, isotopic, and head-gas analyses of ground waters. Sampled waters are then analyzed by a variety of techniques: gravimetry, titrimetry, colorimetry, and atomic absorption spectrometry, and ion chromatography. Prior course work in groundwater chemistry is required. Typically offered Spring.

EAPS 58900 - Numerical Modeling Of Ground Water Systems

Credit Hours: 3.00. Investigates the general theory and application of numerical solutions of partial differential equations of flow through porous media and the simulation of ground water flow by computer methods, using both finite difference and finite element methods with a short introduction to boundary integral equation methods. Both transient and steady-state flow; confined, unconfined, and semi-confined flow are treated. Solute transport simulation methods include random walk, method of characteristics, and other methods. Classroom teaching and "hands on" computer experience is utilized. Offered in alternate years. Prior course work in hydrogeology and differential equations is required. Typically offered Spring.

EAPS 59000 - Field Geology North America

Credit Hours: 2.00. Advanced study of tectonic evolution and stratigraphic history of specific geologic provinces. Particular emphasis on the relationship between tectonics, basin development, and sedimentation. Field component deals with application of field techniques used in basin analysis and structural studies. A 10-day field trip is required. Permission of instructor required. Typically offered Spring.

EAPS 59100 - Advanced Topics In Earth And Atmospheric Sciences

Arrange Hours and Credit. Specialized study offered on an individual basis or through specially arranged courses. Permission of instructor required. Typically offered Fall Spring Summer.

EAPS 60000 - Writing Successful Science Proposals

Credit Hours: 3.00. This course is designed to teach graduate students the skills necessary to successfully garner extramural graduate, postdoctoral, and project funding. Topics will include identification of funding sources and development of research objectives and strategies. Emphasis will be on writing concise fellowships and full NSF-type research proposals. Class meetings will be interactive with an emphasis on peer review. Each student will complete a quality research proposal based upon their own research. Any graduate student with a nascent idea for a science or engineering project is encouraged to enroll. We have found that this course works especially well to help newer MS or PhD graduate students develop a research project, improve communication with their advisor, and organize their research priorities regardless of whether they use this course to submit a proposal. Typically offered Fall Spring.

EAPS 61300 - Advanced Topics In Geomorphology

Credit Hours: 3.00. Special and current topics in geomorphology not available in EAPS 52300. Content will vary dependent on special interests and needs of students enrolled. Examples of potential topics for intensive investigation include: fluvial processes and morphology, regional geomorphic studies, quantitative methods and techniques, karst morphology and hydrology, soils geomorphology, and structural geomorphology. Prerequisite: EAPS 52300. Typically offered Fall Spring.

EAPS 62000 - Aerosols, Clouds And Climate

Credit Hours: 3.00. An exploration of the complex relationships between aerosols, clouds and climate, including the so-called "direct effect" of aerosol on the radiation balance and their numerous influences upon relevant cloud properties called "indirect effects", the impact of different cloud types upon incoming solar radiation and outgoing longwave radiation, the effects of anthropogenic aerosol and climate change on precipitation efficiency, and the representation of aerosol, clouds and cloud processes in climate models. Prerequisites: EAPS 53200 or EAPS 53300 or EAPS 63100. Typically offered in alternating years Fall Spring.

EAPS 63000 - Atmospheric Remote Sensing

Credit Hours: 3.00. Introduction to the quantitative retrieval of meteorological variables from satellite-borne sensors. Satellite orbital mechanics and sensor technology. Review of radiative transfer in the atmosphere. Fredholm integral equations of the first kind and their solution; linear and nonlinear, statistical and physical retrieval algorithms. Applications of satellite remote sensing in atmospheric science. Course grade will be based in part on the computer programming project in which the student develops and implements algorithms for inverting observed or simulated satellite observations. Prior course work in atmospheric physics and C or Fortan programming language is required. Typically offered Fall.

EAPS 63100 - Cloud Physics

Credit Hours: 3.00. Examines current research in cloud physics and related fields. Content will vary, depending on special interests and needs of students enrolled. Examples of potential topics for intensive investigation include: molecular structure and properties of water, kinetics of nucleation, hydrodynamics of hydrometeors, stochastic collection, interactions between cloud dynamical and microphysical processes, numerical cloud models, cloud parameterization in larger-scale models. Prior course work in vector calculus or advanced atmospheric physics and advanced differential equations is required. Typically offered Fall.

EAPS 63200 - Advanced Topics In General Circulation

Credit Hours: 3.00. Topics include: conservation principles, the angular momentum and heat budgets of the earth-atmosphere system, heat and energy transports, atmospheric energy budget, results from global experiments, general circulation models, and laboratory modeling of the general circulation. Prior coursework in general circulation is required. Typically offered Fall Spring.

EAPS 63300 - Synoptic Scale Dynamics

Credit Hours: 4.00. A review of the climatology of synoptic scale systems. An in-depth study of their kinematic properties, including horizontal wind, vorticity, divergence, and vertical motion fields. An analysis of processes influencing the growth and decay of synoptic systems with emphasis on the energetics of open atmospheric systems. Prior coursework in synoptic labs and advanced differential equations is required. Typically offered Fall Spring.

EAPS 63400 - Numerical Modeling Of Atmospheric Systems

Credit Hours: 3.00. Introduction to numerical schemes for differential and integral equations. Von Neuman's analysis of linear stability. Nonlinear stability. Numerical methods for solving geofluid dynamics equations. Simulation of microscale, mesoscale and large-scale weather systems. Prior course work in synoptic labs and vector calculus is required. Typically offered Spring.

EAPS 63600 - Mesoscale Meteorology

Credit Hours: 3.00. Review of the theories applied in mesoscale meteorology, including semi-geostrophic systems and frontogenesis, symmetric instability, rainbands and inertia-gravity waves, sea-breeze, terrain effects, mountain waves, lee-vortices and cyclogenesis, convection, convective instability, low-level jets, drylines, and squall lines. Prior course work in synoptic labs and vector calculus is required. Typically offered Fall Spring.

EAPS 63700 - Geofluid Dynamics In Rotating Systems

Credit Hours: 3.00. A theoretical analysis of large-scale motions in the atmosphere and oceans, including shallow water theory, waves, potential vorticity, barotropic and baroclinic instability, frontogenesis and nonlinear instability. Prior course work in synoptic labs and vector calculus is required. Typically offered Fall Spring.

EAPS 63800 - Atmospheric Radiation

Credit Hours: 3.00. Concepts of solid angle, intensity, flux density, and attenuation coefficients. Kirchoff's law, Planck's law and consequences. The radiative transfer equation and its formal solution. Infrared radiative transfer of energy, absorption processes, and departures from thermodynamic equilibrium. Atmospheric optics and visibility, radiative effects of pollutants. Prior course work in synoptic labs, vector calculus, and advanced differential equations is required. Typically offered Spring.

EAPS 63900 - Atmospheric Fluid Dynamics

Credit Hours: 3.00. Review of basic concepts; complete fundamental hydrodynamic equations; principles of irrotational flow; rotating fluid motion; hydrodynamic instability, perturbation dynamics, Boussinesq assumptions, Rayleigh instability theorem; thermal convection, linear and nonlinear theories, Benard cells, atmospheric convection, satellite observations. Prior course work in synoptic labs, vector calculus, and advanced differential equations is required. Typically offered Fall.

EAPS 64000 - Petrography Of Aggregates

Credit Hours: 3.00. Following an introduction of the application of optical mineralogy to aggregates, aggregate materials are identified optically and their performance evaluated with respect to those fundamental properties which may be observed petrographically. Laboratory will include a one-day field investigation. Prior course work in earth materials is required. Typically offered Spring.

EAPS 65000 - Advanced Topics In Geophysics

Credit Hours: 3.00. Specialized topics in geophysics such as heat flow, rock magnetism, and marine geophysics; varied depending on interest. Permission of instructor required. Typically offered Fall Spring.

EAPS 65200 - Folding Of Rocks

Credit Hours: 3.00. Theory and application of finite strain to the study of folded rocks, with numerous illustrations from literature. Presentation of modern theories of folding and density instability of single- and multi-layered rocks, with special emphasis on basic folding mechanisms. Treatment of linear viscous and power-law fluids. Second- and third-order analysis of causes of basic fold forms, such as concentric, chevron and kink folds, and mullion structure. Causes of drag folds and reverse drag folds. Offered in alternate years. Typically offered Fall.

EAPS 65300 - Fracturing Of Rocks

Credit Hours: 3.00. Description and analysis of joints and faults from the point of view of field geology and fracture mechanics. Three basic modes of fracture and their analogs in the Earth's crust. Also examined are structures, such as folds, pressure solution surfaces, basins, and mountain ranges associated with faults. Offered in alternate years. Prerequisite: differential equations. Typically offered Spring.

EAPS 65700 - Geophysical Inverse Theory

Credit Hours: 3.00. Investigates problems of determining physical parameters of the earth from remote observations of wave and potential fields. The theoretical topics include spectral and singular value decompositions, maximum likelihood and stochastic

inversion, Backus and Gilbert theory, Green's function and linear operators, and the physics of layered media. Geophysical applications include seismic tomography, deconvolution, gravity and magnetics, earthquake sources, geodetics, and remote sensing. Offered in alternate years. Prior course work in advanced differential equations, physics, and chemistry of the earth is required. Typically offered Spring.

EAPS 65800 - Quantitative Seismology

Credit Hours: 3.00. Advanced methods for theoretical seismology; elastodynamic theorems; seismic source theory for earthquakes and explosions; scattering of plane waves and spherical waves; physics of layered and radially varying media; seismic attenuation; asymptotic ray methods and finite difference methods for the calculation of seismic waves in laterally varying media. Offered in alternate years. Prior course work in advanced differential equations, physics, and chemistry of the earth is required. Typically offered Spring.

EAPS 68000 - Contaminant Hydrogeology

Credit Hours: 3.00. Covers the basic theory and applications of problem-solving exercises in hydrogeology, fluid mechanics, and chemistry of contaminated sites; flow and transport equations and models; investigational methods; remediation methods; case studies; and pertinent environmental laws. Prior course work in chemistry, computer programming, differential equations, and hydrogeology is required. Typically offered Spring.

EAPS 69000 - Seminar In Atmospheric Science

Credit Hours: 1.00. (AGRY 69000) Presentations and discussions by staff and graduate students on subjects of contemporary interest in atmospheric science. Typically offered Spring.

EAPS 69100 - Seminar In Earth Science

Credit Hours: 1.00. Presentations and discussions by staff and graduate students on subjects of contemporary interest in the geologic sciences. Typically offered Fall Spring.

EAPS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

EAPS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Economics

ECON 10000 - Economics Lectures

Credit Hours: 1.00. An orientation to the undergraduate program in economics, to the library and computing facilities used by economics undergraduates, and to the advising and placement services available. Typically offered Spring.

ECON 21000 - Principles Of Economics

Credit Hours: 3.00. Economics is the study of decision making under conditions of scarcity. This course looks at the behavior of the individual consumer and firm and their interaction with the government. The second half of the course studies the macroeconomy and focuses on the causes of inflation, unemployment, and interest rate changes. The international economy also will be studied. No credit for management students. Typically offered Fall Spring Summer. CTL:ISH 1040 Introduction To Economics

ECON 21100 - Contemporary Economic Problems

Credit Hours: 3.00. The course assists students in analyzing current economic issues such as inflation, and unemployment, the energy crisis, environmental protection, poverty, and income distribution, urban blight, health care, and education. All students are required to give presentations and prepare papers on one of these topics. Typically offered Spring.

ECON 21700 - Economics

Credit Hours: 3.00. National economic problems such as unemployment, recessions, inflation, taxation, bank interest rates, the growth of government, monetary systems, and a rising national debt are discussed along with the principles, policies and institutions for solving these macroeconomic problems. Typically offered Spring.

ECON 21900 - Economics For Future Elementary Teachers

Credit Hours: 3.00. A principles of economics course designed for future elementary and social studies teachers. The purpose of this course is to: 1) introduce the future teacher to basic economic concepts required by the Indiana Academic Standards for

Social Studies, K-6, 2) learn methods for teaching these concepts in the K-6 curriculum, and 3) develop a catalog of curriculum materials appropriate for teaching economics in grades K-6. No credit for management students. Typically offered Fall Spring.

ECON 21910 - Economics For Future Secondary Teachers

Credit Hours: 3.00. Upon completion of this course students will be able to analyze economic events in order to make more intelligent choices as consumers, workers, and voting citizens; identify and understand the basic concepts and principles of economics in order to meet standards at the secondary school level; identify supplemental materials and programs from variety of sources used in your teaching major, minor or as supplements in your classrooms; and review and organize lessons that teach economic concepts. No credit for management students. The course content is principles-level economics and is designed for social studies education students who are beginning their sequence of required economics courses. The course is designed to be taken before upper-division economic content courses. Typically offered Fall Spring.

ECON 25100 - Microeconomics

Credit Hours: 3.00. Microeconomics studies the choices individuals make and the incentives that influence those choices. Emphasis is on the incentives that determine market prices and resource allocation. The role of public policy in influencing incentives and efficiency is also addressed. Typically offered Fall Spring Summer. CTL:ISH 1042 Microeconomics

ECON 25200 - Macroeconomics

Credit Hours: 3.00. Introduction to macroeconomic theory. The course develops a theoretical framework permitting an analysis of the forces affecting national income, employment, interest rates, and the rate of inflation. Emphasis is placed upon the role of government fiscal and monetary policy in promoting economic growth and stable prices. Typically offered Fall Spring Summer. CTL:ISH 1041 Macroeconomics

ECON 28000 - Mathematics For Economists

Credit Hours: 3.00. The course is designed to provide familiarity with some of the basic mathematical tools used extensively in economics. Topics to be covered include constrained optimization and comparative statistics along with economic applications. Typically offered Spring.

ECON 29000 - Sophomore Level Problems In Economics

Credit Hours: 1.00 to 4.00. Arrange with instructor before enrolling. Investigation in a specific economics field. Typically offered Summer Fall Spring.

ECON 34000 - Intermediate Microeconomic Theory

Credit Hours: 3.00. Topics from consumer behavior and demand, decisions under uncertainty, production and cost, factor demand, market structure, general equilibrium and welfare. Emphasis on the tools used to analyze the behavior of individual economic units. Typically offered Fall Spring.

ECON 35200 - Intermediate Macroeconomics

Credit Hours: 3.00. Continuation of ECON 25200. A more rigorous, general equilibrium treatment of macroeconomic theory with emphasis on the components of the model: determinants of consumption, investment, net exports and foreign exchange rates, the level of unemployment, inflation and the long-run rate of economic growth. Typically offered Fall Spring.

ECON 35500 - Comparative Analysis Of Economic Systems

Credit Hours: 3.00. This course describes the general economic problem and how it is solved by alternative forms of economic organization. Market, centrally planned, social democratic, and mercantilist systems are contrasted in terms of their assignment of property rights, their mechanisms for transmitting information, their incentive structure, and the degree to which they meet efficiency and equity criteria. Worldwide contemporary trends are analyzed. Typically offered Spring.

ECON 36000 - Econometrics

Credit Hours: 3.00. This course examines the statistical techniques used to analyze economic data, estimate casual effects, make predictions, and test economic theory. Students learn empirical skills used in analytical consulting, financial modeling, economic research, and by analysts in the private and public sectors. Emphasis is placed on estimating a single equation (e.g., demand function) and the problems associated with such estimation. As part of the course, students will estimate equations using statistical software available in the Krannert computer labs. Typically offered Fall Spring.

ECON 36100 - Antitrust And Regulation

Credit Hours: 3.00. The course studies the influence of laws and regulations on the behavior of firms, focusing on two types of government intervention in the market: antitrust law and economic regulation. Antitrust laws define the rules by which firms must compete. Economic regulation more tightly constrains the actions of firms, requiring that they obtain approval to set prices and/or enter new markets. The focus is on current topics in both areas, including comparison of U.S. practice with that of European Union and elsewhere. Typically offered Spring.

ECON 36500 - History Of Economic Thought

Credit Hours: 3.00. The course traces the development of theories of value and economic growth from the seventeenth century to Karl Marx. Among the authors studied are the mercantilists, Hume, Smith, Ricardo, and Marx. Excerpts from the original works are read and evaluated in light of modern theory. Typically offered Spring.

ECON 36800 - Economics And Values

Credit Hours: 3.00. Explores some specific critiques of stereotypical neoclassical economics; utilizes notions of knowledge, learning, rationality, logic, science, and scholarship that tend to complement those found in many conventional economics courses; raises questions about the roles of values in both individual decision-making and in economic thinking, as well as about the interrelation of economic concepts and issues of ethics, justice, and care at both the individual and the social level; embodies interactive, reflective learning. Typically offered Spring.

ECON 37000 - International Trade

Credit Hours: 3.00. Develops an understanding of the economics of globalization, including the movement of goods, people, capital, and ideas across countries. Using the tools of intermediate economic theory, we discuss the benefits and costs of globalization, the implications of globalization for wages, earnings, and national welfare, and their intersection with government policies. Typically offered Fall Spring.

ECON 37100 - International Monetary Problems

Credit Hours: 3.00. A mixture of lectures and case discussions covering historical changes in the world's monetary system, problems with balance of payments adjustments, exchange rates and foreign exchange markets, international capital markets and financial flows, the international transmission of business fluctuations, monetary and fiscal policy in an interdependent world, and crises in developing countries. Typically offered Spring.

ECON 37500 - United States Economic History

Credit Hours: 3.00. Application of economic analysis to illuminate such historical questions as the economic effects of British colonial administration, the rise of banking institutions, the financing of the railroads, the economics of slavery, the rise of big business, and the sources of government regulation of business. Typically offered Spring.

ECON 38000 - Money And Banking

Credit Hours: 3.00. The course analyzes the economics of money, monetary systems, investments, and financial intermediaries in modern industrial economies. Topics considered include the origin of money and the banking industry, financial asset markets, the role of central banks, and the effects of various monetary policies. The theory will be presented side by side with current economic and financial news, and the students will learn how to track financial and economic data via The Wall Street Journal. Typically offered Fall Spring.

ECON 38500 - Labor Economics

Credit Hours: 3.00. The purpose of this course is to introduce important topics, theories, institutions, and policy issues relating to the functioning of labor markets. Topics to be considered include labor supply decisions, investments in human capital, compensating wage differentials, labor contract theory, unions, compensation programs, signaling in labor markets, the economics of unemployment, and government employment, retirement, and workplace safety. Typically offered Fall Spring.

ECON 39000 - Junior Level Problems In Economics

Credit Hours: 1.00 to 4.00. Investigation into a specific topic area of economics. Permission of instructor required. Typically offered Fall Spring Summer.

ECON 41500 - Contemporary Economic Problems And Policies

Credit Hours: 3.00. An application of the principles of economics developed in ECON 25100 and ECON 25200 to contemporary controversies in public policy. Half of the semester is devoted to microeconomics issues and half to controversies in macroeconomics policy. Typically offered Spring.

ECON 41900 - Managerial Economics

Credit Hours: 3.00. The application of economic analysis and common nonmathematical models to managerial decisions. Topics include decisions involving time and uncertainty in both competitive and noncompetitive markets. Pricing decisions are emphasized. Permission of Department required.Typically offered Fall Spring.

ECON 42200 - Public Finance And Taxation

Credit Hours: 3.00. This course examines the role of government in market economies. The aim of the course is to provide an understanding of the reasons for government intervention in the economy and how individuals and firms respond to taxation and other government actions and how to evaluate the benefits of public programs. For example, what effects do taxes have on

incentives to work, save, and invest? Emphasis is placed on current U.S. policy issues including Social Security, health care, education, environmental regulation, welfare programs, and tax reform. Typically offered Spring.

ECON 45100 - Game Theory

Credit Hours: 3.00. In the course, economic, political, and social interactions are represented as games, in which strategies and resulting outcomes can be analyzed. The analysis of these interactions is then used to demonstrate how one can make optimal decisions under uncertainty. Typically offered Fall Spring.

ECON 45600 - Urban Economics

Credit Hours: 3.00. Examines the market forces that lead to the development, growth, and size of cities. In addition, this course covers the theory of location and land use, principles of local public finance, policy problems in the areas of urban housing, transportation, crime, and pollution. Typically offered Spring.

ECON 46000 - Econometrics

Credit Hours: 3.00. This course examines the statistical techniques used in testing economic theory. Emphasis is placed on estimating a single equation (e.g., a demand function) and the problems associated with such estimation. As part of the course, students will estimate equations on the University's computational facility. Typically offered Spring.

ECON 46100 - Industrial Organization

Credit Hours: 3.00. This course examines the determinants of firm and market structure and the resulting market performance in imperfectly-competitive markets. Advanced topics include advertising, research and development, imperfectly competitive international markets, and market integration. Emphasis is placed on using theoretical models of firm and industry behavior to explain and analyze real-world examples of firm behavior. Typically offered Fall.

ECON 46600 - International Economics

Credit Hours: 3.00. Analyzes topics in international economics, using more advantage techniques and more detailed treatment than in ECON 37000 or ECON 37100. While coverage varies somewhat with instructor, some topics could include: economic growth, innovation and technology transfer, and the role of multinational corporations. Typically offered Fall Spring.

ECON 47000 - Transportation Economics

Credit Hours: 3.00. Building upon basic economic principles, this course introduces the student to mainstream areas in transportation economics including market demand and supply, market structure, transportation investment, marginal cost pricing, cost-benefit analysis, land use and transportation, transportation safety, and government intervention. Blending theory with application, the course takes a case study approach in drawing upon a wealth of empirical work on highways, railroads, motor carriers, airlines, and water carriage. Typically offered Spring.

ECON 47100 - Behavioral Economics

Credit Hours: 3.00. Students learn about human behavior in economic environments, with a strong emphasis on classroom laboratory exercises. Topics considered include behavior in a variety of markets - for example, markets with price controls, markets for financial assets and auction markets -- and behavior in social dilemmas that arise when people try to provide public goods voluntarily or when sellers try to conspire to fix prices. Students will also learn how people bargain with, trust each other, and show social preferences towards others. Decision-making and anomalies for risky and uncertain choices will also be covered. Typically offered Fall Spring.

ECON 49000 - Problems In Economics

Credit Hours: 1.00 to 4.00. Arrange with instructor before enrolling. Supervised reading and reports in various subjects. Open only to a limited number of seniors with superior records in previous courses. Permission of instructor required. Typically offered Fall Spring Summer.

ECON 49900 - Senior Honors Thesis

Credit Hours: 3.00. Execution by economics honors students of a senior honors thesis under the direction and supervision of the faculty. In addition to a paper, completion of the research project may involve the presentation of the findings in a seminar or workshop setting. Permission of Department required. Typically offered Spring.

ECON 51000 - Game Theory

Credit Hours: 2.00. Game theory is a powerful tool that facilitates a decision making process of individuals. Games are characterized usually by two or more players where any player's action has an impact on other players' payoff. Players are decision making units, e.g. individuals, firms, workers, managers, countries etc. Game theory analyzes situations in which people (or other animals) interact by breaking these situations down into basic descriptions of the set of players, the strategies available to these players, and the payoffs that the players receive for different combinations of strategy choices. Permission of department required. Typically offered Spring.

ECON 51100 - Intermediate Economics I

Credit Hours: 3.00. Consumer behavior and demand, production and cost, factor demand, market structure, general equilibrium and welfare. Emphasis on the tools used to analyze the behavior of individual economic units. Not open to students with credit in ECON 34000. Typically offered Fall Summer.

ECON 51200 - Intermediate Economics II

Credit Hours: 3.00. Course content includes money and banking, national income and aggregative economics; the analysis of the determination of national income, employment, the price level, and the balance of payments. Consideration of both theory and economic policy. Not open to students with credit in ECON 35200. Typically offered Spring.

ECON 51300 - Economic Theory

Credit Hours: 3.00 or 4.00 (West Lafayette, Calumet) 3.00 (North Central) Theoretical analysis of a market economy with an emphasis on decision processes of managers. Consideration is given to micro aspects of price determination, utilization of resources and market organization, and to aggregative concepts of national income and employment. Typically offered Spring Fall.

ECON 51400 - Microeconomics

Credit Hours: 2.00. An introduction to microeconomic theory. Analysis of consumer demand, output and input decisions of firms, price determination, economic efficiency, market structures, and market failure. Typically offered Fall Spring.

ECON 51500 - Macroeconomics

Credit Hours: 2.00 or 3.00. Investigation of the causes of macroeconomic fluctuations in the economy. Looks at changes in inflation, unemployment, real output, interest rates, and exchange rates, and explores why they occur, what their effects are, and what, if any, role government should play in dealing with these problems. A mixture of theory and case studies with reference to historical case studies. Current macroeconomic problems will be discussed with a focus on the international aspects of macroeconomic problems. Typically offered Fall Spring.

ECON 51900 - Economics For Pre-College Educators

Credit Hours: 1.00 to 3.00. Economics and economic education materials and instructional strategies for pre-college teachers in all grade levels and subject areas. Most sections, or workshops, survey both microeconomics and macroeconomics concepts and current public policy issues. Some workshops, however, deal with special themes or contemporary economics problems, and vary each time they are offered, e.g., international economics, economics in literature and children's literature or energy and

environmental economics. Participants are usually expected to develop a package of classroom activities and supplements. Typically offered in the Summer, but occasionally in the Fall and Spring semesters.

ECON 52000 - Industrial Economics

Credit Hours: 2.00. This course will explore the division of economic activity among industries in developed and less-developed countries. It will examine patterns of private and public ownership in different countries. It will discuss the determinants of market and firm structure, firm conduct, and market performance in imperfectly competitive markets, and different approaches to regulating such markets. Emphasis is placed on using basic economic models of firm and industry behavior to explain and analyze real-world markets. Permission of department required. Typically offered Fall.

ECON 53400 - International Trade Theory

Credit Hours: 2.00 or 3.00. Problems of the international economy addressed in the light of economic theory. Emphasis is on real, as opposed to monetary, topics. Topics may include trade barriers, multinational corporations, technology transfer, the European economic community, economic constraints on the sovereignty of nation-states. Typically offered Fall.

ECON 55000 - Personnel Economics

Credit Hours: 2.00. Personnel Economics applies micro- and macroeconomic theory to the workings of the labor market while maintaining a focus on incentives in the workplace. The course will investigate the determination of wages and compensation (based on a study of labor demand and supply) and the differences in these forms of payment for labor services across workers within an occupation, across occupations, and across cultures. Other topics to be considered include the connection between investments in education and training and labor market outcomes and estimates of the costs and benefits of immigration and employee turnover and discuss the impact of unions, as well as discrimination in the labor market issues. Permission of department required. Typically offered Spring.

ECON 56200 - Econometrics I

Credit Hours: 3.00. This masters-level course in econometrics covers the tools that will enable students to conduct empirical analysis using economics data. The course examines the statistical techniques used in testing economic theories, estimating casual effects, and making predictions. Emphasis is placed on estimating a single equation (e.g., a demand function) and the problems associated with such estimation. As part of the course, students will estimate equations using STATA, a statistical software package. Permission of department required. Typically offered Fall.

ECON 56500 - Law And Economics

Credit Hours: 2.00. This course is designed to give the student an understanding of both legal and economic principles and the relationship between them. It will also show the student how to access various data bases, Lexis/Nexis, to get a formal statement of the law and how the laws have actually been interpreted and enforced. Finally, through the use of economic analysis, the student will acquire the tools to predict the likely outcomes of particular laws and how they will affect their family and business decisions. Permission of department required. Typically offered Fall.

ECON 57000 - International Economics

Credit Hours: 2.00-3.00. Study of the economic characteristics of the contemporary transportation market with emphasis on the impact of governmental policies on resource allocation within the sector. Permission of instructor required. Typically offered Fall Spring Summer.

ECON 57200 - Econometrics II

Credit Hours: 2.00. This course is primarily related to the specification of, and estimation, prediction, testing and inference in, the linear regression model under ideal and generalized conditions. Other topics covered include: a discussion of typical mean-independence violations and instrumental variables estimation. This course builds on 57100 in its extensive use of linear algebra and mathematical statistics to illustrate these concepts. Throughout the course, we will apply techniques discussed in the classroom using MATLAB. The programming side of the course should not be excessively demanding, and instructional tutorials for basic MATLAB operations will be posted online. Permission of department required. Typically offered Fall Spring Summer.

ECON 57300 - Financial Econometrics

Credit Hours: 2.00. This course offers an introduction of basic principles of econometric analysis that will help students understand finance theories and their empirical applications. It will also equip students with appropriate statistical techniques for doing applied financial research. The statistical techniques are particularly well suited for analyzing financial time-series data. Permission of department required. Typically offered Spring

ECON 57400 - Microeconometrics

Credit Hours: 2.00. This is a graduate-level course in microeconometrics. This course is primarily related to the specification and estimation of various models commonly encountered in microeconomic applications. The course will first briefly cover the theory of maximum likelihood estimation (MLE), and apply MLE in some introductory settings. These methods will then be applied to various latent-variable economic models including binary choice models (the logit, probit, and other alternatives), censored regression models (e.g., the tobit) and models for count data. Permission of department required. Typically offered Fall.

ECON 58500 - Behavioral Economics

Credit Hours: 2.00 or 3.00. This course explores human economic behavior, with a strong emphasis on laboratory and field experiment methodology used in behavioral economics research. Topics considered include behavior in markets for financial assets and auction markets, and behavior in social dilemmas that arise when people try to provide public goods voluntarily or increase economic surplus through trust. Students will also study how people bargain with and exhibit social preferences towards others. Decision-making and anomalies for risky uncertain choices will also be covered. Typically offered Fall Spring Summer.

ECON 59000 - Problems In Economics

Credit Hours: 1.00 to 4.00. Open only to a limited number of seniors and graduate students. Arrange with instructor before enrolling. Supervised reading and reports in various subjects. Permission of instructor required. Typically offered Fall Spring Summer.

ECON 60000 - Teaching Economics

Credit Hours: 1.00 to 3.00. This course traces the development of economic theory from the Mercantilist writers through the contributions of J. S. Mill and Karl Marx. Topics covered include the development of value theory (especially labor theories of value), theories of economic growth and business cycles, the classical debate over the meaning and validity of Say's Law, and changing views regarding the appropriate role of government in the marketplace. In each case, the contributions of the authors considered are evaluated in light of our modern understanding of economic theory. Typically offered Spring.

ECON 60600 - Microeconomics I

Credit Hours: 1.00 to 3.00. An introduction to basic consumer and producer theory, competitive markets (including using the continuum to model competition), basic general equilibrium theory, and basic risk/uncertainty. Co-requisite: ECON 61500. Typically offered Fall.

ECON 60700 - Microeconomics II

Credit Hours: 1.00 to 3.00. Building on Microeconomics I, more advanced consumer and producer theory using support functions, risk/uncertainty and information, and basic game theory and oligopoly. Prerequisite: ECON 60600. Typically offered Fall.

ECON 60800 - Macroeconomic Theory I

Credit Hours: 2.00 or 3.00. An introduction to general equilibrium macroeconomic models in both deterministic and stochastic

settings. Topics studied include: static neoclassical models, social planner problems, dynamic programming, growth and capital accumulation, stochastic economies, asset pricing, and overlapping generations models. Typically offered Fall.

ECON 60900 - Microeconomics III

Credit Hours: 1.00 to 3.00. An advanced course in game theory and general equilibrium theory. Among the topics covered are: games in strategic form, games in extensive form, games of incomplete information, cooperative games with side payments, mechanism design, consumer choice theory, Pareto optimality, the Arrow-Debreu-McKenzie model, and the existence and stability of competitive equilibria. Prerequisite: ECON 60600. Typically offered Spring.

ECON 61000 - Advanced Game Theory

Credit Hours: 1.00 to 3.00. An advanced course in game theory and its applications. Among the topics covered are: extensive form games, normal form games, Nash equilibrium, mixed strategies equilibrium, subgame perfect equilibrium, learning and equilibrium, games with incomplete information, repeated games, cooperative games, noncooperative bargaining, and auctions. Prerequisite: ECON 60600. Typically offered Fall Spring.

ECON 61100 - Macroeconomic Theory II

Credit Hours: 2.00 or 3.00. An introduction to selected topics in macroeconomics, including theories of business cycles, economic growth, microfoundations of labor markets and some miscellaneous issues. Topics covered include: theories of business cycles (real business cycles, information imperfections, coordination failures), economics of growth (neoclassical model, human capital model, endogenous growth), microfoundations of labor markets (recursive competitive equilibrium models, search and matching models, efficiency wages, implicit contracts, insider-outsider model), miscellaneous issues including monetary economics (cash-in-advance constraint models), the Lucas critique, time inconsistency, and endogenous cycles. Prerequisite: ECON 60800. Typically offered Spring.

ECON 61200 - Macroeconomic Theory III

Credit Hours: 1.00 to 3.00. Selected topics in contemporary research in macroeconomic theory. Emphasis on the implications of uncertainty in macroeconomic theory, including such topics as search theory, asset selection under uncertainty, stochastic optimal control, and asymmetric information. Typically offered Fall Summer.

ECON 61300 - Topics In Microeconomics

Credit Hours: 3.00. Economic theory workshop, with presentations given by departmental and external speakers. Typically offered Fall Spring.

ECON 61400 - Economics Of Information

Credit Hours: 1.00 to 3.00. An introduction to the economics of information. Key topics considered are nonexpected utility theory and the various implications of asymmetric information-either hidden action(s) and/or hidden types, including extensions of the basic principal-agent model as well adverse selection issues, mechanism design, and screening/signaling models. Other topics that may be considered include the value of information/real option theory, herd behavior, capital asset pricing models, stochastic calculus and options pricing models, organizational decision making, search theory and price dispersion models, and herd behavior. Prerequisite: ECON 60600. Typically offered Fall Spring.

ECON 61500 - Mathematical Analysis For Economists

Credit Hours: 2.00 or 3.00. Topics include constrained optimization, comparative statics, and elementary topics in mathematical analysis. Students should be familiar with calculus, linear algebra, basic probability, and have a grasp of microeconomic theory (such as the material covered in ECON 51100). Typically offered Fall.

ECON 61800 - Advanced Topics In Economics

Credit Hours: 3.00. Macro/international theory workshop. Topics on macroeconomics and international economics are presented by departmental and external speakers. Typically offered Fall Spring.

ECON 62000 - Industrial Organization

Credit Hours: 1.00 to 3.00. A survey of some of the major theoretical issues in the field of industrial organization. Topics include: the welfare economics of competition and monopoly, static and dynamic oligopoly theory, differentiated products models, and entry deterrence. Typically offered Fall Spring.

ECON 62100 - Applied Industrial Organization

Credit Hours: 1.00 to 3.00. A continuation of ECON 62000, with emphasis on empirical analysis and the application of theory to real-world situations. Topics covered include: empirical estimation of market structure, empirical tests of market conduct, the effect of anti-competitive behavior on economic performance, antitrust practice, regulation theory and practice, and experimental industrial economics. The material is selected from current journal articles. Prerequisite: ECON 62000. Typically offered Fall Spring.

ECON 63000 - Advanced Monetary Theory

Credit Hours: 1.00 to 3.00. Covers current literature on decentralized monetary economies. Topics are selected from recent research publications that include: studies related to endogenous determination of pattern of exchange, valuation of assets and currencies, price determination and dispersion, and international finance. The material is selected from current journal articles. Prerequisite: ECON 53000. Typically offered Fall Spring.

ECON 63100 - Industrial Organization

Credit Hours: 1.00 to 3.00. A study of asset selection within the expected utility approach, with some attention given to the nonexpected utility decision models. Topics covered include axioms for measurable utility, monetary models under uncertainty, models of capital budgets, and security-selection models. Prerequisite: Master's student standing or higher. Typically offered Fall Spring.

ECON 63200 - Labor Economics

Credit Hours: 1.00 to 3.00. An area seminar. Theoretical and empirical research on the financial markets. Prerequisite: ECON 63000. Typically offered Fall Spring.

ECON 63400 - International Trade

Credit Hours: 1.00 to 3.00. Application of microeconomic techniques to international trade. Topics include: classical, neoclassical, and modern theories of international trade; the theory of tariffs and commercial policy, (including aspects of political economy), welfare aspects of trade and tariff theory, and related topics. The material is selected from current journal articles. Prerequisite: ECON 60700. Typically offered Fall Spring.

ECON 63500 - Monetary International Economics

Credit Hours: 1.00 to 3.00. A research seminar on international monetary issues. Topics include: theories of balance of payments and exchange-rate determination, international asset markets and capital flows, breakdowns of pegged exchange-rate regimes, currency substitution, monetary integration, international impacts of alternative monetary, and fiscal and intervention policies. Assignments are based on selected articles. Prerequisite: ECON 60800. Typically offered Fall Spring.

ECON 63600 - Topics And Research In International Trade

Credit Hours: 1.00 to 3.00. A course in international trade theory and empirics, with emphasis on surveying the recent developments in the field-including empirical applications of material covered in ECON 63400. While specific subject matter may vary from year to year, likely topics include: theory and empirics on trade and wages, trade and the environment, trade in the

presence of multinational firms and vertical specialization, empirical evaluation of the positive theories of trade (especially factor endowment and variety models), and the identification and measurement of trade barriers and their effects. Material is selected from current journal articles. Prerequisite: ECON 60700. Typically offered Fall Spring.

ECON 64000 - Economic And Social Policy

Credit Hours: 2.00 or 3.00. The role of government in the American economy. Policies relating to the environment, energy, transportation, labor markets, the distribution of income, macrostability, and international trade are analyzed. Prerequisite: ECON 51300, Master's student standing or higher and Management majors only. Typically offered Fall Spring Summer.

ECON 65000 - Labor Economics

Credit Hours: 1.00 to 3.00. Topics in labor economics. While the specific subject matter varies from year to year, recent seminars have examined such topics as dynamic labor demand and supply analysis, human capital theory, screening and signaling theories, contract theory, efficiency wages, job matching, search, unions, and internal labor markets. Material is selected from current journal articles. Typically offered Fall Spring.

ECON 65200 - Economics Of Labor Markets

Credit Hours: 2.00 or 3.00. Study of labor force concepts and measurements, the macroeconomic behavior of employment and earnings, and the functioning of labor markets. Emphasis is placed on empirical findings and research methods. Typically offered Fall.

ECON 66800 - Topics In Applied Economics

Credit Hours: 3.00. Applied micro workshop. Topics on applied macroeconomics are presented by departmental and external speakers. Typically offered Fall Spring.

ECON 67000 - Probability And Statistics

Credit Hours: 2.00 or 3.00. An introduction to probability theory and the basic statistical estimation methods. Topics include: axiomatic development of probability theory, counting methods, conditional probability and Bayes' theorem, random variables and distributions, expectation, variance, covariance and correlation, special distributions, statistical inference, maximum likelihood estimators, unbiased estimation, and testing hypotheses. Prerequisite: ECON 61500. Typically offered Fall.

ECON 67100 - Econometrics I

Credit Hours: 1.00 to 3.00. An introduction to the modern techniques of econometrics and their applications. Topics include: the classical linear regression model (specification, estimation, inference, and prediction), specification analysis, functional form, heteroscedasticity, and autocorrelation. Prerequisite: ECON 67000. Typically offered Spring.

ECON 67200 - Econometrics II

Credit Hours: 1.00 to 3.00. Topics include generalized method of moments, estimation and inference with weak instruments, panel data models and bootstrap methods. Prerequisite: ECON 67100. Typically offered Fall.

ECON 67300 - Time Series Econometrics

Credit Hours: 1.00 to 3.00. This advanced course gives an up-to-date and comprehensive treatment of modern time series analysis and empirical macroeconomics. Topics include: ARIMA processes, spectral analysis, forecasting, covariance-stationary vector processes, vector autoregressions, state space representations in the Kalman filter, non-stationary time series and fractional integrated processes, and time series models of heteroscedasticity. Prerequisite: ECON 67200. Typically offered Fall Spring.

ECON 67400 - Microeconometrics

Credit Hours: 1.00 to 3.00. This advanced course covers the econometrics and statistical methods needed to study data on individual agents in general qualitative response models and models of limited dependent variables. Special emphasis is placed on applying the alternate estimation and inference techniques to actual or simulated datasets. Topics include: univariate binary models, multinomial and multivariate qualitative response models, choice based sampling, distribution-free estimation methods, and Tobit models. Prerequisite: ECON 67200. Typically offered Fall Spring.

ECON 67600 - Economics Of Uncertainty And Information I

Credit Hours: 2.00 to 4.00. Covers topics in decision theory and the economics of information. Topics include: insurance, nonexpected utility theory, capital asset pricing models, stochastic calculus and options pricing models, organizational decision making, herd behavior, search theory and price dispersion models, principal-agent models, multiple agents, multiple tasks, multiple periods, incomplete contracts, and adverse selection topics. Applications of these models arise in industrial organization, labor economics, and public economics, as well as various areas in management. Course readings are primarily from journal articles. Prerequisite: ECON 60700. Typically offered Fall Spring.

ECON 67700 - Economics Of Uncertainty And Information II

Credit Hours: 1.00 to 3.00. Continuation of ECON 67600. Prerequisite: ECON 67600. Typically offered Fall Spring.

ECON 68500 - Experimental Economics I

Credit Hours: 1.00 to 3.00. An overview of seminal and recent developments in experimental economic research. Provides practical training in designing and conducting experiments and the analysis of experimental data. Content varies from year to year. Applications include: industrial organization, game theory, finance, international trade, information economics, and monetary economics. Course readings are primarily from journal articles. Prerequisite: ECON 60700. ECON 61000. Typically offered Fall Spring.

ECON 68600 - Experimental Economics II

Credit Hours: 2.00 or 3.00. Covers topics different from ECON 68500, and they vary from year to year. May be taken prior to ECON 68500. Course readings are primarily from journal articles. Prerequisite: ECON 60700. ECON 61000. Typically offered Fall Spring.

ECON 69000 - Advanced Problems In Economics

Credit Hours: 1.00 to 4.00. Advanced individual reading and investigation in a specific economic field at the graduate level. Open to individual students with superior records. Permission of instructor required. Typically offered Fall Spring Summer.

ECON 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ECON 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Education-Curriculum and Instruction

EDCI 20500 - Exploring Teaching As A Career

Credit Hours: 3.00. Students will become familiar with the work of teachers and begin to develop their educational philosophies through examining what it means to teach and to learn and the nature and purpose of schools. Students will critically evaluate teaching as their chosen profession. This course includes a required weekly field-based experience in an elementary, middle, or high school classroom. Typically offered Fall Spring.

EDCI 21000 - Education Scholars Program I

Credit Hours: 1.00. To explore the field of education by having professionals share their thoughts and experiences about the profession, and watching videos of teachers in the classroom. Students will learn about a relevant topic in education and what is involved in conducting research by assisting a professor in their area of interest/specialization. Awarded the DeVito Scholarship. Typically offered Fall.

EDCI 21100 - Education Scholar Program II

Credit Hours: 1.00. To explore the field of education by visiting local schools, having professionals share their thoughts and experiences about the profession, and watching videos of teachers in the classroom. Students will learn about a relevant topic in education and what is involved in conducting research by assisting a professor in their area of interest/specialization. (Note: travel time is needed to visit local educational sites.) Awarded the DeVito Scholarship. Typically offered Spring.

EDCI 24200 - Principles And Philosophy Of Vocational And Technical Education

Credit Hours: 2.00 or 3.00. An introduction to the origin, scope, evolution, and objectives of vocational and technical education. Emphasis will be placed on the need for vocational-technical education and its relation to other types of education. Typically offered Summer Fall Spring.

EDCI 24400 - Seminar In Leadership For Career And Technical Student Organizations

Credit Hours: 1.00. Particular emphasis on practice relative to effective functioning as advisors to vocational youth organizations. Fundamentals of small-group work and individual responsibilities in working with vocational youth organizations will be stressed. Typically offered Fall Spring.

EDCI 25000 - Professional Development In Family And Consumer Sciences Education

Credit Hours: 1.00 or 2.00. This course focuses on students' professional development as family and consumer sciences educators. Characteristics and relationships among middle and high school family and consumer sciences standards, resources,

and learning experiences; the Purdue Family and Consumer Sciences Education program; and expectations for Indiana FCS teacher-licensure are emphasized. Includes participation in professional organizations and meetings. Typically offered Fall.

EDCI 27000 - Introduction To Educational Technology And Computing

Credit Hours: 3.00. Addresses fundamentals of educational technology, including the integration of instructional design, media, computers and related technologies within the classroom setting. Typically offered Fall Spring Summer.

EDCI 28500 - Multiculturalism And Education

Credit Hours: 3.00. This course integrates an understanding of multiculturalism with principles of democratic education. Historical, sociological, cultural, political, philosophical, and pedagogical foundations of multiculturalism are explored and related to issues of pedagogy in a pluralistic society. This course is taken concurrently with EDCI 20500, which includes a school-based Theory into Practice field experience. Some discussion topics and assignments will be based on that field experience. It is highly recommended that EDCI 27000 be taken with or before taking this course. Typically offered Fall Spring Summer.

EDCI 30500 - The Teaching Of Modern Foreign Languages In The Elementary Schools

Credit Hours: 3.00. Lectures and discussions on the place of modern foreign languages in the elementary school curriculum and on current methods and materials for teaching modern foreign languages at this level; workshop activities for the development of teaching skills. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Should precede the professional semester. Typically offered Fall.

EDCI 30800 - Practicum In Reading For The Classroom Teacher

Credit Hours: 3.00. For prospective teachers in elementary or secondary schools who desire advanced supervised practice in teaching reading to pupils experiencing reading difficulty. It is required for a minor in reading. The seminar will evaluate diagnostic and tutoring strategies, methods, materials, and achievement. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall Spring Summer.

EDCI 30900 - Reading In Middle And Secondary Schools: Methods And Problems

Credit Hours: 3.00. For prospective teachers at junior and senior high schools. An overview of reading processes, fundamentals of reading instruction, factors that influence the ability to read text materials, strategies and materials for identifying and reducing reading problems, school resources, and programs for normal and deficient readers. Concurrent enrollment with program-specified methods course. Typically offered Fall Spring.

EDCI 31000 - Literacy And The Young Child

Credit Hours: 3.00. A content course designed to provide the background knowledge needed to guide the literacy development of children aged 3-8. The course examines young children's emergent use and understanding of literacy in the home and in early schooling. The course traces the connections between the developmental history of children's literacy and classroom practice. Typically offered Summer Fall Spring.

EDCI 31100 - Media For Children

Credit Hours: 3.00. Books and other resources designed for children and adolescents are studied and evaluated in terms of literary theory and aesthetic appreciation. Emphasis is placed on literature and its place in the child's world. Typically offered Fall Spring.

EDCI 32500 - Literacy In The Primary Classroom

Credit Hours: 3.00. Students will study how children's oral language develops, how children learn to read and write in primary grade settings, and the teacher's role in this process. Students will learn how phonemic awareness, phonics, fluency, vocabulary and comprehension influence children's literacy development. Students will learn how to select appropriate instructional materials; employ teaching strategies to meet the cognitive and affective literacy needs of all children; and collect, interpret, and use data from various types of assessments to inform literacy teaching and learning processes. Typically offered Fall Spring Summer.

EDCI 32600 - Literacy In The Intermediate Classroom

Credit Hours: 3.00. This course includes a field based component. Students will build on material learned in EDCI 32500. They will concentrate on increasing student's literacy skills with a focus on fluency, phonics, strategic reading, vocabulary, literary analysis, content area reading, the writing process, and building comprehension skills. They will learn to select appropriate materials, employ strategies to meet the cognitive and affective literacy needs of all children; and create integrate, and use data from various forms of assessment to inform the teaching and learning process. Typically offered Fall Spring Summer.

EDCI 35000 - Community Issues & Applications For Educators

Credit Hours: 2.00 or 3.00. This course is an examination of diverse individual, family, and community characteristics and issues, and potential impacts on teaching and learning processes. Includes service learning with human service agencies and personnel in the school and community. As part of this course, students complete certification to meet the Indiana Department of Education suicide prevention training requirement for teacher licensure. Typically offered Fall.

EDCI 35600 - Career Education In Family And Consumer Sciences

Credit Hours: 3.00. Examination of middle and high school career education accomplished through family and consumer sciences, including (1) life and career exploration and planning; (2) analysis of career paths and opportunities in family and consumer sciences; and (3) career preparation through laboratory and cooperative education programs. Historical and contemporary foundations for career education in family and consumer sciences is also are addressed. Includes observations and interactions with students and teachers in career-education programs and participation in professional meetings. Typically offered Fall.

EDCI 35700 - Occupational Internship In Career And Technical Education

Credit Hours: 1.00 to 3.00. Supervised experiences in the area(s) of job training teacher certification. One hour of credit earned in increments of 250 clock hours of in-service training. Approval of University vocational education advisor. Typically offered Spring Fall.

EDCI 35800 - Introduction To The Organization And Coordination Of Vocational And Technical Education

Credit Hours: 2.00 or 3.00. An introduction to the organization and coordination of vocational and technical education. Areas of emphasis include delivery systems, funding, state plan, credentialing systems, public relations, recruitment/placement/ follow-up, youth organizations, trends, and issues. Typically offered Summer Fall Spring.

EDCI 36000 - Curriculum And Instruction In Family And Consumer Sciences: Middle School

Credit Hours: 3.00. Instructional program development for family and consumer sciences. Developmental needs and issues of early adolescents; study of adolescent literacy; and curriculum integration of language arts, math, and other content areas are emphasized. Development of a comprehensive unit of instruction that incorporates standard-based curriculum, assessment, and instruction for family and consumer sciences is a major component of the course. Includes observations and interactions with family and consumer sciences teachers and students and participation in professional meetings. Typically offered Spring.

EDCI 36100 - Social Studies In The Elementary School

Credit Hours: 3.00. Provides students with an overview of the field of social studies, of selected issues in the field, and of best practice strategies for teaching social studies to elementary school children. Encourages participants to reflect on social studies knowledge, skills and dispositions, how students learn these most effectively, and how best to teach social studies. Includes a

field-based experiential component. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Summer Fall Spring.

EDCI 36200 - Literacy In The Elementary School I

Credit Hours: 6.00. Examines how children's oral language develops, how they learn to read and write, and the teacher's role in these processes. Using a balanced approach to literacy instruction, students learn to select materials; employ strategies to meet the cognitive and affective literacy needs of all children; and collect, integrate, and use data from various forms of assessment to inform teaching and learning processes. Includes a field-based experiential component. Taken concurrently with EDCI 36100. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall Spring.

EDCI 36300 - Literacy In The Elementary School II

Credit Hours: 3.00. Focuses on teaching children who experience difficulty acquiring literacy. Assessments of children's strengths and needs are used to plan and evaluate instruction. Strategies for helping children develop more mature literacy understandings are applied in weekly small-group instructional sessions. Includes a field-based experiential component. Taken concurrently with EDPS 43000. Typically offered Fall Spring.

EDCI 36400 - Mathematics In The Elementary School

Credit Hours: 3.00. Focuses on teaching mathematics in the elementary school. Students learn what it means to teach mathematics when reasoning, problem solving, communication, and connections are the foci. Includes a field-based experiential component. Typically offered Fall Spring.

EDCI 36500 - Science In The Elementary School

Credit Hours: 3.00. Investigates ways children learn science as a basis for planning, enacting, and assessing science curriculum and instruction. State and national standards, teaching cases, and science lab experiences are used as tools for reflecting on practice. Includes a field-based experiential component. Taken concurrently with EDCI 36400 and EDCI 37000. Typically offered Fall Spring.

EDCI 37000 - Teaching English As A New Language

Credit Hours: 2.00. This course focuses on the design of materials and instructional strategies for English Language Learners Pre-K - Grade 6. This course must be taken concurrently with EDCI 36400 and EDCI 36500. It includes a field-based experiential component. Typically offered Fall Spring.

EDCI 40100 - Reading Comprehension In The Content Area

Credit Hours: 3.00. Fulfills requirement for reading endorsement. Reading comprehension related to organizing and remembering expository text for primary, intermediate, and middle school students. Teaching strategies for general and specific content area comprehension. Typically offered Fall Spring.

EDCI 40200 - Teaching Kindergarten: Issues And Methods

Credit Hours: 3.00. Examination of developmentally appropriate kindergarten curricula, current issues, and practices. The course addresses not only the activities and procedures of a kindergarten classroom, but also the connections between children's development and the design of developmentally appropriate, integrated curricula. Typically offered Summer Fall Spring.

EDCI 42100 - The Teaching Of Biology In Secondary Schools

Credit Hours: 3.00. The rationale, objectives, methods, and materials of teaching biology and life science in junior and senior high schools. Extensive use of multimedia resources in planning specifically for the student teaching experience. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall.

EDCI 42200 - The Teaching Of English In Secondary Schools

Credit Hours: 3.00. Explores a wide variety of instructional practices suitable for teaching middle and high school English including language, literature, and writing - addressing specific pedagogical issues such as teaching diverse learners and developing cohesive units of instruction. Typically offered Fall Spring.

EDCI 42300 - The Teaching Of Social Studies In Secondary Schools

Credit Hours: 3.00. The purpose of this course is the development of a theoretical framework and pedagogical skills necessary to teach social studies to middle and high school students. Students are introduced to the general issues involved in planning and organizing a social studies curriculum. Typically offered Summer Fall Spring.

EDCI 42400 - The Teaching Of Earth And Physical Science In The Secondary Schools

Credit Hours: 3.00. The methods and materials needed for the teaching of chemistry, earth-space, physics, and general science in the secondary schools, including field experience. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. May be taken for two credits (no field experience) by students who are enrolled in another methods course with field experience. Typically offered Fall.

EDCI 42500 - Teaching Of Mathematics In Secondary Schools

Credit Hours: 2.00 or 3.00. This course is designed for students who are planning to be secondary mathematics teachers in the twenty-first century. The course content is organized around tools and tasks for teaching secondary mathematics content, theories of teaching and learning mathematics, and organizing for classroom instruction. Must have completed at least 18 credit hours of Mathematics previous to this course. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall Spring.

EDCI 42600 - Teaching Mathematics In The Middle And Junior High School

Credit Hours: 2.00. Designed to prepare the prospective teacher to plan, present, and evaluate mathematics lessons, determine goals, manage instruction, and use a variety of instructional strategies. Must have completed at least 18 credit hours in Mathematics previous to this course. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall Spring.

EDCI 42700 - The Teaching Of Modern Foreign Languages In Secondary Schools

Credit Hours: 3.00. The course is a combination of lecture, computer-facilitated interaction, and guided on-site secondary school experience provided through the Professional Development School program. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall.

EDCI 42800 - Teaching Science In The Middle And Junior High School

Credit Hours: 2.00. Designed to prepare preservice teachers to teach science in the middle and junior high school (grades 5-9). No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Spring.

EDCI 42900 - Methods Of Teaching Physical Education In Secondary Schools

Credit Hours: 3.00. Application of instructional concepts and strategies in physical education field experience setting. No

undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall.

EDCI 43000 - The Teaching Of Foreign Languages In Junior High And Middle School

Credit Hours: 2.00. An examination of second language listening, reading, speaking, and writing skills, along with information on cultural problems. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Spring.

EDCI 43200 - The Teaching Of Health And Safety In Secondary Schools

Credit Hours: 3.00. The selection and application of teaching methods, materials, content, and resources appropriate for health instruction at the various educational levels. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall.

EDCI 43300 - The Teaching Of Social Studies In Junior High/Middle School

Credit Hours: 2.00. Foundations of social studies; methods, techniques, strategies of teaching, and activities - with special attention to skills of planning, questioning, and testing. Includes observation, participation, and microteaching in social studies classrooms. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Summer Fall Spring.

EDCI 43400 - Literacy Teaching And Learning In Secondary Schools

Credit Hours: 2.00. Exploration and development of various instructional methods and materials appropriate for supporting adolescent literacy in secondary English (i.e., middle and high school English Language Arts), including the teaching of reading. Content-area literacy methods and materials are also addressed. Includes a field experience of up to 20 hours in a secondary English school setting. Typically offered Fall Spring.

EDCI 43500 - The Teaching Of Speech And Theatre In Secondary Schools

Credit Hours: 2.00 or 3.00. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall Spring.

EDCI 44400 - Methods for Teaching Family and Consumer Sciences

Credit Hours: 4.00. The culminating on-campus teacher-education course for the Purdue University Family and Consumer Sciences program. The course builds and consolidates teacher-candidates' knowledge and skills for teaching family and consumer sciences. Emphasis placed on standards-based instructional planning and materials; instructional strategies, including laboratories, assessment of student learning, and classroom management. Course includes field experiences. Program content requirements should be completed previous to or concurrent with this course. Typically offered Fall.

EDCI 44600 - Directed Observation For Family And Consumer Sciences

Credit Hours: 1.00 to 4.00. Field-based experience in a middle or high school, a Cooperative Extension setting, or other applicable career setting for family and consumer sciences educators. Build professional capacity through focused, participatory experiences that include interactions with family and consumer sciences educators, other school/agency personnel, and students/clients. Thirty-five hours of documented experience in approved setting needed for one credit. Typically offered Fall Spring.

EDCI 45000 - Techniques Of Coordination In Cooperative Vocational Education

Credit Hours: 2.00. For prospective and present coordinators and supervisors of cooperative vocational programs in public schools. Emphasis on problems of organization, administration, supervision, and operation of cooperative education programs. Typically offered Summer Fall Spring.

EDCI 46600 - Integrated Curriculum In The Elementary School

Credit Hours: 2.00. This course introduces various approaches to integrated curriculum, including historical foundations and current conceptual frameworks. Students develop integrated curriculum units (with relevant goals, materials, activities and plans) suitable for particular teaching contexts. The course includes a field-based component and is taken concurrently with EDPS 43000. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall Spring.

EDCI 49000 - Individual Research And Teaching Experience

Credit Hours: 1.00 to 8.00. Primarily for teacher candidates requiring special, individualized experience in research or teaching. Permission of instructor required. Typically offered Fall Spring Summer.

EDCI 49600 - Student Teaching In The Elementary School

Credit Hours: 8.00 to 16.00. Full time elementary classroom teaching experiences and a student teaching seminar under the mentorship of the classroom teacher and a University supervisor. Typically offered Fall Spring.

EDCI 49800 - Supervised Teaching

Credit Hours: 8.00 to 16.00. Teaching full time in a school classroom under the supervision of the teacher in charge of the class and a University supervisor. Completion of education methods courses and other Gate requirements for the major area and admittance to teacher education required. Typically offered Fall Spring Summer.

EDCI 50000 - Foundations Of Literacy

Credit Hours: 3.00. Survey course in the acquisition of and instruction in reading, writing, and other aspects of language. Typically offered Fall Spring Summer.

EDCI 50100 - Problems In Literacy Acquisition: Evaluation And Instruction

Credit Hours: 3.00. Examines informal and standardized instruments useful for evaluating students who experience difficulties acquiring reading, writing, and other aspects of language. Discusses corrective/remedial instructional strategies appropriate for the classroom and clinic. Supervised practicum. Typically offered Spring.

EDCI 50200 - Reading In Middle And Secondary Schools

Credit Hours: 3.00. A course designed for teachers and prospective teachers in subject matter areas of the junior and senior high school. Surveys of techniques and objectives of reading instruction in the schools with special attention to the opportunities and obligations to teach reading within content areas. Teaching experience helpful but not required. May be taken as part of the sequence leading to reading specialist or for the junior high school endorsement program. Typically offered Fall Spring.

EDCI 50600 - Environmental Education

Credit Hours: 3.00. Synthesis of philosophies, scientific principles and methods for environmental education programs in forests, camps, and schools. Students conduct and summarize literature research on scientific and educational principles. In interdisciplinary teams, they develop, implement, and evaluate curricula for schools, nature centers, interpretive and outdoor education programs. Typically offered Fall Spring.

EDCI 50900 - Writing In Middle And Secondary Schools

Credit Hours: 3.00. Focuses on understanding philosophical and theoretical approaches, such as the writing process model, current reading/writing research, and how various approaches fit into existing school curriculum. Typically offered Fall Spring Summer.

EDCI 51000 - Colloquium In Science And Mathematics Education

Credit Hours: 1.00. Weekly colloquia on individual research topics of interest to science and mathematics education faculty and graduate students. Colloquia will describe research programs in education. Course will be required of first-year graduate students. Typically offered Fall.

EDCI 51100 - Teaching Mathematics In The Elementary School

Credit Hours: 3.00. Historical and current curriculum developments in mathematics education with implications for classroom practice; analysis of instructional strategies; cognitive development; use of research results. Typically offered Fall Spring Summer.

EDCI 51200 - Mathematics In The Secondary School

Credit Hours: 3.00. Models of mathematics learning, current curriculum trends and practices with emphasis on laboratory and individualized systems; designing instructional materials. Typically offered Fall Spring.

EDCI 51300 - Foundations Of Learning Design And Technology

Credit Hours: 3.00. Provides an historical overview of the field and delineates the foundational knowledge, skills, and attitudes needed by professionals in the field of educational technology and instructional design. Students explore the field by engaging in collaborative projects, along with thinking and writing about various aspects of educational technology and the underlying instructional design theories. Typically offered Summer Fall Spring.

EDCI 51400 - Language Arts In The Elementary School

Credit Hours: 3.00. Research, recent trends, and current developments in the field of language arts and implications for classroom practice in the elementary school. Typically offered Fall Spring Summer.

EDCI 51500 - Reading In The Elementary School

Credit Hours: 3.00. Research, recent trends and current developments in the field of reading instruction. Emphasis will be on improving developmental reading in the elementary school programs rather than on surveying remedial programs. Typically offered Fall Spring Summer.

EDCI 51600 - Seminar In Environmental Education

Credit Hours: 3.00. The seminar covers current research and literature in environmental education, focusing on teaching children and adults about the environment. Topics vary by semester and student interest. Typically offered Summer Fall Spring.

EDCI 51700 - Survey Of Science Education

Credit Hours: 3.00. Introduction to current issues and research in science education, broadly organized under themes of learning, teaching, and science curriculum. Typically offered Fall.

EDCI 51800 - The Nature Of Science In Science Teaching

Credit Hours: 3.00. Explores philosophical issues related to the scientific enterprise, such as the production and validation of scientific knowledge; the role of the scientific community; and the influence of gender and culture on doing science. Also examines the implications of these issues for science teaching and learning, as well as for research in science education. Typically offered Spring.

EDCI 51900 - Teaching Learners Of English As A New Language

Credit Hours: 3.00. (ENGL 51900) This course focuses on current issues and techniques in ESL instruction and assessment for students at the beginning or intermediate stages of English language acquisition Pre-K-12. Emphasis is on the design of materials and instruction that foster English language development in the content areas of the curriculum (i.e., Specially Designed Academic Instruction in English or SDAIE). Some familiarity with elementary and/or secondary teaching methods is assumed. Typically offered Fall.

EDCI 52600 - Language Study For Educators

Credit Hours: 3.00. (ENGL 52900). Covers foundational knowledge in language and linguistics for teachers and educational researchers. Topics include structure and functions of language, language acquisition and development, language diversity,

classroom discourse, language and media, and literacy-language arts curriculum. A foundation for work in Literacy and Language Education. Typically offered Summer Spring.

EDCI 52700 - Science Methods In The Elementary School

Credit Hours: 3.00. The examination of learning theories, instructional methods, and curricular materials appropriate for teaching science concepts and skills in the elementary school setting. Students will apply, evaluate, and reflect upon elementary science teaching methods through class activities and field experience assignments. Acceptance into the Elementary Transition into Teaching (TTT) program. Typically offered Fall Spring.

EDCI 52800 - Human Performance Technology

Credit Hours: 3.00. This course provides an introduction to the field of human performance technology (HPT). It examines basic concepts and principles of human performance, the theoretical underpinnings of the field, research and application literature, and various approaches to solving human performance problems. A systematic approach to the analysis, design, development, implementation and evaluation of performance improvement interventions within organizations is emphasized. Typically offered Fall Spring Summer.

EDCI 53000 - English Language Development

Credit Hours: 3.00. (ENGL 53000). Focuses on theoretical and practical knowledge for teachers about how second languages are learned, and on the educational and philosophical basis for second language teaching and learning. Links English language development to teaching and learning strategies and is designed for undergraduate and graduate students in education and practicing teachers. Typically offered Fall Spring Summer.

EDCI 53100 - Learning Theories And Instructional Design

Credit Hours: 3.00. This course has been designed to help you learn how theories of human learning and motivation can be applied to the instructional process in order to make the process more effective, efficient, and/or appealing. The focus of the course is on two areas: 1) the theoretical principles that have contributed to the field of Instructional Design (ID), and 2) how those principles can be applied within practical settings. Typically offered Fall Spring Summer.

EDCI 53200 - STEM Goes Rural Seminar I

Credit Hours: 3.00. An examination of current problems, issues, research, and practice related to the teaching of STEM (Science, Technology, Engineering and Mathematics) subjects in rural school settings. Permission of Department required. Typyicall offered Fall Spring Summer.

EDCI 53300 - Teaching And Learning Number And Operations.

Credit Hours: 3.00. This course is designed to provide opportunities for mathematics educators to develop understanding of teaching and learning in the domain of number and operation. Central to this work is the construction of models of learners' understanding of number and operation and the use of those models to build and select curriculum. While curricular efforts have historically taken as central a formal view of mathematics and its construction, more recently curriculum has been written to engage learners and to build from knowledge of learners' understanding. In this course we will develop models of learner's understandings of different facets of number and operation and then use those models and our emerging understanding of curriculum to explore challenges in teaching and learning. Typically offered Fall Spring Summer

EDCI 53400 - Teaching And Learning Geometry And Measurement

Credit Hours: 3.00. This course is designed to provide opportunities for mathematics educators to develop understanding of teaching and learning in the related domains of geometry and measurement. Central to this work is the construction of models of learners' understandings of geometry and measurement and the use of models to design instruction. Geometry, as a discipline in school mathematics, has historically and more currently been debated. In this course we will explore research in the teaching and learning of geometry and measurement. A synthesis of select literature will inform our efforts to develop models of learners' geometric reasoning and understanding of measurement. We will move past the development of models to the design of instruction meant to support understandings of concepts that utilizes technology. Typically offered Fall Spring Summer

EDCI 53500 - Teaching And Learning Algebra And Functions

Credit Hours: 3.00. This is a course for current or prospective mathematics teachers wishing to explore ways of teaching algebra with a focus on addressing concerns related to student performance in algebra and increasing algebraic reasoning skills in the classroom. The course includes experiences with inquiry-based learning by engaging participants in algebra activities from two secondary National Council of Teachers of Mathematics (NCTM) standards-based curricula. The course will provide opportunities for participants to collaborate on the development of algebraic thinking in mathematics classrooms and will address pedagogical approaches to students' learning of algebra. Typically offered Fall Spring Summer.

EDCI 53600 - Teaching And Learning Data Analysis And Probabilty

Credit Hours: 3.00. This course will provide opportunities for the growth of middle school mathematics teachers understanding of data analysis and probability as a means to help analyze and interpret experienced events. The course will address the following: selecting and using appropriate statistical methods to analyze data, developing and evaluating inferences and predictions that are based on data, and understanding and applying the basic concepts of probability. This course will also address pedagogical approaches to students' learning of data analysis and probability. Typically offered Fall Spring Summer

EDCI 54100 - Contemporary Issues In Career And Technical Education

Credit Hours: 3.00. Identification, analysis, synthesis, and implications of current issues and problems in career and technical education at the elementary, secondary, postsecondary, and adult levels; policy and literature review; formulation of alternatives and solutions. Typically offered Fall Spring.

EDCI 54300 - Instruction In Career And Technical Education

Credit Hours: 3.00. Contemporary trends and methods in teaching career and technical programs, learning styles and teaching styles, and a variety of creative instructional strategies for different educational contexts will be identified and analyzed. Typically offered Fall Spring.

EDCI 54400 - Career And Technical Education For Special Needs Learners

Credit Hours: 3.00. Legislative initiatives; identification of special needs learners at the elementary, secondary, postsecondary, and adult levels; learning characteristics; assessment; individualized planning; instructional adaptations; school and community resources; exemplary program models; research, trends, and issues; and evaluation. Typically offered Summer.

EDCI 54500 - Planning In Career And Technical Education

Credit Hours: 3.00. Principles and strategies in planning new and improving existing career and technical education programs, strategic planning, needs assessment, community and workforce market research, information and data analysis, program improvement. Permission of Department required. Typically offered Fall Spring.

EDCI 54800 - Teaching Mathematics To Diverse Learners

Credit Hours: 3.00. This course is designed to provide opportunities for in-service teachers to engage around issues of equity in mathematics education. Equity here is used as a broad construct intended to help us think about how to provide meaningful opportunities to learn for all the students in our mathematics classrooms. The notion of "diverse" here is also taken broadly. All students have special needs, but it is sometimes helpful to think about the needs of particular groups of students while at the same time avoiding reducing differences among students to stereotypes. Issues of diversity here include, but are not limited to race, culture, gender, disabilities, language, SES, and sexual orientation. Typically offered Fall Spring Summer

EDCI 54900 - Assessment In Mathematics Education

Credit Hours: 3.00. This course is designed to help teachers of mathematics recognize the link between productive assessment and productive instruction, using the mathematics education standards for teacher competence in educational assessment. This

course is designed to help teachers meet those professional standards and understand the public pressure as well as instructional need for effective formative and summative assessment. Typically offered Fall Spring Summer.

EDCI 55000 - Career Education

Credit Hours: 3.00. An overview of contemporary legislation, educational reform, trends, and issues; career education program models; vocational and technical education, technology prep, and school-to-work systems; partnerships; foundations of career education; career development; curriculum; career guidance and counseling; career assessment; career planning practices; learning styles and instructional strategies; career information sources and resources; exemplary programs; and special needs populations and practices. Typically offered Summer Fall Spring.

EDCI 55100 - Young Adult Literature

Credit Hours: 3.00. This course is a survey of classic and contemporary young adult texts. Students are introduced to the genre through reading notable young adult texts, applying relevant literary criticism, and investigating effective pedagogical strategies. Typically offered Fall Spring.

EDCI 55200 - Generalizable Skills Instruction In Career And Technical Education

Credit Hours: 3.00. Curriculum, assessment, planning, implementation, and evaluation relating to generalizable skills (also known as generic, transferable, or workplace skills) in career and technical education, other content areas, and special education programs; philosophical, historical, social, economic, political, and educational influencing factors; analysis and synthesis of current research and conceptual models; practical applications for programs; instructional strategies; resources and support services, interdisciplinary collaboration approaches; applications for special needs learners; learning styles and characteristics. Typically offered Summer Fall Spring.

EDCI 55300 - Leadership Development In Career And Technical Education

Credit Hours: 3.00. Design, development, implementation, and evaluation of systems and strategies for enhancing the skills and knowledge of personnel seeking to become leaders in the field of Career and Technical Education (CTE); research related to critical and emerging leadership issues, strategies, policies, and resources are examined and applied to program improvement initiatives in schools, the workplace, agencies, and other organizations that serve a wide variety of youth, adolescents, young adults, and adults. Typically offered Summer Fall Spring.

EDCI 55400 - Production Of Instructional Materials

Credit Hours: 3.00. Involves the design, development, and editing of digitally-based materials for use in computer-based learning

environments. Includes planning and implementing text, graphics, audio, and video materials for use as communication and learning tools. Typically offered Fall Spring Summer.

EDCI 55600 - Educational Video Game Design

Credit Hours: 3.00. Designed to provide an introduction to the design of educational video games. The focus of the course is on two areas: 1) the learning, instructional design, and game design theories which can inform the design of effective and engage in educational video games, and 2) how to apply those theories within practical settings. Typically offered Fall Spring Summer.

EDCI 55900 - Academic Language And Content Area Learning

Credit Hours: 3.00. (ENGL 59900) Course focuses on theoretical and practical knowledge for teachers about how second languages are learned, and on the educational and philosophical basis for second language teaching and learning. The course links English language development to teaching and learning strategies and is designed for undergraduate and graduate students in education and practicing teachers. Typically offered Fall Spring Summer.

EDCI 56000 - Educational Technology For Teaching And Learning

Credit Hours: 3.00. Educational/training application of instructional technology, including computers, media, and instructional design. Stresses knowledge, skills, and attitudes needed to implement and manage technology in instructional environments. Typically offered Fall Spring Summer.

EDCI 56400 - Integration And Management Of Computers In Education

Credit Hours: 3.00. This course is intended for pre-service teachers, in-service teachers, administrators, trainers, and others who use or intend to use computers in educational settings. This course focuses on techniques for and issues related to integrating computers in educational environments. Topics covered include: popular computer applications, management issues, information and security issues, and designing educational applications for use in educational settings. Typically offered Spring Fall Summer.

EDCI 56500 - Principles Of Adult Education

Credit Hours: 3.00. (YDAE 56500) Principles of adult education applied to helping adults learn, evaluating their performance, and determining their needs. Examines history, philosophy, and research of adult education. Explores techniques required in design and delivery of instruction for adults. Typically offered Spring.

EDCI 56600 - Educational Applications Of Hypermedia

Credit Hours: 3.00. Examination of educational applications of hypermedia tools and related research. Creation of hypermedia instructional materials. Incorporation of digitized media (sound, photographs, and motion clips) in hypermedia is explored. Typically offered Spring.

EDCI 56700 - Action Research In Science Education

Credit Hours: 3.00. An introduction to various models and conceptions of teacher action research in science education. Students review literature on action research, participate in small research cohorts, and plan and conduct action research within their respective educational situations. Typically offered Fall Spring.

EDCI 56800 - Partnering With Web-Based Tools For Learner Centered Environments

Credit Hours: 3.00. Provides an in-depth look at Web-based digital tools for teaching and learning, with a focus on learner-centered activities and environments. Emphasis is given to applying the knowledge and skills necessary to create a Web-based, student-centered lesson/unit that provides diverse learners with opportunities for formal and informal learning. Course content is applicable to both independent and collaborative learning, as well as use of the Web as the sole educational delivery system or in combination with other approaches, including traditional classroom instruction. Typically offered Summer Fall Spring.

EDCI 56900 - Introduction To E-Learning

Credit Hours: 3.00. This course examines how design and development of instruction are impacted by the use of the computer as delivery system. A primary focus is on effective learning design strategies for computer mediated instruction. Learners will identify and apply effective design with emphasis on project management, planning, and implementation issues. Education or training materials will be developed using appropriate authoring tools as determined by the instructional context. Typically offered Fall Spring Summer.

EDCI 57200 - Introduction To Learning Systems Design

Credit Hours: 3.00. An introduction to the principles of designing instructional materials and to instructional communication theory and techniques. Topics include objectives, student characteristics, media selection, communication variables, message design, and systematic evaluation. Typically offered Fall Spring Summer.

EDCI 57300 - Instructional Development Practicum

Credit Hours: 2.00 or 3.00. Provides supervised field experience in programs involving instructional design development activities. Students participate in ongoing projects in the design, development, and evaluation of instructional materials and training programs in business and industry, medical facilities, or other settings deemed appropriate. Permission of instructor required. Typically offered Fall Spring.

EDCI 57500 - Foundations Of Distance Learning

Credit Hours: 3.00. An introduction to the field of distance learning/education. Examination of basic concepts and principles of distance learning, the theoretical underpinnings of the field, research and application literature, and distance education delivery technologies. Focus is on integration of distance education technologies for learning and teaching. Typically offered Summer Fall Spring.

EDCI 57700 - Strategic Assessment And Evaluation

Credit Hours: 3.00. This course explores principles and techniques that can be used to carry out evaluations within an organization. In particular, the course examines several aspects of conducting evaluations: planning and designing an evaluation, developing appropriate instruments, using various methods to collect information, analyzing information obtained from those methods, and communicating results and recommendation. This course is designed to help learners understand the multiple ways that evaluation is used in instructional systems, and provide opportunities to design various types of evaluation instruments. Approximately one half of the course is dedicated to the study of learner assessment, and the remaining half of the course is dedicated to the study of program evaluation. Typically offered Fall Spring Summer.

EDCI 58000 - Foundations Of Curriculum

Credit Hours: 3.00. Introduction to the major historical and philosophical sources of curriculum ideas. Significant forces influencing curriculum decision making. Different theoretical approaches to the construction and analysis of curriculum. Typically offered Fall.

EDCI 58500 - Multicultural Education

Credit Hours: 3.00. Concepts and theories of ethnicity and cultural pluralism: implications for educational change. Examination of value systems and cultural characteristics of various ethnic groups, different ethnic learning styles, ethnically pluralistic curriculum content and instructional materials, and conceptual curriculum design strategies for implementing multicultural education. Typically offered Fall Spring Summer.

EDCI 58600 - Topics In Educational Reform

Credit Hours: 3.00. (EDFA 58600) Explore important and timely issues related to educational reform and restructuring. Topics include: school choice, curriculum reform, assessment, technology, and influences on the reform process. Typically offered Fall Spring.

EDCI 58700 - Leadership And Management In Educational Technology

Credit Hours: 3.00. This course addresses the fundamentals of leadership and management of educational technology in a K-12 setting. Students will explore and evaluate computer hardware, software, networks, and lab management, including how they fit into education. This course is designed to provide prospectives on organizational leadership of educational technology, as well as providing future teachers with the ability to troubleshoot basic problems often associated with computers and software in the classroom. Typically offered Fall Spring Summer.

EDCI 58800 - Motivation And Instructional Design

Credit Hours: 3.00. This course has been designed to provide an in-depth study of motivation as one of the fundamental variables underlying human learning, behavior, and instructional design. The focus of the course is on two areas: 1) theories of motivation and the general principles that have contributed to the field of instructional design, and 2) how those principles are applied within practical design settings. Typically offered Fall Spring Summer.

EDCI 58900 - Special Topics For Teachers

Credit Hours: 1.00 to 4.00. Consideration of appropriate professional problems of experienced educational personnel in workshops or in-service programs. Typically offered Fall Spring Summer.

EDCI 59000 - Individual Research Problems

Credit Hours: 1.00 to 6.00. Opportunities for students to study particular problems under the guidance of a member of the This plan of individualized instruction may be used in any field of education or vocational education. Does not include thesis work. Permission of instructor required. Typically offered Fall Spring Summer.

EDCI 59100 - Special Topics In Education

Credit Hours: 1.00 to 4.00. Group study of a current problem or special topic of interest to professional educational personnel. Intensive study of research, theory, or practical aspects of a particular issue within the usual graduate class format. Typically offered Fall Spring Summer.

EDCI 59200 - Elementary Transition To Teaching Seminar And Practicum

Credit Hours: 0.00 to 3.00. This is a two-semester course with an additional two-four week summer component. The course is comprised of a seminar portion, taught by the TTT coordinator, with concurrent practicum experiences where students spend approximately 14 hours per week in elementary classrooms (20 during the summer component). During all three practicum experiences, students are supervised by the resident master teacher, the TTT coordinator, and additional University supervisors, if necessary. The focus of the seminar is on reinforcing and extending pedagogical concepts and methodology and teaching basic instructional practices essential for success in the classroom. (Prerequisite: acceptance into the Transition to Teaching program.). Permission of instructor required. Typically offered Summer Fall Spring.

EDCI 59300 - Introductory Secondary Transition To Teaching Seminar

Credit Hours: 1.00. This seminar course offers an introduction to the TTT program, as well as an overview of general educational concerns and issues applicable to all content area instruction at the middle and high school levels. It is often the first course taken in the TTT program by program participants. The course centers on discussions of educational issues, theories, and approaches that the students who are seeking licensure in any of the secondary areas available at Purdue will find helpful. Additionally, the course provides general information about TTT program course sequences, the fee structure, application processes for student teaching placements, and the overriding philosophy of the TTT program at Purdue. Permission of instructor required. Typically offered Summer.

EDCI 59400 - Concluding Secondary Transition To Teaching Seminar

Credit Hours: 2.00. This seminar course offers a conclusion to the program, as well as a review of general educational concerns and issues applicable to all content area instruction at the middle and high school levels. It is often the last course taken in the TTT program by program participants. The course centers on discussions of educational issues, theories, and approaches that the students who are seeking licensure in any of the secondary areas available at Purdue will find helpful. Additionally, the course helps students prepare to obtain their teaching license and enter the teaching community as a secondary teacher. Permission of instructor required. Typically offered Summer.

EDCI 59500 - Advanced Studies In English Education

Credit Hours: 1.00 - 3.00. Advanced study of an English education topic, issue, problem and/or trend within the instructor's fields of specialization. Typically offered Fall Spring Summer.

EDCI 60000 - Seminar And Practicum In The Supervision Of Reading Instruction

Credit Hours: 3.00. Seminar and practicum in supervision of reading instruction. Seminar includes theory and practice of reading

supervision with emphasis on the role of the reading specialist. Includes field supervision of students in reading courses. Typically offered Fall Spring Summer.

EDCI 60400 - Social Studies In The Elementary School

Credit Hours: 3.00. Social Studies-content and place in the modern elementary education curriculum. Materials, instruction techniques, evaluation procedures, and understanding the syntax of the structure of social studies. Prerequisite: EDCI 36100. Typically offered Fall Spring Summer.

EDCI 60500 - Teaching Science

Credit Hours: 3.00. Analysis of historical developments and present trends in science education; the designing, implementation, and evaluation of science programs; the role of research in present and future developments. Typically offered Fall Spring Summer.

EDCI 60800 - Individualizing Instruction In The Elementary And Secondary Schools

Credit Hours: 3.00. This course explores the foundations underlying individualized instruction, the preparation of individualized instruction materials for the class-room, the role of research in individualized instruction, and the future trends and issues in individualized instruction. Completion of a teacher certification program. Typically offered Summer Fall.

EDCI 61200 - Seminar In Literacy

Credit Hours: 3.00. Recent trends and research in literacy. Topics provide in-depth study of literacy acquisition in educational settings. Typically offered Fall.

EDCI 61300 - Seminar In The English Language Arts

Credit Hours: 3.00. (ENGL 69100) Problems in the teaching of English: literature, language, rhetoric. Attention to recent scholarship and to its application in the public schools. Typically offered Fall Spring.

EDCI 61400 - Literacy And Development Of Young Children

Credit Hours: 3.00. Focuses on literacy development (reading, writing, other aspects of language) in pre-school and elementary

age children. An emergent literacy model is contrasted with traditional models and school instruction. Particular experiences and materials that aid literacy acquisition are considered. Typically offered Fall.

EDCI 61500 - Qualitative Research Methods In Education

Credit Hours: 3.00. Focuses on expanding graduate students' research skills to include knowledge of the theories and methods associated with qualitative and qualitative-quantitative combined research. Prerequisite: EDPS 53300. Typically offered Spring.

EDCI 61600 - Advanced Qualitative Research Methods In Education

Credit Hours: 3.00. This course focuses on expanding students' foundation level knowledge of qualitative research in the areas of theories, methods, analysis and interpretation, and presentation. Prerequisite: EDCI 61500. Typically offered Fall.

EDCI 61800 - Gender And Culture In Science Education

Credit Hours: 3.00. An examination of the different perspectives on issues of gender, culture, and science. Major topics include feminist critiques of scientific theories and methods, the work of women and minorities in science, the role science has played in the construction of race and gender, and topics in science education, such as girls' learning in science and the potential of inclusive practices in the science classroom. Prerequisite: EDCI 51800 or EDCI 58500. Typically offered Summer Fall Spring.

EDCI 61900 - Learning Science

Credit Hours: 3.00. The course provides a holistic study of how children and adults learn science; how the learner's ideas, ways of thinking, abilities to do science, and their attitudes towards and beliefs about science learning influence how they learn science. Typically offered Fall Spring.

EDCI 62000 - Seminar In Mathematics Education

Credit Hours: 1.00 to 6.00. Selected topics in mathematics education. Typical topics considered are: (1) problem solving; (2) instructional strategies; (3) cognitive structure; (4) current curriculum; (5) current research. Permission of instructor required. Typically offered Spring.

EDCI 62200 - Seminar In Science Education

Credit Hours: 1.00 to 3.00. Current issues in science education. Typical topics considered are: (1) science curriculum; (2) concept learning; (3) teacher education; (4) intellectual developments; (5) current research. Prerequisite: EDCI 51700, EDCI 51800. Typically offered Spring.

EDCI 62300 - Seminar In Genre Studies

Credit Hours: 3.00. Explores theoretical and practical implications of genre theory for literacy studies, literary studies, psychology, communication, and education. Course topics include theoretical models of genre in spoken and written language and human activities; genres as tools for perceiving the world, maintaining and challenging social hierarchies, and developing a sense of self; the development of genre knowledge across the life span; and educational applications of genre theory. Typically offered Fall.

EDCI 62400 - Seminar In Social Studies Education

Credit Hours: 3.00. An investigation of various aspects of the teaching of the social studies. One topic is dealt with in each enrollment. Master's candidates are expected to complete the first three topics. Areas include: (1) philosophic concepts used in the social studies; (2) curricular analysis and examination of new social studies materials; (3) methods of inquiry in the social studies; (4) research methodology in the social studies. Typically offered Fall Spring Summer.

EDCI 62700 - Current Topics In Educational Technology

Credit Hours: 3.00. A critical analysis of problems, trends, issues, and programs related to the area of educational technology. Prerequisite: EDCI 51300. Typically offered Summer Fall Spring.

EDCI 62800 - Curriculum And Instruction Doctoral Seminar I

Credit Hours: 1.00. An examination of current issues and concerns related to doctoral study in Curriculum and Instruction. This course is intended for all new doctoral students in the Department of Curriculum and Instruction and should be taken within the first year of doctoral study. Typically offered Fall.

EDCI 63500 - Content And Goals In Mathematics Education

Credit Hours: 3.00. Examines conceptions of what mathematics is and how those conceptions have influenced the mathematics curriculum over the course of American history. Prerequisite: Master's student standing or higher and enrolled in Mathematics Education. Typically offered Fall.

EDCI 63600 - The Learning Of Mathematics: Insights And Issues

Credit Hours: 3.00. Examines research related to the learning of mathematics and to the relationships of social and cultural factors to the learning of mathematics. Prerequisite: Master's student standing or higher and enrolled in Mathematics Education. Typically offered Spring.

EDCI 63700 - The Teaching Of Mathematics: Insights And Issues

Credit Hours: 3.00. Examines research related to mathematics teaching, including research on characteristics of mathematics teachers, the features of effective mathematics teaching, and the professional preparation and development of mathematics teachers. Prerequisite: Master's student standing or higher and enrolled in Mathematics Education. Typically offered Spring.

EDCI 64400 - Legal Issues In Career And Technical Education

Credit Hours: 3.00. Comprehensive examination of contemporary federal, state, and local legislation; rules, policy, regulations, provisions, guidelines, and initiatives affecting the nature, establishment, and implementation of state and local programs at the secondary and postsecondary levels in career and technical education; need for legislation and initiatives and the reauthorization of existing legislation; social, political, and economic aspects of legislation; advocacy for legislation; and public policy and policy development. Approval of Department required. Typically offered Fall Spring.

EDCI 64500 - Organization And Administration Of Career And Technical Education

Credit Hours: 3.00. Organizational structure and delivery systems at the national, regional, state, and local levels; program areas and services; legislative initiatives; federal, state, and local planning; administrative functions and practices; leadership development; trends; and issues. Typically offered Fall Spring.

EDCI 64600 - Supervision In Career And Technical Education

Credit Hours: 3.00. Purposes, principles, strategies, and procedures of supervision and management in career and technical education and related workforce education and development contexts: theory and practice: human resource development: environment, education, and management. Approval of Department required. Typically offered Fall Spring.

EDCI 64700 - Research In Career And Technical Education

Credit Hours: 3.00. Rationale for and history of research in career and technical education; analysis of the research process and research methods; examination of the environment and support required for research; proposal development, and strategies for dissemination and utilization of research. Offered in alternate years. Typically offered Fall.

EDCI 64800 - Curriculum In Career And Technical Education

Credit Hours: 3.00. Overview of curriculum in career and technical education programs; business and industry training programs; curriculum planning, development, implementation, and evaluation; review and analysis of curriculum models. Typically offered Fall Spring.

EDCI 64900 - Assessment In Career And Technical Education

Credit Hours: 3.00. Goals and rationale for evaluation in education and work training contexts; assessment and measurement methods, techniques, and procedures; reliability, validity, and accuracy; construction and selection of instruments; data and information collection, analysis, and interpretation; meta evaluation; adaptations and modifications for special needs populations; and using assessment data and information. Typically offered Fall Spring.

EDCI 65000 - Program Evaluation In Career And Technical Education

Credit Hours: 3.00. Goals and objectives of, and criteria for, program evaluation in career and technical education; evaluation models and methods; design and planning; issues; development and selection of instruments and procedures; data and information collection and analysis; preparing program evaluation reports; and using program evaluation results for program improvement. Typically offered Fall Spring.

EDCI 65200 - Seminar In Family And Consumer Sciences Education

Credit Hours: 2.00 to 6.00. A critical analysis of current problems, trends, issues, and programs in family and consumer sciences education. Prerequisite: 12 credit hours in Education or equivalent professional training. Permission of instructor required. Typically offered Fall Spring Summer.

EDCI 65300 - Seminar In Career And Technical Education

Credit Hours: 1.00 to 9.00. Current trends, theory, and practices related to educational contexts and careers. Typically offered Fall Spring Summer.

EDCI 66000 - Learning Design And Technology Seminar

Credit Hours: 1.00. Investigation of trends, developments, and issues in educational technology. Focus is on current practices, problems, and research. Typically offered Fall Spring Summer.

EDCI 66300 - Interactive Multimedia

Credit Hours: 3.00. Examines computer-based interactive multimedia theory, research, design, development, and evaluation. Includes a digital audio-video production and design of interactive multimedia for stand-alone or online delivery. Prerequisite: EDCI 56100, EDCI 57200. Typically offered Fall Spring Summer.

EDCI 67000 - Learning Design And Technology Integrated Project

Credit Hours: 1.00 or 2.00. Current issues and problems in educational technology. Projects in current practice and research selected and pursued. Permission of instructor required. Typically offered Fall Spring.

EDCI 67200 - Advanced Practices In Learning Systems Design

Credit Hours: 3.00. Applications of learning systems design to educational situations. In-depth treatment of learner analysis, task analysis, learning activities design, learner verification and summative evaluation. Focuses on the application of instructional design concepts and principles within authentic ID situations. Prerequisite: EDCI 57200. Typically offered Fall Spring Summer.

EDCI 67300 - Issues And Methods In Learning Systems Design Research

Credit Hours: 3.00. Provides preparation to conduct independent research in the field of educational technology through direct participation in the research process: critically reviewing research, designing and conducting a research study, synthesizing and presenting results in written and oral formats. Prerequisite: EDPS 53300. Typically offered Spring.

EDCI 67400 - Advanced Instructional Design Theory

Credit Hours: 3.00. Examines the impact of both psychological learning theories and instructional applications upon the development of various instructional design theories. Emphasis is on theory construction, influence of learning and educational principles, and the current and future possibilities of instructional design theory. Prerequisite: EDCI 53100 and EDCI 57200. Typically offered Fall Spring Summer.

EDCI 67500 - Instructional Strategies

Credit Hours: 3.00. Examines and applies the cognitive strategies and tactics that can be used by an instructional designer to improve human learning. Applications of chunking, frames, concept mapping, advance organizers, analogies, rehearsal, and imagery tactics to learning will be covered. Implementation and evaluation procedures for those strategies within intellectual skills, verbal information, psychomotor, and attitude domains of learning will be studied and applied. Prerequisite: EDCI 57200. Permission of instructor required. Typically offered Fall Spring Summer.

EDCI 68200 - Contemporary Curriculum Theory

Credit Hours: 3.00. Critical examination of contemporary concepts of curriculum theory. Rational/technical curriculum, social needs/child centered curriculum. Socio-political curriculum theory; curriculum as existential, aesthetic, and phenomenological. Implications for current practice, school reform, and educational research. Typically offered Spring.

EDCI 68400 - Seminar In Curriculum Studies

Credit Hours: 3.00. A course designed to allow for the in-depth exploration of specialized and timely topics in curriculum theory, practice, and reform. Though all specialized topics address both theory and practice, some topics focus more heavily on practice, and others focus more heavily on theory. Typically offered Fall Spring Summer.

EDCI 68500 - Global Issues In Education

Credit Hours: 3.00. Critical examination of contemporary global issues in education. Historical, social economic, political, and cultural theories of globalization in international context. Analysis and synthesis of current research. Implications and application to current practice, school reform, policy, curriculum, and educational research. Resources for instruction; curriculum design strategies for implementing global education. Prerequisite: 12 credit hours in Education. Typically offered Summer Fall Spring.

EDCI 69400 - Elementary Transition To Teaching Student Teaching/Internship

Credit Hours: 0.00 to 6.00. A full-time elementary classroom teaching experience and internship seminars. Students teach for a period of 14 weeks under the mentorship of a master teacher and a University supervisor. In order to provide support for student teachers and ongoing interactions among students and their supervisors, students will attend scheduled student-teaching seminars. After the classroom experience has ended, students will spend two additional weeks completing a variety of assignments. The purpose of the internship semester is to provide a structured experience for learning and refining the theories and practices necessary to become an effective teacher of all children in the inclusive classroom. Prerequisite: EDCI 50100, EDCI 51100, EDCI 58500, 60300, EDCI 60400, EDCI 60500. Permission of instructor required. Typically offered Fall Spring.

EDCI 69500 - Internship In Education

Credit Hours: 1.00 to 10.00. Amount of credit to be determined by nature and extent of the assignment. A special course in selected areas of education, designed to provide practical field experience under professional supervision in selected situations related to the candidate's area of specialization. Permission of instructor required. Typically offered Fall Spring Summer.

EDCI 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

EDCI 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Educational and Psychological Studies

EDPS 10000 - Personal Growth And Development

Credit Hours: 3.00. An experiential learning approach to interpersonal communications and such developmental issues as autonomy, identity, values clarification, intimacy, and career-life goals. Emphasis is upon active participation in small-group discussion and cognitive mastery of personal and interpersonal dynamics. Typically offered Fall Spring.

EDPS 10100 - Facil Personal Growth And Development

Credit Hours: 3.00. Facil Personal Growth And Development. Typically offered Fall Spring Summer.

EDPS 10101 - Learning In Context-An Introduction To The Learning Sciences

Credit Hours: 3.00. This introductory course is designed to acquaint first year Learning Science students with the core concepts, principles, and research findings of the learning sciences as they apply to a wide range of formal and informal educational contexts. The course provides students with opportunities to interact with and learn about the scholarship of College of Education faculty who conduct research within the framework of the learning sciences. Students will learn about faculty projects that exemplify key features of the Learning Sciences such as attention to the complexity of learning environments, the study of social

and cultural as well as individual dimensions of learning, and the cross-disciplinary nature of the field. Typically offered Fall Spring.

EDPS 10500 - Academic And Career Plan

Credit Hours: 3.00. Builds understanding of career interests and personality characteristics related to academic and career decisions. Expands knowledge of Purdue academic programs and of the world of work. Introduces decision-making strategies. Typically offered Fall Spring Summer.

EDPS 20000 - Life Career Planning

Credit Hours: 3.00. A course designed to help students clarify and develop educational and vocational plans related to career development. Emphasis upon assessment, exploration of vocational opportunities, the decision-making process, and identification of appropriate educational channels leading to selected career objectives. Section 1 for juniors and seniors only to focus their career direction and to develop job search, career management, and life-planning skills. Section 2 is for freshmen and sophomores only, in the process of changing or selecting a college major. Typically offered Fall Spring.

EDPS 21000 - Academic Self-Esteem Enhancement

Credit Hours: 3.00. Academic Self-Esteem Enhancement. Permission of instructor required. Typically offered Fall.

EDPS 23500 - Learning And Motivation

Credit Hours: 3.00. Introduction to concepts of learning and motivation in educational contexts (i.e., Educational Psychology). Influence of development, culture, and individual differences on learning and motivation. Uses of assessment and technology in promoting learning and motivation. A field-based experiential component is included. Typically offered Fall Spring Summer.

EDPS 26500 - The Inclusive Classroom

Credit Hours: 3.00. Characteristics of students with special needs/talents; strategies for helping students learn and develop in general educational settings. Emphasis placed upon research evidence, case studies, problem-based learning, and development of a plan for an inclusive classroom. A field-based component is included. Typically offered Spring Summer Fall.

EDPS 27000 - Characteristics of Individuals with Mild Disabilities

Credit Hours: 3.00. Characteristics of students with mild disabilities and their related academic and social outcomes, issues, and implications for assessment and intervention. Typically offered Fall.

EDPS 30000 - Student Leadership Development

Credit Hours: 1.00 to 3.00. Leadership in students is developed through lectures and experiential activities. Topic areas include leadership styles; campus organizational structures; program planning; social and intellectual activities; human relations and cultural differences; motivation; team building; public relations. Permission of instructor required. Typically offered Fall Spring.

EDPS 30100 - Peer Counseling Training

Credit Hours: 1.00 to 3.00. Students are trained to help peers deal with their problems and concerns. Training modules are used to build knowledge and skills in the duties of peer helpers; student development, communication, goal setting, and use of community resources are stressed. (EDPS 30100 and 30100 are for Horizon students only.). Permission of instructor required. Typically offered Fall Spring.

EDPS 30101 - Motivation To Learn

Credit Hours: 3.00. This course introduces students to current social-cognitive and sociocultural theories of motivation for learning and academic achievement, and research framed by those theories. Both individual-level and contextual factors associated with motivation will be considered. The course will also address applications of theory in educational settings, including motivational interventions. Typically offered Fall Spring.

EDPS 30102 - Social-Emotional Aspects Of Learning In Diverse Environments

Credit Hours: 3.00. The course examines the role of social emotional competence in learning and builds understandings of the inter-relationships between theory, empirical evidence, and instructional practice. It takes the perspective that experiences across different learning contexts are interrelated and may influence each other in reciprocal ways. The course views social-emotional dimensions of learning as: embedded in person-environment transactions; tied to specific instructional (formal and/or informal) contexts over time; co-evolving with cognition and language; critical to psychological, behavioral, and learning outcomes. The focus is on intersection of social-emotional competence, learning, and instruction. The course is intended to provide the foundations (theoretical and empirical) that can help those interested in formal and informal instructional environments make informed educational decisions by considering the social-emotional dimensions of learning. Typically offered Fall Spring.

EDPS 30200 - Adolescents Classroom Teacher

Credit Hours: 3.00. Students will develop understanding of physical, intellectual, emotional and social development of learners. Emphasis on individual differences and behavior patterns that influence the establishment of an orderly, healthy learning environment, and upon the teacher as an influence of the learning environment. Typically offered Fall Spring Summer.

EDPS 31500 - Collaborative Leadership: Listening

Credit Hours: 3.00. The purpose of this course is to provide integrated study of listening as a collaborative leadership skill necessary for interpersonal and intrapersonal development. Focus is on the development of professional listening skills, and the understand of the role listening plays in collaborative leadership conflict resolution, interviewing, team building, and ethics. Typically offered Fall Spring Summer.

EDPS 31600 - Collaborative Leadership: Cross-Cultural Settings

Credit Hours: 3.00. In this course, students will explore the cultural nuances of leadership in the United States as well as around the world. This course will include impact of globalism as a context for leadership, conflict resolution in a global environment, and other important factors that impact culturally diverse or global teams. Typically offered Summer.

EDPS 31700 - Collaborative Leadership: Mentoring

Credit Hours: 3.00. The purpose of this course is to provide a theoretical and experiential overview of the basic elements of mentoring as a key aspect of effective collaborative leadership. The learning experience is designed to promote development of the knowledge, skills, and dispositions required for competent mentorship. Emphasis on workplace and youth mentoring. Typically Summer.

EDPS 33000 - Child Behavior Elementary School

Credit Hours: 2.00. Presents methods of collecting and using information about the behavior and development of children in the elementary school. Typically offered Fall Spring Summer.

EDPS 36100 - Use Of Assessment Techniques In Special Education

Credit Hours: 3.00. Assessment techniques for the exceptional child, with applications to curriculum. Includes norm-referenced and curriculum-based measurement, error analyses, and observational ratings. Admission to Teacher Education Program, passage of Gate A. Typically offered Spring.

EDPS 36200 - Organization And Management Of Instructional Behaviors

Credit Hours: 3.00. Organization and management techniques, including structure, principles, scheduling, evaluation, and strategies for effective integration into regular, resource, and special education classrooms to motivate and increase appropriate learning behaviors and to manage problem behaviors. Admission to Teacher Education Program, passage of Gate A. Typically offered Fall.

EDPS 36400 - Practicum In Special Education Assessment

Credit Hours: 2.00 or 3.00. Practical experiences in test administration, scoring, and interpretation will be provided in practicum. Admission to Teacher Education Program, passage of Gate A. Typically offered Summer Fall Spring.

EDPS 40099 - Topics In Design Based Research, Assessment And Evaluation

Credit Hours: 3.00. Design-Based Research (DBR) is inquiry that is driven by educational practice- the desire to understand and improve the practice of teaching and learning. Learning scientist employ DBR in order to implement innovative designs for teaching and learning in a variety of formal and informal educational settings (e.g., schools, museums, and extramural clubs) and to conduct research no teaching and learning that occurs in the context of their design innovations. The focus of this course is to help students develop a set of core competencies for systemically studying the teaching and learning of science in designed environments. Typically offered Fall Spring.

EDPS 40101 - Computers And Cognition

Credit Hours: 3.00. This course provides an overview of the theoretical basis for using computers and technology K-12 and post-secondary settings. It explores how research on human cognition (e.g., memory, attention, problem solving) can be applied to the use of computers in educational settings. Typically offered Fall Spring.

EDPS 41000 - Collaboration And Transition Practices For Individuals With Disabilities

Credit Hours: 3.00. This course addresses the professional collaborative practices for special educators, who work with school age students with disabilities. The topics of this course include collaboration with professionals, ancillary personnel, agencies, and families, problem-solving and dealing with conflict, co-teaching, and transition planning from early intervention to post-secondary settings. The possible products from this course include community resources, transition plans, co-teaching plans, and family interviews. No undergraduate student may be enrolled in this undergraduate course until they have been admitted to the teacher education program and passed Gates A and B. Typically offered Spring.

EDPS 43000 - Creating And Managing Learning Environments

Credit Hours: 3.00. This course develops skills in classroom organization and management at the elementary level. It includes classroom discipline, interpersonal skills, administrative aspects of teaching, working with families, building support networks, and a classroom design project. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Typically offered Fall Spring.

EDPS 45900 - Assistive Technology

Credit Hours: 3.00. Use of technological applications in special education, including microcomputers, interactive video, auditory and visual enhancement, and other adaptive devices with individuals experiencing disabilities including learning disabilities, intellectual impairments, sensory and physical impairments. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Admission to Teacher Education Program, passage of Gates A and B. Typically offered Spring.

EDPS 46000 - Strategies For Teaching Individuals With Disabilities

Credit Hours: 3.00. Introduction to education of individuals with mild disabilities, learning disabilities, mild mental handicaps, and severe emotional handicaps. Topics include: technological applications, teacher effectiveness, instructional design, development of individualized education programs, and evaluation of instruction. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Admission to Teacher Education Program, passage of Gate A. Typically offered Spring.

EDPS 46100 - Practicum In Strategies For Teaching Individuals With Disabilities

Credit Hours: 1.00 to 6.00. Practicum experience in assessment and teaching of individuals with disabilities. Experience in design, delivery, implementation, and evaluation of instruction. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Admission to Teacher Education Program, passage of Gates A and B. Typically offered Fall.

EDPS 46200 - Advanced Strategies For Teaching Individuals With Disabilities

Credit Hours: 3.00. Advanced strategies for teaching individuals with disabilities. Topics include technological applications, reading, problem-solving, written language, self-monitoring, memory, peer tutoring, generalization, and computer-assisted instruction. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Admission to Teacher Education Program, passage of Gates A and B. Typically offered Fall.

EDPS 49000 - Individual Research And Teaching Experience

Credit Hours: 1.00 to 8.00. Primarily for teacher candidates requiring special, individualized experience in research or teaching. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 49100 - Topics And Issues In Education

Credit Hours: 1.00 to 3.00. Provides student with opportunity to strengthen preparation through study of selected educational topics and issues based upon individual needs and interests. One topic is considered in each enrollment. Typically offered Fall Spring Summer.

EDPS 49800 - Supervised Teaching- Special Education

Credit Hours: 1.00 to 16.00. A student planning to enroll in EDCI 49600, EDCI 49800, EDCI 49900; EDPS 49800, EDPS 49900, EDPS 56100, or EDPS 56600 in the spring or fall semester of any academic year must secure, complete, and submit a student teaching application form between the middle of September and November 1 preceding the academic year during which he or she will be enrolled in the course. Failure to file the application during or prior to this time will make it virtually impossible for the student to receive a student teaching assignment for that year. Application forms may be obtained in and submitted to Room 3241, Liberal Arts and Education Building. Teaching full time in a school classroom under the supervision of the teacher in charge of the class and a University supervisor. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. Admission to Teacher Education Program, passage of Gates A, B, and C. Typically offered Fall Spring Summer.

EDPS 49900 - Supervised Teaching Or Practicum In Endorsement Area

Credit Hours: 3.00 to 9.00. A student planning to enroll in EDCI 49600, EDCI 49800, EDCI 49900; EDPS 49800, EDPS 49900, EDPS 56100, or EDPS 56600 in the spring or fall semester of any academic year must secure, complete, and submit a student teaching application form between the middle of September and November 1 preceding the academic year during which he or she will be enrolled in the course. Failure to file the application during or prior to this time will make it virtually impossible for the student to receive a student teaching assignment for that year. Application forms may be obtained in and submitted to Room 3241, Liberal Arts and Education Building. Teaching full time in an endorsement area in a school classroom under the supervision of the teacher in charge of the class and a University supervisor. No undergraduate students may be enrolled in any of these undergraduate courses until they have been admitted to teacher education. completion of education courses required for the endorsement area and admittance to teacher education program. Typically offered Fall Spring Summer.

EDPS 50000 - Group Counseling Theories And Techniques

Credit Hours: 3.00. Theoretical and experiential overview of fundamental elements of group work and group counseling processes. Broad topics include purposes and types of groups, therapeutic factors and stages of leadership skills, and multicultural, ethical, and legal aspects of group counseling. Typically offered Fall Spring.

EDPS 50100 - Introduction To School Counseling

Credit Hours: 3.00. Presents an overview of counseling in elementary, middle, and secondary schools. Treats the history of school counseling, developmental characteristics and problems of students, and counseling program elements and issues. Typically offered Summer Fall Spring.

EDPS 50500 - Foundations Of Career Development And Assessment

Credit Hours: 3.00. Treats career development theories which emphasize aspects of the self in decision making, occupational classification systems, and educational and vocational information with applications to individual and group counseling. Typically offered Summer Fall Spring.

EDPS 50700 - Counseling Multicultural And Diverse Populations

Credit Hours: 3.00. Counseling strategies for multicultural and diverse populations encountered by helping professionals. Among the populations considered are ethnic and cultural minorities, older persons, the gifted, and the disabled. Typically offered Spring Summer.

EDPS 51000 - Culture And Cognition

Credit Hours: 1.00 to 3.00. Explores how culture shapes thinking and learning form childhood through adulthood. Students develop a critical understanding of the cross disciplinary research on culture and cognition and its implications for teaching and learning. Typically offered Fall.

EDPS 51500 - Applied Behavior Analysis For Teachers

Credit Hours: 3.00. Application of learning theory, measurement procedures, verification of functional relationships, and developing knowledge of current significant research in applied behavior analysis. Typically offered Fall Spring Summer.

EDPS 52000 - Characteristics Of Individuals With Severe Disabilities

Credit Hours: 3.00. Characteristics and issues encountered by individuals who experience severe and profound levels of mental retardation and/or autistic spectrum disorders. Characteristics include: learning, behavioral, social, emotional, and communicative abilities. Typically offered Fall Spring Summer.

EDPS 52500 - Language And Communication In Autism Spectrum Disorders

Credit Hours: 3.00. (SLHS 52500) This course will address development and impairment of language and communication in individuals with autism spectrum disorders (ASD). In addition to language and communication characteristics, this course will review the behavioral, cognitive, sensory, and social-emotional abilities of individuals with ASD. Differential diagnosis, assessment, and intervention strategies will be emphasized with a focus on empirically supported treatments and evidence-based practices. Current developments and research findings will be highlighted related to etiology and diagnosis of ASD, advances in biomedical research, augmentative and alternative communication strategies, assistive technology solutions, behavioral, cognitive, and physiological interventions, and comprehensive treatment approaches. Typically offered Fall Spring Summer.

EDPS 53000 - Advanced Educational Psychology

Credit Hours: 3.00. Theories of learning and development, research on instruction and learning, and principles of measurement applied to educational problems. Typically offered Fall Spring Summer.

EDPS 53100 - Introduction To Measurement And Evaluation

Credit Hours: 3.00. An introduction to the basic concepts and principles of measurement and evaluation with special emphasis on descriptive statistics, and teacher-made and standardized tests. Typically offered Summer Fall Spring.

EDPS 53200 - Measuring Educational Achievement

Credit Hours: 3.00. A course in developing, analyzing, and interpreting measures of educational achievement. Emphasis is placed upon cognitive tests. Nontest techniques for assessing behavior are also explored. Prior experience with statistics or measurement, although helpful, is not required for this course. Typically offered Fall Spring.

EDPS 53300 - Introduction To Educational Research I: Methodology

Credit Hours: 3.00. An introductory course in educational research and evaluation methodology which considers the various methods of educational research, the formulation of research hypotheses, and the preparation of research reports. Typically offered Summer Fall.

EDPS 53400 - Introduction To Educational Research II: Measurement Consideration

Credit Hours: 3.00. An introductory course in measurement concepts and statistical reasoning, with emphasis on the selection, evaluation, and/or development of independent and dependent variables as they are employed in educational research settings.

Unlike EDPS 53100 and EDPS 53200, this course is explicitly designed for the educational researcher and not for the teacher. Permission of instructor required. Typically offered Spring.

EDPS 53500 - Personal And Social Development During The School Years

Credit Hours: 3.00. Stresses understanding of personal and socio-emotional growth of students and teachers in the school environment. Attention is given to means of promoting personal and socio-emotional growth. Typically offered Summer Spring.

EDPS 53600 - Achievement Motivation And Performance

Credit Hours: 3.00. Study of current theory and research on the nature and development of achievement motivation. Motivation for intellectual and academic performance will be emphasized. Applications of theory in educational settings will be considered. Typically offered Fall.

EDPS 54000 - Gifted, Creative And Talented Children

Credit Hours: 3.00. Introduction to intellectual, social, and emotional characteristics of gifted youth. Philosophy of gifted education. Multi-talent concept of giftedness: intellectual, academic, creative, artistic, and leadership. Criteria for selecting instructional materials and methods. Designing learning experiences for the gifted. Typically offered Summer Fall Spring.

EDPS 54100 - Identification And Evaluation In Gifted Education

Credit Hours: 3.00. Introduction to instruments and procedures for identifying gifted, creative, and talented students. Procedures for evaluation of gifted programs and individual student progress. Also covers selection strategies and guidance of the gifted. Typically offered Summer Fall Spring.

EDPS 54200 - Curriculum And Program Development In Gifted Education

Credit Hours: 3.00. Introduction to curricular materials, curriculum development, and programs for gifted, creative, and talented students. Serves needs of teachers and administrators who are developing programs. Also covers administration and evaluation of programs and methods of orientation and in-service training of teachers. Typically offered Summer Fall Spring.

EDPS 54500 - Social And Affective Development Of Gifted Students

Credit Hours: 3.00. Study of the affective and psychosocial development of gifted students. Emphasis on developmental influences on academic performance. Introduction to appropriate educational and counseling interventions for gifted students. Typically offered Summer.

EDPS 56010 - Practicum In Special Education Assessment And Teaching

Credit Hours: 1.00 to 6.00. Assessment and teaching of individuals with varying disabilities. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 56200 - Augmentative And Alternative Communication

Credit Hours: 3.00. (SLHS 54000) Introduction to augmentative and alternative communication. Cognitive, educational, physical, psycho-social, and linguistic aspects are considered together with symbol characteristics, teaching strategies, and research issues. Typically offered Fall.

EDPS 56300 - Identification, Evaluation, And Assessment Of Exceptional Individuals

Credit Hours: 3.00. Advanced procedures for educational assessment of exceptional individuals: norm-referenced and curriculum-based measurement, error analyses, and observational ratings. Adaptations and selections of tests for sensory impairments, behavioral styles, different intelligence levels and ages. Typically offered Fall Spring Summer.

EDPS 56400 - Mild Mental Handicaps: Historical Perspectives, Etiology, And Characteristics

Credit Hours: 3.00. Advanced study of persons with varying disabilities. Topics include: historical development; theoretical models; etiological factors; characteristics; assessment and intervention. Typically offered Fall.

EDPS 56500 - Intervention Strategies And Research

Credit Hours: 3.00. Analysis of intervention strategies and research with individuals with varying disabilities. Reading comprehension; written composition; mathematics; mnemonic strategies; metacognitive strategies; self-monitoring; social problem solving; and transitional instruction. Typically offered Fall.

EDPS 56510 - Collaboration And Transition Practices In Special Education

Credit Hours: 3.00. Three modules related to collaboration and transition practices in special education are addressed. Included are theoretical frameworks and assessment for consultation and collaboration involving paraeducators and families. Typically offered Fall Spring Summer.

EDPS 56600 - Graduate Supervised Teaching Special Education

Credit Hours: 1.00 to 16.00. Demonstration of ability to function independently in special education setting by appropriately planning for student needs, implementing and evaluating plans, establishing appropriate classroom discipline, and interacting professionally with staff and parents. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 56800 - Social, Legal, And Ethical Issues In Special Education

Credit Hours: 3.00. Survey of difference and similarities of children with exceptionality, including their nature and characteristics related to their developmental and educational needs. Analysis and practical application of social, legal, and ethical issues in the field of special education. Typically offered Fall Spring Summer.

EDPS 57100 - Advanced Assistive Technology

Credit Hours: 3.00. Introduction and overview of assistive technology for communication, education, employment, recreation, and daily living activities. Typically offered Spring.

EDPS 57300 - Medical And Physical Management Of Individuals With Multiple Disabilities

Credit Hours: 3.00. Medical and physical aspects of severe disabilities and implications for educational models of intervention and service delivery. Topics include nature of disorders/conditions, recent research findings, advanced methods for individual adaptations, and procedures for structural modification. Typically offered Fall Spring Summer.

EDPS 57500 - Advanced Methods For Teaching Students With Social, Behavioral & Attentional Disorders.

Credit Hours: 3.00. Examination of different approaches to intervention as they relate to the social/emotional, behavioral, and attentional characteristics of students with mild disabilities. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 57600 - Methods Of Teaching Students With Severe Disabilities

Credit Hours: 3.00. Development of knowledge and skills to effectively plan for and teach students with severe disabilities across various educational settings. Topics include: instructional strategies, community-based instruction methods, and vocational training. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 57701 - Characteristics Of Children With Mild Exceptionalities: Advanced Level

Credit Hours: 3.00. This course addresses the academic, behavioral, social-emotional, cognitive, communication, and motor/physical/somatic characteristics of students with mild exceptionalities and their outcomes and implications for accommodation and intervention. Typically offered Fall Spring Summer.

EDPS 58900 - Special Topics For Teachers

Credit Hours: 1.00 to 4.00. Consideration of appropriate professional problems of experienced educational personnel in workshops or in-service programs. Typically offered Fall Spring Summer.

EDPS 59000 - Individual Research Problems

Credit Hours: 1.00 to 6.00. Opportunities for students to study particular problems under the guidance of a member of the This plan of individualized instruction may be used in any field of education or vocational education. Does not include thesis work. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 59100 - Special Topics In Education

Credit Hours: 1.00 to 4.00. Group study of a current problem or special topic of interest to professional educational personnel. Intensive study of research, theory, or practical aspects of a particular issue within the usual graduate class format. Typically offered Fall Spring Summer.

EDPS 60000 - Counseling Theories And Techniques

Credit Hours: 3.00. Examination of major counseling theories and counseling techniques, professional and ethical issues. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 60100 - Counseling Theories And Techniques Laboratory

Credit Hours: 3.00. Use of counseling techniques in a supervised laboratory; application of theories and techniques within varying employment settings. Concurrent Prerequisite: EDPS 60000. Typically offered Fall Spring Summer.

EDPS 60400 - Advanced Counseling Theories And Techniques

Credit Hours: 3.00. Integration of counseling theory, practice, and research. Emphasis on integrating counseling knowledge and skills with major counseling theories and interventions. Prerequisite: EDPS 60000. Permission of instructor required. Typically offered Spring.

EDPS 60500 - Advanced Career Development Theory And Research

Credit Hours: 3.00. Presents the dominant theories in contemporary career psychology. Emphasizes use of recent empirical findings to evaluate and analyze the validity of major constructs, assessment procedures, and counseling techniques derived from each theory. Prerequisite: EDPS 50500. Typically offered Summer Fall Spring.

EDPS 60900 - Program Development And Organization In Human Services

Credit Hours: 2.00 or 3.00. Issues and procedures in program development, management, organization, and administration for school guidance, college student affairs, and mental health services. Also treats administrative theory, intervention strategies, staff development, and evaluation. Prerequisite: EDPS 50100 or EDPS 50300 or EDPS 50400. Typically offered Spring Summer.

EDPS 61000 - Counseling Practicum

Credit Hours: 3.00. EDPS 61000 is a field experience for first year master's students in school counseling, consisting of a minimum of 100 hours in a school, under the supervision of both a site supervisor and a campus supervisor. Permission of instructor required. Prerequisites: EDPS 60000 and EDPS 60100. Permission of instructor required. Typically offered Spring.

EDPS 61100 - School Counseling Seminar

Credit Hours: 3.00. Attention given to current topics, such as special education, gifted education, data management, grant writing, crisis intervention, service learning, K-12 career development, and systemic change. Prerequisite: EDPS 50100, EDPS 50500, EDPS 60100, EDPS 61000. Permission of instructor required. Typically offered Spring.

EDPS 61200 - Advanced Applied Behavior Analysis

Credit Hours: 3.00. Advanced application of basic principles of learning and applied behavior analysis to make informed decisions to create effective contexts for learning. Prerequisite: EDPS 36200 or EDPS 51500 and EDPS 58800. Typically offered Fall Spring.

EDPS 61400 - Advanced Counseling Practicum

Credit Hours: 3.00. Supervised use of personal and career counseling techniques applied to complex and difficult client situations. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 61500 - Theories Of Counseling Supervision

Credit Hours: 3.00. Critical analysis of the theories and counseling supervision. Experiential exercises may be included. Prerequisite: EDPS 61400. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 61700 - Professional Issues, Ethics, And History Of Counseling Psychology

Credit Hours: 3.00. Three primary areas in counseling psychology: 1) historical development within psychology; 2) American Psychological Association ethics, professional, and legal issues; and 3) the scientist-practitioner training model in counseling psychology identity. Permission of instructor required. Typically offered Fall Spring.

EDPS 61800 - Counseling Psychology Research

Credit Hours: 3.00. Content and process learning related to recent investigations of counseling process and treatment efficacy research in counseling psychology. Concurrent prerequisite: EDPS 61700 and Doctoral student standing in the Counseling Psychology Program. Permission of instructor required. Typically offered Fall Spring.

EDPS 61900 - Counseling Psychology Research Practicum

Credit Hours: 3.00. Application of qualitative and quantitative research designs in counseling psychology. Concurrent prerequisite: EDPS 61800 and (PSY 60100 or STAT 50200) and Doctoral student standing enrolled in the Counseling Psychology Program. Typically offered Fall Spring.

EDPS 62000 - Counseling Seminar

Credit Hours: 1.00 to 4.00. Recent investigation and research in (1) counselor supervision; (2) professional issues; (3) counseling theories; (4) education of counselors and student personnel workers; (5) counseling methodology; (6) vocational development; (7) elementary school counseling; (8) counselor consultation; and (9) other relevant topics. One topic is dealt with in each enrollment. Prerequisite: Open to graduate students who have successfully completed 12 credit hours of previous counseling personnel services courses. Typically offered Fall Spring Summer.

EDPS 62100 - Advanced Multicultural Counseling Practicum

Credit Hours: 3.00. Advanced study and clinical application of racial and cultural theories in counseling. Knowledge and practicum components are integrated to facilitate development of awareness and skill competencies central to "Guidelines on Multicultural Education, Training, Research, Practice and Organizational Change for Psychologists" of the American Psychological Association. Prerequisite: EDPS 50700. Permission of instructor required. Typically offered Fall.

EDPS 62200 - Systems Concepts In Counseling And Development

Credit Hours: 3.00. Introduction to the use of systems concepts in the counseling professions. Individuals' development within relationships and family matrix, contemporary person-environment issues, and constructs for research and preventive, developmental, and remedial practice. Prerequisite: EDPS 61700. Typically offered Summer Fall Spring.

EDPS 62300 - Personality Assessment

Credit Hours: 3.00. Applied introduction to methods of administration, scoring, and interpretation of primarily objective personality assessments. Emphasis is placed on assessment of normative population with attention given to personal strengths, developmental factors, and issues of diversity. . Typically offered Summer Fall Spring.

EDPS 62400 - Advanced Off-Site Counseling Practicum And Supervision Theory

Credit Hours: 3.00. Supervised use of personal and/or career counseling and assessment applied to complex and difficult client situations. Critical analysis of counseling supervision theories. Prerequisite: EDPS 61400. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 62500 - Human Growth And Development

Credit Hours: 3.00. An overview of lifespan development. Study of major development theories of childhood, adolescence, and adulthood. Prerequisite: EDPS 60000. Typically offered Fall Spring Summer.

EDPS 63000 - Research Procedures In Education

Credit Hours: 3.00. Development of a philosophy of educational research and consideration of the methods for the selection and evaluation of techniques used in educational research. Techniques discussed are methods to control variables, sampling procedures, data collection procedures, statistical procedures, and research proposal development and writing. Prerequisite: EDPS 53300, (PSY 60100 or EDPS 53300), STAT 50200. Typically offered Fall Spring.

EDPS 63100 - Applied Educational Research Design Seminar

Credit Hours: 1.00 to 3.00. Presentation of a theoretical system for designing research on educational problems in the schools and provision of actual experiences in designing research in cooperation with public school personnel. Sessions with the school personnel involve students in the process of clarifying problems, identifying major parameter and variables, reviewing and interpreting prior research, and formulating a valid design. Prerequisite: EDPS 63000 and one graduate course in Statistics. Typically offered Fall.

EDPS 63200 - Seminar In Research Procedures In Education

Credit Hours: 1.00 to 3.00. Experimental, field study, scientific survey, and prediction study methods in education. Internal and external validity, identification and development of research problems, criteria development, common methodological errors, strategies of analysis, and sources of acceptable educational research literature will be reviewed. Critical analyses of the research methodology of educational research reports in the student's field. Prerequisite: EDPS 63000 or EDPS 53300 and course work in Statistics. Typically offered Spring.

EDPS 63300 - Seminar In Educational Psychology

Credit Hours: 1.00 to 3.00. Recent investigations and research in educational psychology. One topic is dealt with in each enrollment. The topics provide an in-depth study of those areas of psychological investigation in educational settings and problems. These areas include: (1) instructional technology and design; (2) individual differences and educational growth; (3) school learning: theory and research; (4) classroom behavior and social processes; (5) educational assessment; and (6) other relevant topics. Prerequisite: EDPS 53000. Typically offered Fall Spring.

EDPS 63400 - The Psychology Of Learning And Teaching At The College Level

Credit Hours: 3.00. (PSY 69500) Current methods of formulating objectives of instruction; examination of student characteristics which affect learning; discussion of basic learning processes; analysis of instructional variables which affect learning; selection of instruction methods and materials; evaluation of learning outcomes; and evaluation of the instructional system. Typically offered Fall Spring.

EDPS 63500 - Psychometric Theory And Application

Credit Hours: 3.00. Advanced classical test theory and application of psychometric methods to study technical properties of tests. Prerequisite: (EDPS 53100 and STAT 50200), or (PSY 60100 or PSY 51200) or consent of Instructor. Typically offered Fall Spring Summer.

EDPS 63600 - Item Response Theory

Credit Hours: 3.00. Models and model-data fit, estimation of ability and item parameters, item and test information, test construction, obtaining evidence of test reliability and validity, differential item functioning, norming, and equating. Prerequisite: EDPS 53100, (PSY 60100 or STAT 50200 or STAT 51200). Typically offered Summer Fall Spring.

EDPS 63700 - Data Analytic Procedures For Applied Research

Credit Hours: 3.00. Strategies for analyzing data with general statistical packages, including data management and application of various data analysis procedures, and interpretation of statistical results in applied research. Prerequisite: PSY 60100 or STAT 50200 or STAT 51200. Typically offered Summer Fall.

EDPS 63800 - Factor Analytic Procedures

Credit Hours: 3.00. Introduction to exploratory and confirmatory factor analysis techniques and examination of the use of factor analysis in social sciences. Emphasis on application of methods. Students will develop skills to conduct factor analytic research and critically review use of factor analysis in research. Prerequisite: STAT 51200, STAT 52400. Typically offered Spring.

EDPS 65000 - Critical Issues In Special Education

Credit Hours: 3.00. This course is designed for advanced graduate students in special education and related disciplines. The goals of this course are: (a) to familiarize students with current topics and critical controversies in special education, (b) to help students gain skills in critical analyses of issues, and (c) to provide students with opportunities to develop skills that are linked to the professorate (e.g., researching, writing, and speaking about contemporary issues). Typically offered Fall Spring.

EDPS 65300 - Collaborative Learning

Credit Hours: 3.00 Techniques for fostering productive collaboration in classrooms will be discussed along with the evidence for their educational effectiveness. The course will be research focused. Truth-wins, most -competent-member, and average-member models for comparing group performance to individual performance will be described. The goal will be to have students learn how to implement successful collaborative activities in classrooms while also developing the ability to further research in the field. In addition to course readings and class participation, students will be expected to propose a research study related to collaborative learning with emphasis on the literature review. Typically offered Fall Spring Summer.

EDPS 65500 - Computers And Cognition

Credit Hours: 3.00. This course focuses on the interaction between memory and human cognition with technology in general and computers in specific. Typically offered Fall Spring Summer

EDPS 66000 - Practicum In Special Education Assessment And Teaching

Credit Hours: 1.00 to 6.00. Assessment and teaching of individuals with varying disabilities. Prerequisite: EDPS 56300, EDPS 56400, EDPS 56500 or approved teaching experience. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 66100 - Review And Implications Of Research In Special Education

Credit Hours: 3.00. Investigation and research in (1) special issues; (2) mental retardation; (3) learning disabilities; (4) emotional disturbance; (5) early education for exceptional children; (6) curriculum development; (7) career education; (8) parent education; and (9) other relevant topics. One or more topics are dealt with in each enrollment period. Prerequisite: Must have post-master's status. Typically offered Fall Spring Summer.

EDPS 66300 - Organization And Administration Of Special Education

Credit Hours: 3.00. (EDST 66300) A comprehensive course in the organization and administration of special education including the organizational arrangements, identification, placement and service delivery, tests and assessments, program evaluation, personnel, and school/community relations. Typically offered Spring.

EDPS 66400 - Seminar In Special Education

Credit Hours: 1.00 to 4.00. A critical analysis of or special assignments related to research, practice, and selected problems in special education or in specific disability areas. One topic is considered in each enrollment. For advanced graduate students. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 66500 - Collaboration And Transition Practices In Special Education

Credit Hours: 3.00. Three modules related to collaboration and transition practices in special education are addressed. Included are theoretical frameworks and assessment for consultation and collaboration involving paraeducators and families. Typically offered Fall Spring Summer.

EDPS 68800 - Single Subject Research Design

Credit Hours: 2.00 or 3.00. Designed to introduce advanced level students to single subject research methodology in context of a science of human behavior, including design theory and application, measurement, experimental validity, applied behavior analysis, and data analysis procedures. Typically offered Fall Spring Summer.

EDPS 69500 - Internship In Education

Credit Hours: 1.00 to 10.00. Amount of credit to be determined by nature and extent of the assignment. A special course in selected areas of education, designed to provide practical field experience under professional supervision in selected situations related to the candidate's area of specialization. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 69600 - Internship In Counseling Psychology

Credit Hours: 1.00 to 10.00. A special course in the practice activities of counseling psychology. Provides field experience under the supervision of a licensed psychologist. Permission of instructor required. Typically offered Summer Fall Spring.

EDPS 69700 - Education Specialist Project-Research

Credit Hours: 0.00 to 18.00. Educational Specialist project research. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

EDPS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Educational Leadership and Cultural Foundations

EDST 20000 - History And Philosophy Of Education

Credit Hours: 3.00. (EDFA 20000) How history and philosophy have informed school organization, curriculum, and teaching practice. Students develop their own philosophies of teaching. Topics include continuities and discontinuities of schooling, colonial period to present. Conflicting demands placed upon schools. Issues of race, class, and gender inform debates over school purposes and practices. Typically offered Fall Spring Summer.

EDST 24800 - Contemporary Issues In American Schools

Credit Hours: 3.00. Students will read about and discuss critical issues facing schools today. Issues will include: funding, testing/assessment, charter schools, vouchers, bilingualism, dropout programs, violence in schools, accountability movement, teacher unions, parent involvement, inclusion, tracking, technology, and others. Requirements include weekly readings and online responses; one five-page paper; and one group project. Typically offered Fall Spring.

EDST 49000 - Individual Research And Teaching Experience

Credit Hours: 1.00 to 8.00. Primarily for teacher candidates requiring special, individualized experience in research or teaching. Permission of instructor required. Typically offered Fall Spring Summer.

EDST 49100 - Topics And Issues In Education

Credit Hours: 1.00. Provides student with opportunity to strengthen preparation through study of selected educational topics and issues based upon individual needs and interests. One topic is considered in each enrollment. Typically offered Fall.

EDST 50000 - Philosophy Of Education

Credit Hours: 3.00. (EDFA 50000) Study of fundamental philosophical issues and concepts in education. Treatment of historical and contemporary positions in educational philosophy and connection of philosophical understandings to American schools. Typically offered Fall Spring Summer.

EDST 50100 - History Of American Education

Credit Hours: 3.00. Survey course with analysis of key terms: history, education, and American. Examination of European background of American education; cultural, philosophical, psychological, historical, and sociological factors that have shaped the educational system. Typically offered Fall Spring Summer.

EDST 50600 - History Of Women's Education

Credit Hours: 3.00. Study of types of school systems, programs, and curricula for females at elementary, secondary, and postsecondary levels, as well as nonformal education programs, throughout American history. Intersection of gender, race, ethnicity, social class, and regionalism is emphasized. Typically offered Fall Spring.

EDST 51100 - Information Systems In Education

Credit Hours: 3.00. (EDFA 51100) An overview of automated data processing applications to education. Primary emphasis on administrative applications for pupil, staff, facility, program, and financial accounting. Typically offered Summer Fall Spring.

EDST 51200 - Foundations Of Educational Administration

Credit Hours: 3.00. (EDFA 51200) Administration of education; roles of local, state, and federal government. Focus on purpose, organization, task areas, and processes of educational administration. Typically offered Summer Fall Spring.

EDST 51300 - Educational Facilities Planning

Credit Hours: 3.00. (EDFA 51300) Systems approach as a basis for school facilities planning. Study directed toward procedures for solving facilities problems. Emphasis on techniques for developing and securing technical information. Permission of instructor required. Typically offered Fall Spring Summer.

EDST 51400 - Economics Of Education

Credit Hours: 3.00. (EDFA 51400) A general course in financing education, including current economic theories, sources of revenues, and trends in fiscal structure and operations in education. Typically offered Summer Fall Spring.

EDST 51600 - School-Community Relations

Credit Hours: 3.00. (EDFA 51600) This course will stress concepts and principles relevant to school-community interaction. It will focus on the new roles of the public in education and will deal with problems encountered by educators in communicating with the public. Typically offered Fall.

EDST 58900 - Special Topics For Teachers

Credit Hours: 1.00 to 4.00. (EDFA 58900) Consideration of appropriate professional problems of experienced educational personnel in workshops or in-service programs. Typically offered Fall Spring Summer.

EDST 59000 - Individual Research Problems

Credit Hours: 1.00 to 6.00. (EDFA 59000) Opportunities for students to study particular problems under the guidance of a member of the This plan of individualized instruction may be used in any field of education or vocational education. Does not include thesis work. Permission of instructor required. Typically offered Fall Spring Summer.

EDST 59100 - Special Topics In Education

Credit Hours: 1.00 to 4.00. (EDFA 59100) Group study of a current problem or special topic of interest to professional educational personnel. Intensive study of research, theory, or practical aspects of a particular issue within the usual graduate class format. Typically offered Fall Spring Summer.

EDST 60000 - Seminar In The Foundations Of Education

Credit Hours: 3.00. Recommended for those who have had a prior foundations course. Specialized studies in such areas as educational history, educational philosophy, educational sociology, religion and public education, current educational issues, and classical literature of education. Typically offered Fall, Spring, Summer.

EDST 60200 - Seminar: The School Principalship

Credit Hours: 3.00. Individual exploration in depth of selected aspects of the school principalship and critical analysis of related issues. Prerequisite: EDST 51200. Typically offered Summer Fall Spring.

EDST 60300 - The American College And University

Credit Hours: 3.00. Recommended for those who plan to teach on the higher level. History of the development of American higher education, current trends and/or problems, and individual in-depth study of matters related to the individual student's area of specialization. Typically offered Spring.

EDST 60500 - Elementary School Administration

Credit Hours: 2.00 or 3.00. (EDFA 605) Study of role and responsibilities of the elementary school principalship; focus upon leadership functions in staff and pupil personnel, school and class organization, plant management, instructional and educational program, and school and community relations. Prerequisite: EDST 51200. Typically offered Summer Fall.

EDST 60700 - Administration Of Educational Systems

Credit Hours: 3.00. (EDFA 607) An examination of administrative function, process, structure, and practice. Special emphasis given to theory development in administration. Exploration of system analysis applications to educational administration. Prerequisite: EDST 51200. Typically offered Fall Spring Summer.

EDST 60800 - Business Management In Education

Credit Hours: 3.00. (EDFA 608) Examination of internal and external determinants of school fiscal policy. Experiences with fiscal procedures for school budgeting and accounting, including preparation of a school budget. Prerequisite: EDST 51400. Typically offered Fall Spring Summer.

EDST 60900 - Legal Aspects Of American Education

Credit Hours: 3.00. (EDFA 60900) Legal foundations of education as established by constitutional provisions, court decisions, opinions of attorney generals, administrative rulings, and executive directives. Emphasis on legal theory and principles currently in state of change. Stress of case study method of investigation into educational law. Prerequisite: 9 credit hours in Education. Typically offered Fall Spring Summer.

EDST 61000 - Supervision Of Instruction And Instructional Personnel

Credit Hours: 3.00. (EDFA 610) Examination of the functions of school administration which focus on achievement of instructional expectations of educational service. Emphasis on developing an individualized supervisory program for instructional personnel. Prerequisite: EDST 51200. Typically offered Summer Spring.

EDST 61200 - Seminar In Educational Administration And Curriculum

Credit Hours: 3.00. An analysis of current research and theory related to selected topics in educational administration and curriculum. One topic is studied in each enrollment. Permission of instructor required. Typically offered Fall Spring Summer.

EDST 61300 - Clinic For Educational Leaders

Credit Hours: 1.00 to 6.00. (EDFA 61300) Clinic for educational leaders. Typically offered Summer.

EDST 61500 - Educational Policy And Decision Making

Credit Hours: 3.00. (EDFA 615) Examination of educational policy and decision making on the federal, state, and local levels. Analysis of the conversion of demands made upon the school as a political system to policies responsible for allocating resources to its various constituencies. Various methodological approaches to the study of educational policy. Prerequisite: EDST 51200. Typically offered Fall Spring Summer.

EDST 61600 - Analytical Techniques In Educational Management

Credit Hours: 3.00. (EDFA 61600) Analytical techniques requisite to planning and conducting efficient and cost-effective needs assessment, goal definition, planning, decision making, and evaluation of educational efforts. Emphasis placed on applied educational problem solving and cost-effective solutions. Prerequisite: EDST 51400 or EDST 60800. Typically offered Fall Spring Summer.

EDST 66300 - Organization And Administration Of Special Education

Credit Hours: 3.00. (EDPS 66300) A comprehensive course in the organization and administration of special education including

the organizational arrangements, identification, placement and service delivery, tests and assessments, program evaluation, personnel, and school/community relations. Typically offered Spring.

EDST 69400 - Intern In Educational Administration: Building Administrator

Credit Hours: 1.00 to 3.00. (EDFA 69400) Field experience in educational administration under university supervision in selected situations related to school building administration. Amount of credit to be determined by nature and extent of assignment. Permission of instructor required. Typically offered Summer Fall Spring.

EDST 69500 - Internship In Education

Credit Hours: 1.00 to 10.00. (EDFA 69500) Amount of credit to be determined by nature and extent of the assignment. A special course in selected areas of education, designed to provide practical field experience under professional supervision in selected situations related to the candidate's area of specialization. Typically offered Fall Spring Summer.

EDST 69700 - EdS Project-Research

Credit Hours: 0.00 to 18.00. Educational Specialist project in research. Permission of instructor required. Typically offered Fall Spring Summer.

EDST 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Electrical and Computer Engineering

ECE 19000 - Introduction To Electrical And Computer Engineering

Credit Hours: 1.00. This course is intended to provide an introduction to electrical and computer engineering for students in their freshman year. A goal is to provide some historical background of the respective sub-areas within ECE, a description of analytical tools that will be developed throughout their curriculum, the motivation for the tools, and to inform students of elective courses in ECE. Typically offered Spring.

ECE 19595 - Selected Topics In Electrical And Computer Engineering

Credit Hours: 1.00 to 5.00. Topics vary. Permission of department required. Typically offered Fall Spring Summer.

ECE 20000 - Electrical And Computer Engineering Seminar

Credit Hours: 0.00. An introduction to the School of Electrical and Computer Engineering, ECE program objectives and outcomes, BSEE & BSCmpE degree requirements, and professional development. Typically offered Fall Spring.

ECE 20100 - Linear Circuit Analysis I

Credit Hours: 3.00. Volt-ampere characteristics for circuit elements; independent and dependent sources; Kirchhoff's laws and circuit equations. Source transformations; Thevenin's and Norton's theorems; superposition, step response of 1st order (RC, RL) and 2nd order (RLC) circuits. Phasor analysis, impedance calculations, and computation of sinusoidal steady state responses. Instantaneous and everage power, complex power, power factor correction, and maximum power transfer. Instantaneous and average power. Typically offered Fall Spring Summer.

ECE 20200 - Linear Circuit Analysis II

Credit Hours: 3.00. Continuation of ECE 20100. Use of Laplace Transform techniques to analyze linear circuits with and without initial conditions. Characterization of circuits based upon impedance, admittance, and transfer function parameters. Determination of frequency response via analysis of poles and zeros in the complex plane. Relationship between the transfer function and the impulse response of a circuit. Use of continuous time convolution to determine time domain responses. Properties and practical uses of resonant circuits and transformers. Input - output characterization of a circuit as a two-port. Low and high-pass filter design. Typically offered Fall Spring Summer.

ECE 20700 - Electronic Measurement Techniques

Credit Hours: 1.00. Experimental exercises in the use of laboratory instruments. Voltage, current, impedance, frequency, and wave form measurements. Frequency and transient response. Elements of circuit modeling and design. Typically offered Fall Spring Summer.

ECE 20800 - Electronic Devices And Design Laboratory

Credit Hours: 1.00. Laboratory experiments in the measurement of electronic device characteristics. Design of biasing networks, small signal amplifiers, and switching circuits. Typically offered Fall Spring.

ECE 25500 - Introduction To Electronic Analysis And Design

Credit Hours: 3.00. Diode, bipolar transistor, and FET circuit models for the design and analysis of electronic circuits. Single and multistage analysis and design; introduction to digital circuits. Computer-aided design calculations, amplifier operating point design, and frequency response of single and multistage amplifiers. High-frequency and low-frequency designs are emphasized. Typically offered Fall Spring.

ECE 26400 - Advanced C Programming

Credit Hours: 3.00. Continuation of a first programming course. Topics include files, structures, pointers, and the proper use of dynamic data structures. A basic knowledge of the UNIX operating system and an introductory C programming course; C programming knowledge should include basic syntax, control structures, and file I/O, as well as experience in declaring and using functions. Typically offered Fall Spring.

ECE 27000 - Introduction To Digital System Design

Credit Hours: 4.00. An introduction to digital system design and hardware engineering, with an emphasis on practical design techniques and circuit implementation. Typically offered Fall Spring Summer.

ECE 27900 - Sophomore Participation In Vertically Integrated Projects In Electrical And Computer Engineering

0 or 2.00. This course provides an opportunity for undergraduate students to explore and develop comprehensive applications of electrical and computer engineering technologies, especially as they relate to active research areas of Purdue faculty members. Students will learn about the underlying research, and will work on teams to formulate applications of the research that address real-world needs. Students will attend a weekly lecture that provides an introduction to a broad range of applicable technologies and development tools - some associated with the activities of specific teams, and some addressing topics of more general value to students enrolled in the course. Typically offered Fall Spring.

ECE 29100 - Industrial Practice I

Credit Hours: 0.00. For cooperative education program students only. Typically offered Fall Spring Summer.

ECE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 29200 - Industrial Practice II

Credit Hours: 0.00. For cooperative education program students only. Typically offered Fall Spring Summer.

ECE 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 29595 - Selected Topics In Electrical And Computer Engineering

Credit Hours: 1.00 to 5.00. Topics vary. Permission of department required. Typically offered Fall Spring Summer.

ECE 29600 - Electrical And Computer Engineering Projects

Credit Hours: 0.0 to 18.0. Projects in Electrical and Computer Engineering. Permission of Department required. Typically offered Fall Spring Summer.

ECE 30010 - Introduction To Machine Learning And Pattern Recognition

Credit Hours: 3.00. Intelligent information processing, search and retrieval, classification, recognition, prediction and optimization with machine learning and pattern recognition algorithms such as neural networks, support vector machines, decision trees and data mining methods, current models and architectures, implementation topics especially in software, applications in areas such as information processing, search and retrieval of internet data, forecasting (prediction), classification, signal/image processing, pattern recognition, optimization, simulation, system identification, communications, control, management and finance. Topics covered will also be illustrated with the software package MATLAB and related toolboxes. Permission of instructor required. Typically offered Summer.

ECE 30100 - Signals And Systems

Credit Hours: 3.00. Classification, analysis and design of systems in both the time- and frequency-domains. Continuous-time linear systems: Fourier Series, Fourier Transform, bilateral Laplace Transform. Discrete-time linear systems: difference equations, Discrete-Time Fourier Transform, bilateral Z-Transform. Sampling, quantization, and discrete-time processing of continuous-time signals. Discrete-time nonlinear systems: median-type filters, threshold decomposition. System design examples such as the compact disc player and AM radio. Typically offered Fall Spring.

ECE 30200 - Probabilistic Methods In Electrical And Computer Engineering

Credit Hours: 3.00. An introductory treatment of probability theory, including distribution and density functions, moments, and random variables. Applications of normal and exponential distributions. Estimation of means, variances, correlation, and spectral density functions. Random processes and responses of linear systems to random inputs. Typically offered Fall Summer Spring.

ECE 30500 - Semiconductor Devices

Credit Hours: 3.00. Introduces and explains terminology, models, properties, and concepts associated with semiconductor devices. Provides detailed insight into the internal workings of the "building-block" device structures such as the pn-junction diode, Schottky diode, BJT, and MOSFET. Presents information about a wide variety of other devices including solar cells, LEDs, HBTs, and modern field-effect devices. Systematically develops the analytical tools needed to solve practical device problems. Typically offered Fall Spring.

ECE 30600 - Electronic Circuits And Systems Laboratory

Credit Hours: 1.00. Experiments in electronic circuits and systems, including spectral analysis techniques, sampling, distortion measurements, random signals, signal-to-noise ratio and correlation. Typically offered Fall Spring.

ECE 30700 - Electromagnetic Fields And Waves Laboratory

Credit Hours: 1.00. Experimental exercises illustrating concepts in electric and magnetic fields, transmission lines, electromagnetic fields, simple waveguides, and antennas. Typically offered Fall Spring.

ECE 30800 - Systems Simulation And Control Laboratory

Credit Hours: 1.00. Instruction and laboratory exercises in the solution of differential equations that arise in the modeling of physical systems. Instruction in the principles of operation and design of linear control systems. Typically offered Fall Spring.

ECE 30834 - Fundamentals Of Computer Graphics

Credit Hours: 3.00. Fundamental principles and techniques of computer graphics. The course covers the basics of going from a scene representation to a raster image using OpenGL. Specific topics include coordinate manipulations, perspective, basics of illumination and shading, color models, texture maps, clipping and basic raster algorithms, fundamentals of scene constructions. Permission of department required. Typically offered Fall.

ECE 30862 - Object-Oriented Programming In C++ And Java

Credit Hours: 3.00. C++ and Java programming languages, including classes, inheritance, encapsulation, polymorphism, class derivation, abstract classes, interfaces, static class members, object construction and destruction, namespaces, exception handling, function, overloading and overriding, function name overload resolution, container classes, and template classes. Typically offered Fall Spring Summer.

ECE 31100 - Electric And Magnetic Fields

Credit Hours: 3.00. Continued study of vector calculus, electrostatics, and magnetostatics, and Maxwell's equations. Introduction to electromagnetic waves, transmission lines, and radiation from antennas. Typically offered Fall Spring.

ECE 32100 - Electromechanical Motion Devices

Credit Hours: 3.00. The general theory of electromechanical motion devices relating electric variables and electromagnetic forces. The basic concepts and operational behavior of DC, induction, brushless DC, and stepper motors used in control applications are presented. Typically offered Fall Spring.

ECE 32300 - Electromechanical Motion Devices and Systems Laboratory

Credit Hours: 1.00. Experiments closely coordinated with ECE 32100 involving measurement of fundamental parameters of various electromechanical devices using modern instrumentation techniques. Computer simulation is used to predict steady-state and dynamic operating characteristics. Comparison of predicted and measured performance is emphasized. Typically offered Fall Spring.

ECE 33700 - ASIC Design Laboratory

Credit Hours: 2.00. Introduction to standard cell design of VLSI (Very Large Scale Integration) digital circuits using the VHDL hardware description language (Very High Speed Integrated Circuits Hardware Description Language). Emphasis on how to

write VHDL that will map readily to hardware. Laboratory experiments using commercial grade computer-aided design (CAD) tools for VHDL based design, schematic based logic entry, logic and VHDL simulation, automatic placement and routing, timing analysis, and testing. Typically offered Fall Spring.

ECE 35700 - VLSI Chip Design Laboratory

Credit Hours: 1.00. Introduction to standard cell design of VLSI digital circuits using VHDL hardware description language. Emphasis on how to write VHDL that will map readily to hardware. Laboratory experiments using commercial grade computer-aided design (CAD) tools for VHDL based design, schematic based logic entry, logic and VHDL simulation, automatic placement and routing, timing analysis, and testing. Typically offered Fall Spring.

ECE 36200 - Microprocessor Systems And Interfacing

Credit Hours: 4.00. An introduction to basic computer organization, microprocessor instruction sets, assembly language programming, and microcontroller peripherals. Typically offered Fall Spring Summer.

ECE 36400 - Software Engineering Tools Laboratory

Credit Hours: 1.00. To acquaint the students with a variety of current software engineering tools, scripting languages, and application programming languages. Students are expected to use their previous programming experience to design and test software programs using the techniques learned in this course. Typically offered Fall Spring.

ECE 36800 - Data Structures

Credit Hours: 3.00. Provides insight into the use of data structures. Topics include stacks, queues and lists, trees, graphs, sorting, searching, and hashing. Typically offered Fall Spring.

ECE 36900 - Discrete Mathematics For Computer Engineering

Credit Hours: 3.00. This course introduces discrete mathematical structures and finite-state machines. Students will learn how to use logical and mathematical formalisms to formulate and solve problems in computer engineering. Topics include formal logic, proof techniques, recurrence relations, sets, combinatorics, relations, functions, algebraic structures, and finite-state machines. Typically offered Fall Spring.

ECE 37900 - Junior Participation In Vertically Integrated Projects (VIP) In Electrical And Computer Engineering

Credit Hours: 1.00 or 2.0. This course provides an opportunity for undergraduate students to explore and develop comprehensive applications of electrical and computer engineering technologies, especially as they relate to active research areas of Purdue faculty members. Students will learn about the underlying research, and will work on teams to formulate applications of the research that address real-world needs. Students will attend a weekly lecture that provides an introduction to a broad range of applicable technologies and development tools - some associated with the activities of specific teams, and some addressing topics of more general value to students enrolled in the course. Typically offered Fall Spring.

ECE 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 38200 - Feedback System Analysis And Design

Credit Hours: 3.00. In this course, classical concepts of feedback system analysis and associated compensation techniques are presented. In particular, the root locus, Bode diagram, and Nyquist criterion are used as determinants of stability. Typically offered Fall Spring.

ECE 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 39300 - Industrial Practice III

Credit Hours: 0.00. For cooperative education program students only. Typically offered Fall Spring Summer.

ECE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 39400 - Industrial Practice IV

Credit Hours: 0.00. For cooperative education program students only. Typically offered Fall Spring Summer.

ECE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 39500 - Industrial Practice V

Credit Hours: 0.00. For cooperative education program students only. Typically offered Fall Spring Summer.

ECE 39595 - Selected Topics In Electrical And Computer Engineering

Credit Hours: 1.00 to 5.00. Topics vary. Permission of department required. Typically offered Fall Spring Summer.

ECE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 39600 - Industrial Practice Seminar I

Credit Hours: 1.00. A special seminar for cooperative education and curricular practical training students. Permission of instructor required. Typically offered Spring Fall.

ECE 39699 - Professional Practice Internship

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

ECE 40000 - Professional Development And Career Guidance

Credit Hours: 1.00. A lecture-demonstration series emphasizing evaluation of career options, identification and development of professional skills. Examples of career-related topics include choosing a job, and post-graduate education in engineering or other disciplines. Examples of professional skill topics covered include interviewing, writing, intellectual property and ethics. Typically offered Fall Spring.

ECE 40020 - Sound Reinforcement System Design

Credit Hours: 3.00. An introduction to computational tools used in the measurement and analysis of electro-acoustic systems, and their application to sound reinforcement system engineering. Service learning based projects, serving the needs of community clients, provide the context for application of sound reinforcement system design principles and practices. Typically offered Fall.

ECE 40200 - Electrical Engineering Design Projects

Credit Hours: 3.00. Lecture sessions provide the student with background information on the design and management of projects. Formal lectures cover, for example, design for manufacturability, design for quality, test and evaluation, reliability and ethics, patents and copyrights, plus case studies. During the laboratory sessions, the students work in teams on a challenging open-ended electrical engineering project that draws on previous coursework. Projects routinely involve standard design facets (such as consideration of alternative solutions, feasibility considerations, and detailed system descriptions) and include a number of realistic constraints (such as cost, safety, reliability, and aesthetics). Completion of BS EE or BS CmpE core curriculum. Typically offered Fall Spring.

ECE 40400 - Introduction To Computer Security

Credit Hours: 3.00. Introduction to security issues related to the operation of computers and the workings of computer networks. Topics covered include introduction to cryptography, authentication protocols, digital signature algorithms, internet vulnerabilities, worms and virus propagation, denial of service attacks, etc. The students will also learn how to design firewalls to protect a system against unwanted intrusions. Permission of department required. Typically offered Spring.

ECE 40700 - Semiconductor Measurements Laboratory

Credit Hours: 1.00. Experiments incorporating state-of-the-art equipment and measurement techniques are performed to collect electrical characteristics exhibited by a representative set of semiconductor devices including the pn-junction diode, Schottky diode, photo devices (solar cell, photo detectors, LEDs), BJTs, the MOS-Capacitor, MOSFETs, and special resistor-like structures. The devices are subjected to d.c., a.c., and pulse biastry, magnetic fields, optical excitation, and/or temperature ranging. The measured characteristics are subsequently used to deduce information about the internal nature and/or operation of semiconductor devices. Typically offered Fall Spring.

ECE 41200 - Introduction To Engineering Optics

Credit Hours: 3.00. The control and characteristics of optical radiation are covered. Applications to optical instrumentation, thin films, holography, and polarizing optics are discussed. Typically offered Fall.

ECE 41300 - Introduction To Optics Laboratory

Credit Hours: 1.00. A set of laboratory experiments dealing with fundamentals and applications of geometrical optics, polarization optics, wave optics, and Fourier optics. Typically offered Fall.

ECE 41400 - Elements Of Electro And Fiber Optics

Credit Hours: 3.00. Introduction to the use of lasers, fiber and integrated optical components and devices in communication and sensory applications. Topics include generation, transformation, modulation, deflection, and detection of laser beams, and their applications in fiber communication sensory systems. Typically offered Spring.

ECE 41437 - ASIC Fabrication And Test I

Credit Hours: 2.00. The first semester of a two-semester sequence to give teams of 3 to 6 students the experience of designing an ASIC (Application Specific Integrated Circuit), having the chip fabricated and testing it. The team of students will develop requirements for a design, prepare the design using VHDL ((VHSIC(very high speed integrated circuit) Hardware Description Language)), Verilog, or schematic entry tools, create and use test benches to functionally verify the design, use automated tools to prepare a circuit layout, verify the final layout, submit the layout for fabrication, prepare a physical test bed, test or demonstrate the chip, and document all aspects of the design and test results. Permission of department required. Typically offered Fall.

ECE 41438 - ASIC Fabrication And Test II

Credit Hours: 2.00. The second semester of a two-semester sequence to give teams of 3 to 6 students the experience of designing an ASIC (Application Specific Integrated Circuit), having the chip fabricated and testing it. The team of students will develop requirements for a design, prepare the design using VHDL ((VHSIC(very high speed integrated circuit) Hardware Description Language)), Verilog, or schematic entry tools, create and use test benches to functionally verify the design, use automated tools to prepare a circuit layout, verify the final layout, submit the layout for fabrication, prepare a physical test bed, test or demonstrate the chip, and document all aspects of the design and test results. Permission of department required. Typically offered Spring.

ECE 41500 - Electro- And Fiber Optics Laboratory

Credit Hours: 1.00. Laboratory exercises in lasers, hologram, modulation and deflection of laser beams, fiber components, and systems. Typically offered Spring.

ECE 42300 - Electromechanical Motion Control

Credit Hours: 3.00. The operation, analysis, and control of electromechanical systems are covered, including a treatment of electromechanical devices, power electronics, and control systems. Sample applications include servo-systems, propulsion drives, and variable-speed rotational equipment. Typically offered Spring.

ECE 42500 - Electric Machines

Credit Hours: 3.00. A study of the energy conversion principles and operating behavior of AC and DC electric machines. Develops circuit models to study their steady-state characteristics and simple mathematical models to study their transient responses. Considers engineering aspects of practical machines. Examines industrial methods of starting and controlling these machines. Emphasis on formulations that lend themselves readily to digital computational techniques. Typically offered Fall.

ECE 43200 - Elements Of Power System Engineering

Credit Hours: 3.00. Fundamental concepts of power system analysis, transmission line parameters, basic system models, steady-state performance, network calculations, power flow solutions, fault studies, symmetrical components, operating strategies, and control. Typically offered Fall.

ECE 43300 - Power Electronics

Credit Hours: 3.00. Introduction to the fundamental operating principles of power conditioning circuits that are currently being used to effect power flow from AC to DC and vice versa. Emphasis is on the relationship between form and function of these

circuits. Circuits discussed will include AC/DC line-commutated converters, DC/DC converters, DC/variable frequency converters, resonant converters, and AC/AC converters. Computer simulations will be used as a part of the coursework. Typically offered Fall Spring.

ECE 43400 - Power Engineering Laboratory

Credit Hours: 1.00. The laboratory consists of experiments on power measurement techniques, power flow control, and on common components, such as transformers, rectifiers, induction and synchronous machines. Typically offered Fall.

ECE 43500 - Object-Oriented Design Using C++ And Java

Credit Hours: 3.00. Review of OO design with C++ and Java. Difficulties caused by multiple inheritances in C++. Taking advantage of Run-Time Identification in C++. Multi-threading, AWT, and Network Programming in Java. Discussion of Java applets, beans, and servlets. Unified modeling language. Use-case analysis. Constructing conceptual models. System sequence diagrams. "Gang of Four" design patterns. Case studies. Permission of instructor required. Typically offered Spring.

ECE 43700 - Computer Design And Prototyping

Credit Hours: 4.00. An introduction to computer organization and design, including instruction set selection, arithmetic logic unit design, datapath design, control strategies, pipelining, memory hierarchy, and I/O interface design. Typically offered Fall Spring.

ECE 43800 - Digital Signal Processing With Applications

Credit Hours: 4.00. The course is presented in five units. Foundations: the review of continuous-time and discrete-time signals and spectral analysis; design of finite impulse response and infinite impulse response digital filters; processing of random signals. Speech processing; vocal tract models and characteristics of the speech waveform; short-time spectral analysis and synthesis; linear predictive coding. Image processing: two-dimensional signals, systems and spectral analysis; image enhancement; image coding; and image reconstruction. The laboratory experiments are closely coordinated with each unit. Throughout the course, the integration of digital signal processing concepts in a design environment is emphasized. Typically offered Summer Fall Spring.

ECE 44000 - Transmission Of Information

Credit Hours: 4.00. Analysis and design of analog and digital communication systems. Emphasis on engineering applications of theory to communication system design. The laboratory introduces the use of advanced engineering workstations in the design and testing of communication systems. Typically offered Fall Spring.

ECE 44100 - Distributed Parameter Systems

Credit Hours: 3.00. Transient and steady-state behavior of transmission lines, wave guides, antennas, propagation, noise, microwave sources, and system design. Typically offered Fall.

ECE 44500 - Modern Filter Design

Credit Hours: 4.00. Solution to the filtering approximation problem via Butterworth, Chebyshev, Elliptic, etc., approaches. Transfer function scaling and type transformations. Effects of A/D and D/A conversion. Digital filter design methods. Active filter design using operational amplifiers. Operation and design of switched capacitor filters. A laboratory for the construction of digital filters is provided. Typically offered Fall.

ECE 45300 - Fundamentals Of Nanoelectronics

Credit Hours: 3.00. Nanoelectronic devices are an integral part of our life, including the billion-plus transistors in every smartphone, each of which has an active region that is only a few hundred atoms long. This course is designed to convey the key concepts developed in the last 25 years which constitute the fundamentals of nanoelectronics and mesoscopic physics, assuming a minimal set of prerequisites. Topics covered include the new Ohm's law, conductance quantization, the nanotransistor, spin valves, thermoelectricity, quantum systems and the non-equilibrium Green's function (NEGF) method. Typically offered Fall.

ECE 45500 - Integrated Circuit Engineering

Credit Hours: 3.00. Analysis, design, and fabrication of silicon bipolar and MOSFET monolithic integrated circuits. Consideration of amplifier circuit design and fabrication techniques with circuit simulation using Spice-2. Integrated operational amplifiers with difference amplifiers, current sources, active loads, and voltage references. Design of IC analog circuit building blocks. Typically offered Fall.

ECE 45600 - Digital Integrated Circuit Analysis And Design

Credit Hours: 3.00. As applied t digital integrated circuits, the MDs transistor is studied in depth-from its fabrication to its electrical characteristics. Combinational, sequential, and dynamic logic circuits are considered. While the focus of the course is on CMOS technology, bipolar, nMOS, and BiCMOS circuits are introduced as well. SPICE is used as both an analysis and design tool. Semiconductor memory circuits are also discussed. Typically offered Spring.

ECE 45700 - Electronic Design Laboratory

Credit Hours: 1.00. Laboratory exercises illustrating the design and application of electronic circuits. Case studies of circuits presently in existing instruments, such as the color television receiver sampling oscilloscope, are used as a basis for the circuits investigated or designed. Pulse and analog circuits studied, as well as high voltage and power supplies. Signal processing, modulation, and sampling are used to demonstrate the circuits as interconnected into a complete system. Typically offered Spring.

ECE 46100 - Software Engineering

Credit Hours: 3.00. Introduction to software engineering principles, with special emphasis on the process, methods, and tools needed to develop and test quality software products and systems. Typically offered Spring.

ECE 46300 - Introduction To Computer Communication Networks

Credit Hours: 3.00. An introduction to the design and implementation of computer communication networks. The focus is on the concepts and the fundamental design principles that have contributed to the global Internet success. Topics include: digital transmission and multiplexing, protocols, MAC layer design (Ethernet/802.11), LAN interconnects and switching, congestion/flow/error control, routing, addressing, performance evaluation, internetworking (Internet) including TCP/IP, HTTP, DNS etc. This course will include one or more programming projects. Typically offered Fall.

ECE 46800 - Introduction To Compilers And Translation Engineering

Credit Hours: 4.00. The design and construction of compilers and other translators. Topics include compilation goals, organization of a translator, grammars and languages, symbol tables, lexical analysis, syntax analysis (parsing), error handling, intermediate and final code generation, assemblers, interpreters, and an introduction to optimization. Emphasis is on engineering a compiler or interpreter for a small programming language - typically a C or Pascal subset. Projects involve the stepwise implementation (and documentation) of such a system. Department permission required. Typically offered Fall.

ECE 46900 - Operating Systems Engineering

Credit Hours: 4.00. The design and construction of operating systems for both individual computers and distributed (networked) systems. Basic concepts and methods for managing processor, main memory, block-structured storage, and network resources are covered. Detailed examples are taken from a number of operating systems, emphasizing the techniques used in networked versions of UNIX. These techniques are applied to design improvements of portions of a simplified, networked, UNIX-based operating system; the improvements are implemented and their performance is evaluated in laboratory experiments. Typically offered Spring.

ECE 47000 - Curricular Practical Training

Credit Hours: 0.00. An electrical and/or computer engineering work experience. This internship experience is intended to complement the student's academic plan-of-study and help prepare him/her for his/her future role as a practicing engineer. A letter from the prospective employer stating the period of employment, hours per week, job title, job qualifications, and job minimum period of employment is required. This course may not be taken in successive semesters. Permission of department required. Typically offered Summer Fall Spring.

ECE 47300 - Introduction To Artificial Intelligence

Credit Hours: 3.00. The course introduces fundamental areas of artificial intelligence: knowledge representation and reasoning; machine learning; planning; game playing; natural language processing; and vision. Typically offered Spring.

ECE 47700 - Digital Systems Senior Project

Credit Hours: 4.00. A structured approach to the development and integration of embedded microcontroller hardware and software that provides senior-level students with significant design experience applying microcontrollers to a wide range of embedded systems (e.g., instrumentation, process control, telecommunications, and intelligent devices). The primary objective is to provide practical experience developing integrated hardware and software for embedded microcontroller systems in an environment that models one which students will most likely encounter in industry. Permission of instructor required. Typically offered Fall.

ECE 47900 - Senior Participation In Vertically Integrated Projects (VIP) In Electrical And Computer Engineering

Credit Hours: 1.00 or 2.0. This course provides an opportunity for undergraduate students to explore and develop comprehensive applications of electrical and computer engineering technologies, especially as they relate to active research areas of Purdue faculty members. Students will learn about the underlying research, and will work on teams to formulate applications of the research that address real-world needs. Students will attend a weekly lecture that provides an introduction to a broad range of applicable technologies and development tools - some associated with the activities of specific teams, and some addressing topics of more general value to students enrolled in the course. Typically offered Fall Spring.

ECE 48300 - Digital Control Systems Analysis And Design

Credit Hours: 3.00. The course introduces feedback computer controlled systems, the components of digital control systems, and system models on the z-domain (z-transfer functions) and on the time domain (state variable representations.) The objectives for system design and evaluation of system performance are considered. Various discrete-time controllers are designed including PID-controllers, state and output feedback controllers, and reconstruction of states using observers. The systems with the designated controllers are tested by simulations. Typically offered Fall Spring.

ECE 48600 - Sensor-Based Robot Control Laboratory

Credit Hours: 2.00. Laboratory experiments and project illustrate the techniques and concepts of integrating sensory information (vision images from a CCD camera) into a real-time, computer-controlled robotic system. Topics include manipulator kinematics, simple computer vision techniques such as histograming, thresholding, and connectivity analysis, searching and game trees, and system communications. Typically offered Fall.

ECE 49500 - Selected Topics In Electrical And Computer Engineering

Credit Hours: 1.00 to 4.00. Topics vary. Permission of department required. Typically offered Fall Spring Summer.

ECE 49595 - Selected Topics In Electrical And Computer Engineering

Credit Hours: 1.00 to 5.00. Topics vary. Permission of department required. Typically offered Fall Spring Summer.

ECE 49600 - Electrical Engineering Projects

Arrange Hours and Credit. Topics vary. Permission of department required. Typically offered Fall Spring Summer.

ECE 51100 - Psychophysics

Credit Hours: 3.00. (PSY 51100) An examination of the relationship between physical stimuli and perception (visual, auditory, haptics, etc.). Includes a review of various methods for studying this relationship and of the mathematical and computational tools used in modeling perceptual mechanisms. Permission of department required. Typically offered Fall.

ECE 51300 - Diffraction, Fourier Optics, And Imaging

Credit Hours: 3.00. Modern theories of diffraction and Fourier optics for imaging, optical communications, and networking. Imaging techniques involving diffraction and/or Fourier analysis with application to tomography, magnetic resonance imaging, synthetic aperture radar, and confocal microscopy. Additional topics in optical communications and networking, including wave propagation in free space, fiber, integrated optics, and related design issues. Simulation studies, using Matlab and other software packages for analysis and design. Offered every third semester. Typically offered Fall Spring.

ECE 52600 - Fundamentals Of MEMS And Micro-Integrated Systems

Credit Hours: 3.00. (BME 58100) Key topics in micro-electro-mechanical systems (MEMS) and biological micro-integrated systems; properties of materials for MEMS; microelectronic process modules for design and fabrication. Students will prepare a project report on the design of a biomedical MEMS-based micro-integrated system. Offered in alternate years. Permission of department required. Typically offered Fall.

ECE 52800 - Measurement And Stimulation Of The Nervous System

Credit Hours: 3.00. (BME 52800) Engineering principles addressing questions of clinical significance in the nervous system: neuroanatomy, fundamental properties of excitable tissues, hearing, vision, motor function, electrical and magnetic stimulation, functional neuroimaging, disorders of the nervous system, development and refinement of sensory prostheses. Typically offered Spring.

ECE 53200 - Computational Methods For Power System Analysis

Credit Hours: 3.00. System modeling and matrix analysis of three-phase power networks. Applications of numerical methods and computers to the solution of a variety of problems related to the planning, design, and operation of electric power systems. Typically offered Fall.

ECE 53800 - Digital Signal Processing I

Credit Hours: 3.00. Theory and algorithms for processing of deterministic and stochastic signals. Topics include discrete signals, systems, and transforms, linear filtering, fast Fourier transform, nonlinear filtering, spectrum estimation, linear prediction, adaptive filtering, and array signal processing. Typically offered Fall.

ECE 54400 - Digital Communications

Credit Hours: 3.00. Introduction to digital communication systems and spread spectrum communications. Topics include analog message digitization, signal space representation of digital signals, binary and M-ary signaling methods, detection of binary and M-ary signals, comparison of digital communication systems in terms of signal energy and signal bandwidth requirements. The principal types of spread spectrum systems are analyzed and compared. Application of spread spectrum to multiple access systems and to secure communication systems is discussed. Typically offered Fall.

ECE 54700 - Introduction To Computer Communication Networks

Credit Hours: 3.00. A qualitative and quantitative study of the issues in design, analysis, and operation of computer communication and telecommunication networks as they evolve toward the integrated networks of the future, employing both packet and circuit switching technology. The course covers packet and circuit switching, the OSI standards architecture and protocols, elementary queuing theory for performance evaluation, random access techniques, local area networks, reliability and error recovery, and integrated networks. Typically offered Fall.

ECE 55200 - Introduction To Lasers

Credit Hours: 3.00. An introduction to lasers and laser applications which does not require a knowledge of quantum mechanics as a prerequisite. Topics include: the theory of laser operation; some specific laser systems; nonlinear optics; optical detection; and applications to optical communications, holography, laser-driven fusion, and integrated optics. Typically offered Fall.

ECE 55700 - Integrated Circuit Fabrication Laboratory

Credit Hours: 3.00. Laboratory exercises in the fabrication and testing of silicon integrated circuits. Both bipolar and MOS integrated circuit test chips are fabricated and tested. Laboratory technique, the technology of integrated circuit fabrication, and electrical characterization are emphasized. Permission of department required. Typically offered Fall Spring.

ECE 55900 - MOS VLSI Design

Credit Hours: 3.00. An introduction to most aspects of large-scale MOS integrated circuit design including: device fabrication and modeling; inverter characteristics; designing CMOS combinational and sequential circuits; designing arithmetic building blocks and memory structures; interconnect and timing issues; testing and verification; and system design considerations. Term projects involve the complete design of a functional logic block or system using CAD tools. Typically offered Fall.

ECE 56200 - Introduction To Data Management

Credit Hours: 3.00. Emphasis is on the design of systems that can manipulate and retrieve data from large databases using high level formal languages. Topics covered are: data models and data independence, normalization in relational databases, development of high level query languages for relational and hierarchical models, pictorial query languages, object oriented systems, and object oriented databases. The course includes a project that accounts for about 20 percent of the grade for the course. Permission of department required. Typically offered Spring.

ECE 56300 - Programming Parallel Machines

Credit Hours: 3.00. This course presents methods and techniques for programming parallel computers, such as multicore and

high-end parallel architectures. Various parallel algorithms will be presented to demonstrate different techniques for identifying parallel tasks and mapping them onto parallel machines. Realistic science/engineering applications and their characteristics will be discussed. Parallel architectures to be considered are shared-memory and distributed-memory multiprocessor systems. Programming paradigms for these machines will be compared, including directive-based (OpenMP), message passing (MPI) and thread-based (Posix threads) methods. Methodologies for analyzing and improving the performance of parallel programs will be discussed. There will be a class project in which each student parallelizes and tunes the performance of a large computation application or developes/improves a tool that helps this process. Each student will prepare one lecture for a selected topic. Offered during odd years. Typically offered Spring.

ECE 56500 - Computer Architecture

Credit Hours: 3.00. An introduction to the problems involved in designing and analyzing current machine architectures. Major topics include performance and cost analysis, pipeline processing, vector machines and numerical applications, hierarchical memory design, and multiprocessor architectures. A quantitative approach allowing a computer system designer to determine the extent to which a design meets design goals is emphasized. Typically offered Fall.

ECE 56800 - Embedded Systems

Credit Hours: 3.00. This course provides an introduction to the design of embedded and ubiquitous computing systems including their hardware and software architectures, design methodologies and tools, and communication protocols. The lectures are organized into three parts namely, (a) basic design principles including specification and modeling, hardware components and platforms, software organization, embedded and real-time operating systems, interfacing with external environments using sensors and actuators, and communication in distributed embedded systems, (b) advanced topics such as energy management, safety and reliability, and security, and (c) case-studies of real-world systems from a variety of embedded application domains such as biomedical devices, smart cards and RFID, networked sensors, personal computing devices, home appliances and electronics, mobile robotics, etc. In addition to hands-on programming assignments using off-the-shelf embedded system development kits, the course will feature a comprehensive project where students will design, implement, and evaluate a prototype embedded system. Typically offered Fall Spring.

ECE 56900 - Introduction To Robotic Systems

Credit Hours: 3.00. (CS 56900) The topics to be covered include: basic components of robotic systems; selection of coordinate frames; homogeneous transformations; solutions to kinematic equations; velocity and force/torque relations; manipulator dynamics in Lagrange's formulation; digital simulation of manipulator motion; motion planning; obstacle avoidance; controller design using the computed torque method; and classical controllers for manipulators. Basic knowledge of vector-matrix manipulations required. Typically offered Fall.

ECE 57000 - Artificial Intelligence

Credit Hours: 3.00. Introduction to the basic concepts and various approaches of artificial intelligence. The first part of the course

deals with heuristic search and shows how problems involving search can be solved more efficiently by the use of heuristics and how, in some cases, it is possible to discover heuristics automatically. The next part of the course presents ways to represent knowledge about the world and how to reason logically with that knowledge. The third part of the course introduces the student to advanced topics of AI drawn from machine learning, natural language understanding, computer vision, and reasoning under uncertainty. The emphasis of this part is to illustrate that representation and search are fundamental issues in all aspects of artificial intelligence. Typically offered Fall.

ECE 57300 - Compilers And Translator Writing Systems

Credit Hours: 3.00. This course presents the concepts needed to efficiently design and implement translators. Basic compiler/translation theory and technology are briefly reviewed, after which the course focuses on software tools for the automatic construction of translators, as well as more complex concepts involving the construction of compiler symbol tables, etc. Using C on ECN UNIX, each student will construct a simple lexical-recognizer generator, parser generator, and code-generator generator. Basic understanding of compilers and proficiency in C language required. Typically offered Fall.

ECE 57700 - Engineering Aspects Of Remote Sensing

Credit Hours: 3.00. Introduction to the concepts of multispectral image data generation and analysis. Basic principles of optical radiation, reflection, and measurement in natural scenes. Fundamentals of multispectral sensor design and data analysis for complex scenes. Application of signal processing and signal design principles and of statistical pattern recognition to these problems. Spatial image processing methods and algorithms as appropriate to land scene data. Practice with analysis of actual aircraft and spacecraft data in a cross-disciplinary environment. Typically offered Spring.

ECE 58000 - Optimization Methods For Systems And Control

Credit Hours: 3.00. Introduction to optimization theory and methods, with applications in systems and control. Nonlinear unconstrained optimization, linear programming, nonlinear constrained optimization, various algorithms and search methods for optimization, and their analysis. Examples from various engineering applications are given. Elements of linear algebra and calculus of several variables and some experience with MATLAB helpful. Typically offered Spring.

ECE 59500 - Selected Topics In Electrical Engineering

Credit Hours: 1.00 to 3.00. Formal classroom or individualized instruction on topics of current interest. Permission of instructor required. Typically offered Fall Spring Summer.

ECE 60000 - Random Variables And Signals

Credit Hours: 3.00. Engineering applications of probability theory. Problems on events, independence, random variables, distribution and density functions, expectations, and characteristic functions. Dependence, correlation, and regression; multivariate Gaussian distribution. Stochastic processes, stationarity, ergodicity, correlation functions, spectral densities, random inputs to linear systems; Gaussian processes. Prerequisite: Master's student standing or higher. Typically offered Fall Spring Summer.

ECE 60200 - Lumped System Theory

Credit Hours: 3.00. An investigation of the basic theory and techniques of modern system theory, emphasizing linear state model formulations of continuous and discrete time systems in the time domain and frequency domain. Coverage includes notions of linearity, time invariance, discrete and continuous time state models, canonical forms, associated transfer functions and impulse response models, the state transition matrix, the Jordan form, controllability, observability, and stability. Prerequisite: Master's student standing or higher and concurrent prerequisite: MA 51100. Typically offered Fall Spring Summer.

ECE 60400 - Electromagnetic Field Theory

Credit Hours: 3.00. Review of general concepts (Maxwell's equations, materials interaction, boundary conditions, energy flow); statics (Laplace's equation, Poisson's equation); distributed parameter systems (classification of solutions, transmission lines, and wave-guides); radiation and antennas (arrays, reciprocity, Huygen's principle); a selected special topic (e.g., magnetostatics, waves in anisotropic media and optical fibers). Offered in alternate years. Prerequisite: Master's student standing or higher. Typically offered Fall Spring.

ECE 60600 - Solid State Devices

Credit Hours: 3.00. A relatively-broad, moderate-depth coverage of semiconductor devices and related topics. The first portion of the course presents and examines semiconductor fundamentals required in the operational analysis of solid state devices. A detailed examination of the PN junction diode and PN junction devices follows. The final portion of the course treats heterojunction surface devices including the Schottky diode, the MOS capacitor and the MOSFET. Offered in alternate years. Prerequisite: Master's student standing or higher. Typically offered Fall Spring.

ECE 60800 - Computational Models And Methods

Credit Hours: 3.00. Computation models and techniques for the analysis of algorithm complexity. The design and complexity analysis of recursive and nonrecursive algorithms for searching, sorting, set operations, graph algorithms, matrix multiplication, polynomial evaluation and FFT calculations. NP-complete problems. Prerequisite: Master's student standing or higher. Typically offered Fall Spring.

ECE 61000 - Energy Conversion

Credit Hours: 3.00. Basic principles of static and electromechanical energy conversion. Control of static power converters. Reference frame theory applied to the analysis of rotating devices. Analysis and dynamic characteristics of induction and synchronous machines. State variable analysis of electromechanical devices and converter supplied electromechanical drive systems. Prerequisite: Master's student standing or higher. Typically offered Fall.

ECE 61200 - Advanced VLSI Devices

Credit Hours: 3.00. Device physics of advanced transistors. Process, device, circuit, and systems considerations affecting development of new integrated circuit technologies. Review of metal oxide semiconductor (MOS) fundamentals along with key process and circuit concepts. Short channel effects in sub-micron channel length metal oxide semiconductor field-effect transistors (MOSFETs) including device scaling considerations. Device physics and technology issues for sub-100 nm (nanoscale) MOSFETs. Limits of silicon device technology and key issues in the continuing miniaturization of devices. Alternative device structures to replace bulk MOSFET. Computer simulation employed throughout the course to examine device issues and prototype new device technologies. Offerd in alternate years. Prerequisite: ECE 60600. Typically offered Spring.

ECE 61500 - Nonlinear Optics

Credit Hours: 3.00. An in-depth study of nonlinear optics. After a review of linear effects, several nonlinear optical processes and applications are discussed. These include electro-optic switches and modulators, harmonic light generators, sum and difference frequency mixing, parametric amplifiers and oscillators, and phase conjugate mirrors. Discussions of nonlinear spectroscopy include topics such as two-photon absorption, saturation spectroscopy, Raman spectroscopy and double-optical resonance measurements. Photonechoes and other transient effects, and surface effects are also discussed. Offered in alternate years. Prerequisite: ECE 55200, ECE 60400. Typically offered Fall.

ECE 61600 - Ultrafast Optics

Credit Hours: 3.00. A study of the physics, technology, and applications of ultrashort laser pulses. Topics covered include the following: methods for generating and measuring ultrafast laser pulses; basic physical processes affecting ultrashort pulses; devices for manipulating ultrashort pulses; ultrafast nonlinear optics, including nonlinear optics in fibers, nonlinear refractive index effects, pulse compression, solitons, and all-optical switching; time-resolved spectroscopy of ultrafast materials processes; and applications to ultrafast optoelectronics. In addition, each student will select a specific topic for in-depth study. Offered in alternate years. Prerequisite: ECE 55200. Typically offered Fall.

ECE 61700 - Antennas: Design And Applications

Credit Hours: 3.00. Electrically small antennas; arrays; wire antennas and feeding arrangements; aperture antennas such as slots, horns, and parabolic reflectors; antennas for multiple frequencies including log-periodic and other frequency independent types;

receiving antennas and the concept of antenna temperature; antenna measurements and evaluation. Prerequisite: ECE 44100 and concurrent prerequisite: ECE 60400. Typically offered Fall Spring.

ECE 61800 - Numerical Electromagnetics

Credit Hours: 3.00. The numerical solution of Maxwell's equations is studied. Numerical methods such as the Finite Element Method and the Finite Difference Method are presented for the solution of both differential and integral equations. Applications studied include: waveguides (microstrip, VLSI interconnects, optical, discontinuities), scattering (frequency selective surfaces, arbitrary scatterers), antennas, magnetics, semiconductor devices, and inverse scattering. Papers in the current literature are used. Offered every third semester. Prerequisite: ECE 60400. Typically offered Fall Spring.

ECE 62000 - Introduction To Biomedical Imaging Systems

Credit Hours: 3.00. (BME 63000) Overview of biomedical imaging systems and analysis. Examination of various imaging modalities, including X-ray, ultrasound, nuclear, and MRI. Microscopy including how images are formed and what types of information they provide. Image analysis techniques, including analysis of cardiac ultrasound, mammography, and MRI functional imagery. Offered in alternate years. Concurrent prerequisite: ECE 63700. Typically offered Spring.

ECE 62400 - Multimedia Systems

Credit Hours: 3.00. Provides a general coverage of three major areas that include multimedia data management (logical and physical modeling), broadband network architectures and protocols for distributed multimedia communication, and user interface environments. Various models and specification methodologies in these areas are introduced. The discussion is augmented with various case studies. Prerequisite: ECE 54700, ECE 56200. Typically offered Fall.

ECE 62500 - Analysis Of Electromechanical Systems II

Credit Hours: 3.00. Extension of ECE 525. Electric propulsion systems including presentation of cycloconverter and rectifier-inverter drive systems. Dynamic and steady-state analysis of machine performance with series controlled rectifiers in the stator or rotor phases. MMF space harmonic analysis. Prerequisite: ECE 62500. Typically offered Spring.

ECE 62700 - Introduction To Cryptography And Secure Communication

Credit Hours: 3.00. Introduces the basic concepts of cryptography. Various cipher systems are presented, including transposition and substitution systems, Block ciphers, RSA, and Knapsack. Methods used to attack ciphers are discussed with emphasis on complexity. Case studies of the use of cryptographic methods in communication systems are presented with some consideration given to privacy issues. Offered in alternate years. Prerequisite: ECE 60000. Typically offered Spring.

ECE 62900 - Introduction To Neural Networks

Credit Hours: 3.00. Information processing with neural networks, biological and engineering implications, learning algorithms, current neural network models and architectures, implementational topics, applications in areas such as signal/image processing, pattern recognition, optimization, simulation, system identification, nonlinear prediction, communications, and control. Concurrent prerequisite: ECE 60000. Typically offered Fall.

ECE 63300 - Modeling And Simulation Of Power System Components

Credit Hours: 3.00. Recommended for those interested in learning to use computer simulation to investigate the dynamic and controlled behavior of electrical power components. Beginning with an introduction to MATLAB/SIMULINK, the course goes through the key steps of modeling, implementing and verifying the simulation of single and three-phase transformers, single and three-phase induction machines, three-phase wound field synchronous machines and permanent magnet machines useful in power applications, each case amply illustrated in projects around some interesting topics. Students are expected to implement and verify about 10 simulation projects and also discuss observed behaviors on topics such as inrush current in transformers, motoring, generating and braking operation of machines, and pulsating torque from subsynchronous resonance. Prerequisite: ECE 42500 or ECE 43200. Typically offered Fall.

ECE 63400 - Digital Video Systems

Credit Hours: 3.00. Digital video systems. Characteristics of basic analog video systems, including bandwidth constraints, color encoding, and composite signal formation. Digital video concepts with emphasis on processing of time-varying images. Topics include: filtering, enhancement, restoration, and motion estimation and prediction. Digital video compression techniques, including intraframe coding approaches, with particular emphasis on JPEG. MPEG1 and MPEG2 video compression standards. Low bit rate approaches, including H.261, H.263, and MPEG4. Applications include: video servers, transmission systems, high definition television, multimedia systems, and videoconferencing systems. Offered in alternate years. Concurrent prerequisite: ECE 60000. Typically offered Spring.

ECE 63700 - Digital Image Processing I

Credit Hours: 3.00. Introduction to digital image processing techniques for enhancement, compression, restoration, reconstruction, and analysis. Lecture and experiments covering a wide range of topics. 2-D signals and systems, image analysis, and image segmentation. Achromatic vision, color image processing, color imaging systems, image sharpening, interpolation, decimation, linear and nonlinear filtering, printing and display of images. Image compression, image restoration, and tomography. Offered every third semester. Typically offered Spring.

ECE 63800 - Principles Of Digital Color Imaging Systems

Credit Hours: 3.00. Basic principles of color science: physiology of the human eye, trichromatic and color opponent models for color, and uniform color spaces. Color reproduction in electronic imaging systems: color models for input and output devices, color imaging system calibration, color quantization and halftoning, and color printing. Color appearance and computational color: color appearance models, models for color constancy, and physics-based models for color. Offered in alternate years. Prerequisite: MA 51100 and Master's student standing or higher. Typically offered Fall.

ECE 63900 - Error Control Coding

Credit Hours: 3.00. The theory and practice of error control coding is examined. The study includes the arithmetic of Galois fields as well as linear block, cyclic, and convolutional codes. Some applications of codes in digital communication systems and in computer systems are presented. Offered every third semester. Concurrent prerequisite: ECE 60000. Typically offered Fall Spring.

ECE 64100 - Digital Image Processing II

Credit Hours: 3.00. An advanced treatment of selected topics in digital image processing. Image models, color, digital video, synthetic aperture radar, magnetic resonance imaging, stack filters, morphological filters, in-verse problems in computational vision, multiscale techniques. Offered every third semester. Prerequisite: ECE 60000, ECE 63700. Typically offered Spring.

ECE 64200 - Information Theory And Source Coding

Credit Hours: 3.00. A treatment of the basic concepts of information theory. Determination of channel capacity and its relation to actual communication systems. Rate distortion theory is introduced, and the performance of various source codes is presented. Offered in alternate years. Prerequisite: ECE 60000. Typically offered Fall.

ECE 64500 - Estimation Theory

Credit Hours: 3.00. This course presents the basics of estimation and detection theory that are commonly applied in communications and signal processing systems. Applications in communications and signal processing will be considered throughout. Prerequisite: ECE 60000. Typically offered Spring.

ECE 64700 - Performance Modeling Of Computer Communication Networks

Credit Hours: 3.00. The mathematical background needed for the performance and stability analysis of computer communication networks is developed. Point processes, Markov processes, and queuing processes are used in the modeling and analysis of queues, interconnected queues such as ARPANET, and random multiple access networks such as Xerox's ETHERNET.

Distributed control of random access networks and centralized control of queuing networks is considered. The techniques developed are useful in the design of computer systems as well as computer networks. Offered in alternate years. Prerequisite: ECE 60000. Typically offered Spring.

ECE 64800 - Wavelet, Time-Frequency, And Multirate Signal Processing

Credit Hours: 3.00. Advanced topics in signal processing, including time-frequency analysis, multiscale edge detection, wavelet bases and filter banks, and techniques for approximation, estimation, and compression using wavelets. Offered in alternate years. Prerequisite: ECE 53800. Typically offered Spring.

ECE 65000 - Topics In Solid-State Devices And Materials

Credit Hours: 1.00 to 3.00. An introductory treatment of selected device and materials related topics. Topics will change from semester to semester and will be announced in advance. The list of possible topics includes solid state microwave devices, optoelectronics, laser-quantum electronics, magnetics, noise in semiconductor devices, acoustic wave devices, energy conversion, device fabrication, electroceramics, MOS devices, thin-film devices, and memory devices. Typically offered Fall Spring.

ECE 65400 - Solid State Devices II

Credit Hours: 3.00. Introduction to advanced concepts in semiconductor devices as an extension and continuation of ECE 60600. Topics include charge storage and transfer in deep depletion MOS devices (CCDs and DRAMs); negative differential mobility and transit time effects in microwave oscillators (Gunn and IMPATT diodes); spontaneous and stimulated emission, quantum efficiency, and charge confinement in photonic devices (LEDs and double heterojunction lasers); and quantum efficiency and spectral response in conventional and avalanche photodiodes. Prerequisite: ECE 60600. Typically offered Spring.

ECE 65600 - Electronic Transport In Semiconductors

Credit Hours: 3.00. A treatment of the microscopic and phenomenological physics of carrier transport in bulk semiconductors and in semiconductor devices. The Boltzmann transport equation is introduced as are techniques for solving it analytically and numerically. The physics of carrier scattering in common semiconductors is explored. Theoretical treatments of low and high field transport are compared with measured results. Balance equations are derived as moments of the Boltzmann Transport Equation and are applied to the analysis of sub-micron semiconductor devices. Students are expected to be able to apply elementary concepts of quantum mechanics and solid state physics. Offered every third semester. Prerequisite: ECE 60600. Typically offered Fall Spring.

ECE 65800 - Semiconductor Material And Device Characterization

Credit Hours: 3.00. A comprehensive survey of modern characterization techniques routinely used to determine solid-state material and device parameters. Concepts and theory underlying the techniques are examined, and sample experimental results are presented. The coverage includes electrical, optical, chemical, and physical characterization methods. Offered in alternate years. Prerequisite: ECE 60600. Typically offered Spring.

ECE 65900 - Quantum Phenomena In Semiconductors

Credit Hours: 3.00. This course is designed for graduate students familiar with semiconductor fundamentals, with engineering electromagnetics and with linear algebra, but having no significant acquaintance with either quantum mechanics or statistical mechanics. The purpose of the course is to introduce the relevant concepts of quantum mechanics and nonequilibrium statistical mechanics as possible using device-related examples. Topics include: preliminary concepts, equilibrium, restoration of equilibrium, transport, effective mass equation, optical properties, advanced concepts. Offered every third semester. Prerequisite: ECE 60600, MA 51100. Typically offered Fall Spring.

ECE 66100 - Computer Vision

Credit Hours: 3.00. This course deals with how an autonomous or a semi-autonomous system can be endowed with visual perception. The issues discussed include: sampling from a topological standpoint; grouping processes; data structures, especially hierarchical types such as pyramids, quadtrees, octrees, etc.; graphic theoretic methods for structural description and consistent labeling; issues in 3-D vision such as object representation by Gaussian spheres, generalized cylinders, etc. Prerequisite: ECE 57000. Typically offered Spring.

ECE 66200 - Pattern Recognition And Decision-Making Processes

Credit Hours: 3.00. (CS 66200) Introduction to the basic concepts and various approaches of pattern recognition and decision-making processes. The topics include various classifier designs, evaluation of classifiability, learning machines, feature extraction and modeling. Prerequisite: ECE 30200. Typically offered Spring.

ECE 66300 - Compiler Code Generation, Optimization, And Parallelization

Credit Hours: 3.00. This course presents the concepts needed to design and implement production quality code generators for any of the more popular languages and families of computer architecture (including various pipelined, superscalar, and macro-parallel machines). Flow analysis and concurrency detection, as well as optimizations and loop and irregular code parallelizations, are covered in detail. Using C on ECN UNIX, each student will complete a project implementing a simple optimizer/parallelizer. Prerequisite: ECE 56500, CS 50200 or ECE 46800 or ECE 57300. Typically offered Spring.

ECE 66400 - Formal Languages, Computability, And Complexity

Credit Hours: 3.00. Topics in computability theory and formal languages include recursive function theory, the equivalence of various generic programming languages for numeric calculations and string manipulations, regular languages and finite state automata, and context-free and context-sensitive languages. In complexity theory, emphasis is on the theory of NP-completeness, including proof methods, the distinctions between strong- and weak-sense NP-completeness, NP-hardness, and performance-guaranteed approximation algorithms. Offered in alternate years. Prerequisite: ECE 60800. Typically offered Fall.

ECE 66600 - Advanced Computer Systems

Credit Hours: 3.00. The study of theoretical aspects of advanced computer systems where multiprocessing is used. Topics include the design, architecture, and performance evaluation of multiprocessor memories, interconnection networks, and computational pipelines. Also included are the topics of scheduling, synchronization, resource allocation, load-balancing, partitioning and deadlock avoidance in multiprocessors. Also covered are the design and analysis of parallel algorithms, programming languages and automatic approaches to parallelism detection/exploitation for concurrent computation. Prerequisite: ECE 56500, ECE 60800. Typically offered Spring.

ECE 67000 - Modeling And Optimization Of High-Performance Interconnects

Credit Hours: 3.00. RLC extraction of VLSI interconnects. Modeling of interconnects as RLC trees or networks. Elmore delay model. Reduced-order modeling: moment matching, Pade approximation, and Krylov-subspace methods. Device modeling with consideration of resistive shielding in the interconnection load. Delay calculation with consideration of devices and interconnects. Repeater insertion and planning at floorplanning. Timing-driven placement: zero-slack algorithm for delay budgeting, net-based placement, and path-based placement. High-performance clock synthesis: zero-skew routing, bounded-skew routing, and useful-skew routing. Term projects investigating interconnect-related issues are assigned. Prerequisite: ECE 55900. Typically offered Fall (even years).

ECE 67300 - Distributed Computing Systems

Credit Hours: 3.00. Discussions of the design issues of distributed computing systems (DCS). The general theory of distributed transaction management, reliability, and resource management is discussed. Various algorithms and specification methodologies for DCS are introduced. A general coverage of the three major areas of DCS, namely: distributed operating systems, distributed databases, and distributed AI is provided. The discussion is augmented with various case studies. Prerequisite: ECE 46900 or introductory course in operating systems. Typically offered Spring.

ECE 67500 - Introduction To Analysis Of Nonlinear Systems

Credit Hours: 3.00. An introduction to modeling of dynamic control systems. State plane and numerical methods for solving modeling equations. Linearization and describing function techniques. Stability concepts. Controller and state estimator design for nonlinear systems. Variable structure sliding mode control. Vector field techniques. Introduction to chaos. Offered in alternate years. Prerequisite: ECE 60200. Typically offered Fall.

ECE 67600 - Academic Oral Communication For International Research Students

Credit Hours: 0.00. Discussions of and activities related to such topics as appropriate nonverbal communication; learning styles; strategies for effective speech and listening; and speech acts for the classroom, office, and laboratory. Individual weekly tutoring sessions to improve speech comprehension. Prerequisite: Master's student standing or higher and Electrical & Computer Engineering majors only. Permission of department required. Typically offered Fall Spring.

ECE 67700 - Communication Aspects Of Academic Research

Credit Hours: 0.00. Topics relevant to oral and written communication needs of Ph.D. students. Three papers are written: a journal article review, a literature review, and the choice of a thesis proposal, conference paper, or a journal article. Library and Internet research strategies and resources; research/writing ethics; citing sources; citation styles; and academic language. Oral presentations based on the written projects. Extensive peer revision and editing and out-of-class writing conferences with the instructor. Prerequisite: Master's student standing or higher and Electrical & Computer Engineering majors only. Permission of department required. Typically offered Fall Spring.

ECE 67800 - Radar Engineering

Credit Hours: 3.00. An introduction to the system aspects of modern radar engineering. The theoretical basis for radar performance analysis is developed and applied to radars designed for a variety of different applications. Consideration is given to system parameters such as receiver noise, antenna characteristics, operating frequency, target characteristics, transmitted signal modulation, and methods of detection. Attention is given to radars for special purposes, such as automatic range and angle tracking, moving target indication, and resolution enhancement through synthetic aperture techniques. Offered in alternate years. Prerequisite: ECE 60000. Typically offered Fall.

ECE 67900 - Advanced Digital Communications

Credit Hours: 3.00. Provides a detailed examination of optimum digital communication principles and introduces three advanced topics critical to the design of digital communication systems: system synchronization; techniques for communication in nonideal channels (equalization); and communication over fading/multipath channels. Theoretical principles and practical implementations are considered. Prerequisite: ECE 54400, ECE 60000. Typically offered Spring.

ECE 68000 - Modern Automatic Control

Credit Hours: 3.00. Theoretical methods in optimal control theory. Topics include the calculus of variations and the Pontryagin minimum principle with applications to minimum energy problems. Geometric methods will be applied to the solution of

minimum time problems. Computational methods, singular problems, observer theory, and sufficient conditions for existence of solutions are also discussed. Offered in alternate years. Prerequisite: ECE 60200. Typically offered Fall.

ECE 68800 - VLSI Testing And Verification

Credit Hours: 3.00. Discusses different aspects of VLSI testing and formal verification of designs. Design and manufacturing defect models are introduced along with test generation and fault simulation algorithms targeting the different fault models. Both combinational and sequential logic testing are covered, and different synthesis for testability schemes such as BIST (Built-In-Self-Test), scan path design, etc., are introduced. Other new and emerging test and verification techniques also are discussed. Offered every third semester. Prerequisite: ECE 55900. Typically offered Fall Spring.

ECE 69300 - Advanced Intern Project

Credit Hours: 1.00. Graduate-level project course in ECE based on off-campus intern position. Individual research projects are approved by the supervising Purdue ECE faculty member before registering for the course. An approved written report must be filed before credit is accepted. This course cannot be used to satisfy the minimum course requirements for the master's or Ph.D. degrees. Permission of instructor required. Typically offered Summer Fall Spring.

ECE 69400 - Electrical And Computer Engineering Seminar

Credit Hours: 0.00. Seminar presentations by representatives from industry, members of the faculty of the School of Electrical and Computer Engineering, and other staff and faculty of Purdue University. The presentations introduce the student to a wide variety of current topics relevant to the technical and career aspects of electrical and computer engineering. Technical topics span the entire spectrum of electrical and computer engineering. Career topics include the importance of interpersonal communications, opportunities beyond graduate school, interviewing techniques, and descriptions of non-typical jobs. Required of electrical and computer engineering graduate students at Purdue during one of their first two semesters in residence. Typically offered Fall Spring.

ECE 69500 - Advanced Topics In Electrical And Computer Engineering

Credit Hours: 1.00 to 3.00. Formal classroom or individualized instruction on advanced topics of current interest. Permission of instructor required. Typically offered Fall Spring Summer.

ECE 69600 - Advanced Electrical Engineering Projects

Arrange Hours and Credit. Individual research projects to be approved by the supervising faculty member before registering for

the course. An approved written report must be filed before credit is accepted. Permission of instructor required. Typically offered Fall Spring Summer.

ECE 69700 - Directed Reading In Electrical Engineering

Credit Hours: 1.00 to 3.00. Individualized reading course supervised by an appropriate faculty member and pertaining to a topic not intended for a subsequent project or thesis done by that student. Approval for each reading course must be obtained from the department prior to registration. Permission of instructor required. Typically offered Fall Spring Summer.

ECE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ECE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Electrical and Computer Engineering Technology

ECET 10300 - Topics In Electrical Technology

Credit Hours: 1.00 to 4.00. This course includes specialized topics and skills associated with electrical technology. The level of coverage varies according to the audience. Since various electrical/electronics topics may be offered under this title. Does not carry credit toward degree requirements in Electrical Engineering Technology. Typically offered Fall Spring Summer.

ECET 10700 - Introduction To Circuit Analysis

Credit Hours: 4.00. Voltage, current, resistance, Ohm's law, Kirchhoff's current and voltage laws, resistance combinations, and The'venin's, Norton's and superposition theorems are studied and applied. DC and AC circuits are studied and utilized, with basic AC terminology described. Ideal RC coupling and filter circuits and RC switching circuits are introduced. Fundamental analog circuits with ideal or near-ideal electronic devices are utilized in the lecture and laboratory to enhance the understanding of basic circuit laws and theorems. Typically offered Fall Spring.

ECET 10900 - Digital Fundamentals

Credit Hours: 3.00. This course introduces basic gate and flip-flop logic devices and their application in combinational and sequential digital circuits. Topics include decoders, displays, encoders, multiplexers, demultiplexers, registers, and counters. Logic circuit analysis, implementation of circuits using standard IC chips or programmable logic devices, circuit testing, and troubleshooting are emphasized. Typically offered Fall Spring Summer.

ECET 11700 - Circuits Problem Solution Methods

Credit Hours: 1.00. This course provides students with structured assistance in developing problem-solving skills in circuit fundamentals. Students work together in small groups to complete class assignments. Typically offered Fall Spring Summer.

ECET 11900 - Digital Problem Solution Methods

Credit Hours: 1.00. This course provides students with structured assistance in developing problem-solving skills in digital fundamentals. Students work together in small groups to complete class assignments. Typically offered Fall Spring Summer.

ECET 12000 - Gateway To Electrical Engineering Technology

Credit Hours: 3.00. This course introduces students to the academic and professional field of electrical and computer engineering technology. Familiar applications of technology that impact today's and tomorrow's society are blended with foundational electrical and electronics principles. Practical systems are examined to illustrate the diverse knowledge required to design, analyze, and solve problems in multifaceted systems. Skills needed to explore electronic systems using standard laboratory instrumentation and methods of measurement are introduced. Typically offered Fall Spring Summer.

ECET 15700 - Electronics Circuit Analysis

Credit Hours: 4.00. Capacitors, inductors, switching circuits, transformers, rectifiers, linear regulators, dependent sources, operational amplifiers, BJT- & MOSFET-based small-signal amplifiers, waveform generation, and programmable analog devices are studied. Circuit fundamentals such as Kirchhoff's laws are utilized in analysis and design of circuits. Computer simulation is used. Typically offered Fall Spring.

ECET 15900 - Digital Applications

Credit Hours: 4.00. This course continues the study of combinational and sequential digital applications using programmable logic devices and standard logic devices. The input and output characteristics of the various common logic families, the

appropriate signal conditioning techniques for on/off power interfacing, digital and analog signal interfacing techniques, and memory devices and systems are discussed. Typically offered Fall Spring Summer.

ECET 17700 - Data Acquisition And Systems Control

Credit Hours: 3.00. Fundamental electrical parameters and measurement techniques are introduced. These are then applied to implementing power interfaces, actuators and sensors. Modules that provide signal conditioning, data conversion, filtering and controllers are evaluated. A full, closed loop control system is built and evaluated. Typically offered Fall Spring Summer.

ECET 17900 - Introduction To Digital Systems

Credit Hours: 3.00. This course introduces computing systems and defines the major classes of computing devices. Sequential and concurrent operations, along with logic and control structures, are covered. Knowledge of fundamental computing principles is discovered. Common software tools are used to create, test, and debug systems. Systems are constructed from standard blocks with a focus on subsystem operation and performance, troubleshooting/debugging and testing. Common applications of embedded systems are introduced. Typically offered Fall Spring Summer.

ECET 19600 - Introduction To EET And Projects

Credit Hours: 2.00. This course introduces ECET projects and the ECET program. Included are topices about ECET projects, options and electives in the ECET curriculum, university services, study techniques and student employment and career opportunities. Also introduced are techniques for proper and safe use of basic hand and machine tools, and the processes of fabricating, assembling and testing printed circuit boards. Typically offered Fall Spring Summer.

ECET 20700 - AC Electronics Circuit Analysis

Credit Hours: 4.00. AC circuits including the j operator, phasors, reactance and impedance are studied. Circuit laws, network theorems, and the fundamental concepts of Fourier analysis are applied and used in the study of topics such as passive filters, IC filters, amplifiers, resonant circuits, single-phase and three-phase circuits. Computer aided analysis of circuits is used. Typically offered Fall Spring Summer.

ECET 20900 - Introduction To Microcontrollers

Credit Hours: 4.00. This course is an introduction to microcontroller hardware and software, focusing on embedded control applications. Interconnections of components, peripheral devices, bus timing relationships, structured C-language programming, debugging, input/output techniques, and use of PC based software development tools are studied. Typically offered Fall Spring Summer.

ECET 21400 - Electricity Fundamentals

Credit Hours: 3.00. An introduction to elemental electrical components and their characteristics, basic electrical circuit theory, and use of basic laboratory test equipment, electrical motors, and industrial motor controls. Not open to EET students. Typically offered Fall Spring Summer.

ECET 22000 - Professional Career Development

Credit Hours: 1.00. This course expands the student's knowledge about the EET program. Included are topics such as: options and electives in the EET curriculum; the EET plan of study; student activities, including professional practice and organizations; international opportunities; employment and career opportunities; plant tours; and guest lectures, featuring EET alumni. Typically offered Fall Spring Summer.

ECET 22001 - Academic Success Seminar

Credit Hours: 0.00. This course expands the student's knowledge about the EET program. Included are topics such as: options and electives in the EET curriculum; the EET plan of study; student activities, including professional practice and organizations; international opportunities; employment and career opportunities; plant tours; and guest lectures, featuring EET alumni. Typically offered Fall Spring Summer.

ECET 22400 - Electronic Systems

Credit Hours: 3.00. This course is a survey of key electrical and electronics systems, their basic performance and applications. DC fundamentals include sources, resistance, Ohm's and Kirchhoff's Laws with simple circuits. AC systems include transformers and reactive elements, power production and distribution, filtering, motors and relays. Computer systems are presented with a microprocessor and provide the ability to write and read both digital and analog data. Analog systems include diodes, transistors, IC amplifiers, and analog-digital and digital to analog conversions. The semester closes by combining all of the topics presented in the control of motor speed. Typically offered Fall Spring Summer.

ECET 22700 - DC And Pulse Electronics

Credit Hours: 3.00. Capacitors, inductors, oscillators, rectifiers, bipolar and MOSFET power switches, switching power supplies, half-and full-H bridges, switching audio power amplifiers, op amp differential, composite and single supply operation, and linear regulators are studied. Computer-aided analysis of circuits is utilized. Typically offered Fall Spring Summer.

ECET 22900 - Concurrent Digital Systems

Credit Hours: 3.00. This course establishes a foundation for concurrent digital systems. Common methods of describing digital circuit operation are studied along with the techniques for translation between any two methods. Basic building blocks of digital systems are defined and applied. Analysis techniques for combinational and sequential logic circuits or subsystems are covered. Computer-based development tools, programmable logic devices, and technical reference sources are used to build, test, and evaluate digital systems. Typically offered Fall Spring Summer.

ECET 23100 - Electrical Power And Controls

Credit Hours: 4.00. This course introduces magnetic materials and properties followed by analysis of transformers and power conditioning equipment, induction motors, and single-phase and three-phase power systems. Motor control devices, programmable logic controllers, PLC input and output devices, and power systems communications and monitoring are introduced. Typically offered Fall Spring Summer.

ECET 23300 - Electronics And Industrial Controls

Credit Hours: 3.00. Familiarization with electronics as applied to industry. Basic theory and application of electronics to controls for industrial equipment and data processing. Typically offered Spring.

ECET 25700 - Consumer Power Electronics

Credit Hours: 4.00. This course is a study of the application of circuit techniques to amplifiers used in power and RF electronics, including bipolar junction transistors, power MOSFETs, thyristors, RF amplifiers, switching power supplies, and appropriate applications. Computer-aided analysis of circuits is used. Typically offered Fall Spring Summer.

ECET 27000 - Electronics Prototype Development And Construction

Credit Hours: 3.00. This course introduces project planning and basic concepts in electronic design automation (EDA). The student develops a portion of an electronic system using EDA, design for testing (DFT), surface mount technology (SMT), design for manufacturability (DFM), and component characteristic selection techniques. New construction and testing techniques are introduced. Typically offered Fall Spring Summer.

ECET 27300 - Modern Energy Systems

Credit Hours: 3.00. This course is an introduction to modern energy system technologies. Topics include energy conversion

fundamentals, efficiency, and renewable energy technologies such as wind, solar, and geothermal. Other topics include central and distributed generation, and power plant fundamentals. Typically offered Fall Spring Summer.

ECET 27400 - Wireless Communications

Credit Hours: 3.00. The theory and techniques of wirelessly sending information (voice, music, data) from one location to another is studies from a systems point of view. This includes a signal analysis, modulation techniques, transmitters, receivers, low noise amplifiers, and filters in the RF frequency spectrum. In addition, special topics of current interest are introduced. This course incorporated a student-based communication design and analysis laboratory. Typically offered Fall Spring Summer.

ECET 27700 - AC And Power Electronics

Credit Hours: 3.00. AC Circuits including the j operator, phasors, reactance and impedance are studies. Circuit laws, network theorems, and the application of circuit analysis techniques to amplifiers used in power electronics, including power MOS devices, thyristors, and other appropriate applications. Computer-aided analysis of circuits is used. Typically offered Fall Spring Summer.

ECET 27900 - Embedded Digital Systems

Credit Hours: 3.00. A course emphasizing the advanced applications of embedded digital systems. Topics include embedded system architecture, use of advanced programmable counter/timer arrays, analog interfaces, serial communication, and interrupts. Typically offered Fall Spring Summer.

ECET 29000 - International Experience

Credit Hours: 1.00 to 3.00. This variable-title, variable-credit course establishes student credit for ECET department approved international activities such as study abroad or industrial internships in foreign countries. Permission of department is required. Typically offered Fall Spring Summer.

ECET 29700 - Electronic Prototype Development

Credit Hours: 4.00. This course introduces basic concepts in the development of an electronic product prototype. The student develops an electronic device by utilization of: electronic design automation (EDA), design for testing (DFT), surface mount technology (SMT), design for manufacturability (DFM), component characteristic selection techniques, and basic failure predictions. New construction and testing techniques are introduced. The final prototype is presented in a written and/or oral report. Typically offered Fall Spring.

ECET 29900 - Selected Electrical Engineering Technology Subjects

Credit Hours: 0.00 to 6.00. Hours and subject matter to be arranged by staff. Permission of instructor required. Typically offered Summer Fall Spring.

ECET 30200 - Introduction To Control Systems

Credit Hours: 4.00. This first course in industrial controls is applications oriented and includes on-off type open- and closed-loop control systems, and analog-based systems. Major topics include relay and programmable controller-based systems. Typically offered Fall.

ECET 30201 - Introduction To Industrial Controls

Credit Hours: 3.00. This course examines the concepts, devices and common practices associated with control systems with a primary focus on industrial implementations. Additionally, the course provides a hierarchical examination of the implantation of control theory. Programmable logic controllers serve as the primary platform for presenting applications in interfacing and control of electromechanical and pneumatic devices. Electrical industrial safety standards are presented and emphasized throughout the course. Typically offered Fall Spring Summer.

ECET 30400 - Introduction To Communication Systems

Credit Hours: 4.00. The theory and techniques of sending information (voice, music, data, etc.) from one location to another is studied from a systems point of view. This includes signal analysis, various modulation techniques, transmitters, receivers, video, impedance matching networks and filters through the VHF frequency spectrum. In addition, wireless communication, digital communication and special topics of current interest are introduced. This course also incorporates a student-based communication design and analysis laboratory. Typically offered Fall Spring.

ECET 30700 - Analog Network Signal Processing

Credit Hours: 4.00. This is an advanced course in network analysis that stresses network theorems and solutions of time- and frequency-domain problems. Transform circuit and signal analysis using Laplace and Fourier techniques are developed, culmination in active filter design applications. Software techniques, such as MATLAB(r) and LabVIEW(tm), to solve mathematical problems are employed. Typically offered Fall Spring.

ECET 30900 - Advanced Embedded Microcontrollers

Credit Hours: 4.00. A course emphasizing the advanced applications of embedded microcontrollers. Included are microcontroller architecture, use of advanced programmable counter/timer arrays, analog interfaces, serial communication, and other peripherals. Typically offered Fall Spring Summer.

ECET 31100 - Electrical Systems And Signals In Healthcare

Credit Hours: 3.00. This course offers an overview of electrical systems in the healthcare industry and the human physical parameters which can be electrically measured. Electrical biosignals and their associated issues are introduced. Measurements techniques are studied and implemented in the laboratory. Healthcare electrical systems are investigated including diagnostic, therapeutic, monitoring, and research based equipment. Electrical safety issues are identified. Typically offered Fall Spring.

ECET 31410 - Military RF Electronic Applications

Credit Hours: 3.00. The theory and techniques of using RF transmissions to support military operations are studied from a systems point of view. This includes functions such as identification, location and tracking, communications, jamming, and deception. Many of the technologies studied are also widely used in civilian applications, such as air traffic control, satellite communications, navigation, and homeland defense. Typically offered Fall Spring Summer.

ECET 32100 - Introduction To Nanotechnology

Credit Hours: 3.00. This course explores the downsizing of electronic devices and introduces the field of nanotechnology. The downscaling to nanoelectronics, properties of nanomaterials and the tools of nanotechnology are studied. Interdisciplinary research and commercial applications are reviewed. The course involves participation in research seminars and hands-on laboratory experiences with nanotechnology instrumentation. Typically offered Fall Spring Summer.

ECET 32300 - Introduction To Electric Vehicle Systems

Credit Hours: 3.00. The course is an introduction to electric vehicle (EV) technology analysis and configuration. The course explores the integrated mechanical and electrical power and control systems including the management of integrated power and control systems within an electric vehicle. Students perform detailed analysis of and develop design approaches for electrically powered vehicles. Typically offered Fall Spring Summer.

ECET 32400 - Fundamentals Of Electromagnetics

Credit Hours: 4.00. This course introduces the fundamentals of electromagnetics in both theory and application. In the course wave propagation, transmission lines, antenna theory, and antenna design are studied. Other topics include Maxwell's equations,

planewave propagation, reflection, refraction, diffraction, propagation losses, RF signal measurement, impedance matching, and Smith chart applications. Typically offered Fall.

ECET 32500 - Computer Architecture, Modeling And Performance Analysis

Credit Hours: 4.00. A study of the architecture, hardware, and system software of computers. Fundamental principles associated with the operation of computers are introduced and studied. Modeling and analysis of computer subsystems, their performance, and interactions are also studied. Typically offered Summer Fall Spring.

ECET 32700 - Instrumentation And Data Acquisition Design

Credit Hours: 3.00. This course builds upon the prerequisite knowledge and covers implementation of electric systems to measure and record mechanical, electrical, and biological parameters. Signal characteristics, transducer specification and selection, signal conditioning and transmission design, data conversion, software, and an overall system error budget are developed. Typically offered Fall Spring Summer.

ECET 32900 - Advanced Embedded Digital Systems

Credit Hours: 3.00. This course focuses on the study and application of real-time embedded systems. Real-time operating systems (RTOS) are introduced and applied. Students learn and use programming and scripting languages to discover the advantages and limitations of RTOS application in the lab. Typically offered Fall Spring Summer.

ECET 33100 - Generation And Transmission Of Electrical Power

Credit Hours: 4.00. A study of the generation and transmission of electrical energy. Includes modeling and analysis of synchronous alternators, transformers, and transmission lines, plus analytical and computer methods of solving load flow and fault conditions on balanced and unbalanced three-phase systems. Introduces techniques used by utilities for protection and economic operation of power systems. Typically offered Fall Spring Summer.

ECET 33300 - Power Electronics In Energy Systems

Credit Hours: 3.00. A study of fundamentals and applications of switch-mode DC-DC and DC-AC power electronic converters. The emphasis is given to hardware development aspects. Students will learn how to safely work with high power and high voltage circuits. Typically offered Fall Spring Summer.

ECET 33500 - Computer Architecture And Performance Evaluation

Credit Hours: 3.00. The course focuses on the application and evaluation of computers. The architecture of modern computer CPUs and their peripheral subsystems are presented. Analytic performance evaluation techniques are introduced and developed. Common benchmarking tools for quantifying performance are used. Students also apply performance evaluation algorithms of their own creation to evaluate CPU and subsystem performance. Typically offered Fall Spring Summer.

ECET 33700 - Analog Signal Processing

Credit Hours: 3.00. This advanced course in analog circuit analysis stresses network theorems and solutions of time and frequency domain problems. Transform circuit and signal analyses, using Laplace and Fourier techniques, are applied in active filter design. Software tools are employed to solve mathematical problems. Typically offered Fall Spring Summer.

ECET 33900 - Digital Signal Processing

Credit Hours: 3.00. The course introduces students to the fundamental principles associated with processing discrete time signals. The architecture, instruction set and hardware and software development tools associated with a fixed point general purpose VLSI digital signal processor are examined. Some common real-time applications are implemented such as digital filters and DFT-based spectral estimation on a typical fixed point digital signal processor. Typically offered Fall Spring Summer.

ECET 34101 - Biocompatability And Bio-Issues

Credit Hours: 3.00. This course introduces specific techniques and methodologies of electrical instrumentation applications to healthcare systems. Biocompatibility of materials and mechanisms of material modification are studied. Biosafety and regulations are introduced. Bioethical discussions bring current and global aspects to the course. Career paths for ECET students in Healthcare are identified. Typically offered Fall Spring Summer.

ECET 34500 - Advanced Digital Systems

Credit Hours: 4.00. Digital system design with an emphasis on Application Specific Integrated Circuits is studied. System considerations, including design entry, simulation, and testing; selection of ASIC methodology, process technology, and packaging; and IC fabrication are addressed. Hierarchical circuit designs are implemented with CPLDs or FPGAs using a Hardware Description Language. Typically offered Fall.

ECET 34900 - Advanced Digital Systems

Credit Hours: 3.00. This course investigates complex digital systems that are implemented with field programmable gate arrays (FPGAs) using concurrent and sequential digital design techniques. Applications will include interfacing with analog signals and memory systems. Typically offered Fall Spring Summer.

ECET 35700 - Real-Time Digital Signal Processing

Credit Hours: 4.00. A study of the architecture, instruction set and hardware and software development tools associated with a fixed-point general purpose DSP VLSI processor. Fundamental principles associated with the processing of discrete time signals are also introduced along with the implementation of some common applications such as waveform generation, audio affects, FIR and IIR digital filtering and DFT and FFT based spectral estimation. Typically offered Fall Spring Summer.

ECET 35900 - PC Interfacing And Applications

Credit Hours: 4.00. A course emphasizing PC Systems and the techniques to create PC interfacing systems to solve real-world control and data collection problems. Graphical user-interfaces and driver software for custom applications are emphasized. Typically offered Fall.

ECET 35901 - Computer Based Data Acquisition Applications

Credit Hours: 3.00. This course focuses on the study and application of computer based data acquisition (DAQ) systems. Concepts of high resolution and high throughput data acquisition are introduced and applied. Students learn and use programming and scripting languages to discover the interfacing, advantages and limitations of computer based (DAQ) systems. Typically offered Fall Spring Summer.

ECET 36000 - CIM In Electronics Manufacturing

Credit Hours: 4.00. This course covers the manufacture and assembly of electronic printed circuit boards from component selection and board layout to soldering and test. Special emphasis is placed on high volume manufacturing techniques and state-of-the-art processes, such as surface mount technology (SMT). Laboratory projects include CAD circuit board layout, using automatic placement and soldering equipment, investigating thermal characteristics of circuit boards, process design and evaluation using SPC techniques. Effects of manufacturing processes on electrical characteristics are considered. Typically offered Spring.

ECET 36400 - Fundamentals Of Electromagnetics

Credit Hours: 3.00. This course introduces the fundamentals of electromagnetics in both theory and application. Wave

propagation, transmission lines, port parameters, antenna theory, and antenna design are studied. Other topics include Maxwell's equations, propagation losses, RF signal measurement, impedance matching, and Smith chart applications. Typically offered Fall Spring Summer.

ECET 36500 - Electrical Measurements

Credit Hours: 4.00. A study of instrumentation and automatic measurements. Individual instruments include DMM, counters, oscilloscopes, spectrum analyzers, and signal generators. The signals and operation of the general purpose interface bus are examined and applied to a measurement system. Typically offered Fall Spring Summer.

ECET 36800 - Linear Integrated Circuits

Credit Hours: 4.00. This course is a study of the applications of analog integrated circuits (IC). Topics include linear amplifiers, IC specifications, linear regulators, waveform generation, linear and switched capacitor active filters, and nonlinear circuit applications. Computer aided analysis of many of these circuits is also presented. Typically offered Fall Spring Summer.

ECET 37200 - Process Control

Credit Hours: 4.00. A study of the basic elements of closed-loop analog and digital systems. Topics include characteristics of heat, servo motion, and process tank components and systems. Also covered are closed-loop tuning, troubleshooting, documentation, diagram standards and performance specifications. Several sensor types and interpretation of their static and dynamic specifications are included. Commercial controllers employed include analog, embedded microprocessor and PLC based systems. Software is used to model components and analyze open and closed-loop systems. Typically offered Spring.

ECET 37300 - Applied Electronic Drives

Credit Hours: 3.00. This course covers operational principles and application development consideration of all subsystems that make up electric drives: electric machines, power-electric based converters, mechanical system requirements, feedback controller design, and the interaction of drives with the utility grid. State of the art drive development tools are introduced through hands-on activities. Typically offered Fall Spring Summer.

ECET 37400 - Digital Telecommunications

Credit Hours: 4.00. This is an advanced course in digital communications concepts and applications. Digitalization of analog signals, modulation of digital signals, signaling techniques, multiplexing and protocols are investigated. Applications of transport technologies utilizing underlying digital communication protocols are discussed. Transfer of digital information through diverse

communication media is emphasized. Practical application of the technologies and protocols are investigated in the laboratory. Typically offered Summer Fall Spring.

ECET 37401 - Digital Communication Systems

Credit Hours: 3.00. Digital communication systems form the backbone of modern communication systems, such as cell phone, telecommunication, wireless local area network, Ethernet and optical fiber systems. This course explores the core concepts of modern digital communications systems, covering topics in areas including quantization, encoding, compression, modulation and channel modeling. Typically offered Fall Spring Summer.

ECET 38000 - Professional Issues In EET

Credit Hours: 1.00. This course addresses professional ethics, legal issues, professional development, technology transfer, and corporate culture as they relate to EET graduates. Information relating to personal job and career choices, resumes, and interviews are included. Typically offered Fall Spring Summer.

ECET 38001 - Global Professional Issues In Electrical Engineering Technology

Credit Hours: 3.00. This course addresses professional ethics, legal issues, professional development, technology transfer, and corporate culture as they relate to EET graduates and our global society. Information relating to personal job and career choices, resumes, and interviews are included. Typically offered Fall Spring Summer.

ECET 38100 - Electrical Distribution Systems

Credit Hours: 4.00. A study of the design and operation of electric distribution systems including estimated demand, demand calculations, energy conservation, faults on power systems, power quality, power factor improvement, electric rates, voltage drops, protective devices, illumination, and the applicable portions of the National Electric Code (NEC). Both new facilities and additions to existing facilities are included. Typically offered Summer Fall Spring.

ECET 38500 - Introduction To Automotive Electronics

Credit Hours: 4.00. This course is a study of automotive electronics components and systems. Main topics are sensors, actuators, engine fuel systems and ignition systems. Also covered are braking, emissions, General Motors Class II bus, and OBD (On Board Diagnostic) systems and emerging technologies. Typically offered Summer Fall Spring.

ECET 38600 - Building Electrical Codes And Standard Practices

Credit Hours: 3.00. A course in the design of building wiring, machine wiring and electrical control systems using relevant codes and standards to layout commercial and industrial facilities and manufacturing processes. Typically offered Fall Spring Summer.

ECET 38800 - Analog IC Applications

Credit Hours: 3.00. This course is a study of the applications of analog integrated circuits. Topics include linear amplifiers, IC specifications, linear regulators, waveform generation, linear and switched-capacitor active filters, and nonlinear circuit applications. Computer aided analysis of these circuits is also presented. Typically offered Fall Spring Summer.

ECET 39600 - Project Development and Management

Credit Hours: 4.00. This is a structured course in electronic projects, with an emphasis on planning and design alternatives to meet cost, performance, and user-interface goals. A software tool is utilized for project management. Students work in teams to solve problem assignments using guided design techniques. Creativity is stressed, and the different approaches taken by different teams are compared and discussed. Typically offered Fall Spring Summer.

ECET 41400 - Wireless Communications

Credit Hours: 4.00. Practical and theoretical aspects of wireless communication system design are studied; particular emphasis is on mobile communications. Frequency reuse, hand-off, cell splitting, indoor/outdoor propagation, cochannel interference, frequency management, channel assignment techniques, cell-site antennas, handset antenna/human body interaction, switching and traffic, AMPS, GSM, TDMA, and CDMA are studied. Typically offered Fall Spring Summer.

ECET 42301 - Electrical Vehicle Integration And Fabrication

Credit Hours: 3.00. This course requires students to develop a detailed design, develop a time/action plan, perform research on existing electronic vehicle systems, develop a procurement plan for electronic vehicle components, design and fabricate custom electric vehicle components, and construct an electric vehicle. The completed electric vehicle is extensively tested for safety, performance, and energy efficiency. Typically offered Fall Spring Summer.

ECET 42400 - Wireless Systems: Design And Measurement

Credit Hours: 4.00. In this course wireless RF signals and microwave circuit designs are studied. Topics covered in the course

include RF passive systems, power dividers, couplers, RF amplifiers, RF filters, impedance matching, planar antennas, resonators, VCO's, RF simulation and high frequency PCB layout. Typically offered Spring.

ECET 42800 - Audio Electronics-Selected Topics

Credit Hours: 3.00. Define, implement, and evaluate the performance of the electronic elements in a professional audio system such as preamplifiers, signal encoding and transmission, data storage, signal reception and decoding, mixers, post processors, and power amplifiers. Both analog and digital signal processing may be implemented in each of the electronic elements. Typically offered Fall Spring Summer.

ECET 43000 - Electrical And Electronic Product And Program Management

Credit Hours: 3.00. This course deals with the planning of electrical and electronic products and projects. Research methods are studied to support new product development including customer needs and the development of engineering requirements. Formal techniques such as functional decomposition, top-down and bottom-up design techniques are studied. Planning and design alternatives to meet cost, performance, and user-interface foals are emphasized. Technical topics are revisited with emphasis on new applications. The various types and levels of new product system tests are studied. New product planning, scheduling, and management techniques are studied, along with the usage of software tools for project scheduling and management. Creativity is stressed, and the different approaches taken by the designers are compared and discussed. Typically offered Fall Spring Summer.

ECET 43100 - International Capstone Project Planning And Design

Credit Hours: 3.00. The course deals with the planning and execution of an industry sponsored senior capstone project carried out jointly with students from a foreign academic institution. Project management and systems engineering methods are studied to support the development of solutions to open-ended problems proposed by industry. Formal techniques such as functional decomposition, top-down and bottom-up, requirement matrix, analysis of alternatives are studied and applied to the projects. Project planning techniques including work breakdown structures, Gantt charts and resource planning are studied and applied to meet cost, performance and project goals. The various types and levels of new system tests are studied and applied. Electronic and internet communication tools shall be used to maintain team and project progress. Foreign travel shall be required for at least one face to face team meeting during the execution of the project. Permission of Instructor required. Typically offered Fall Spring Summer.

ECET 43600 - Electrical Power Transmissions, Distribution, And Smart Control

Credit Hours: 3.00. A course on the simple modeling and simulation of the power grid systems, power flow analysis, and advanced meter infrastructure (AMI). The fundamentals learned in this course will be useful in the study of the effects of distributed energy resources and storage in Smart Grid environment. Typically offered Fall Spring Summer.

ECET 43900 - Advanced Digital Signal Processing

Credit Hours: 3.00. The course builds on the basic principles and applications of Digital Signal Processing with a view to implementing advanced DSP techniques. These techniques are chosen to form some of the building blocks that are used in specialization areas such as the biomedical, communications and energy management fields. Typically offered Fall Spring Summer.

ECET 44400 - Wireless Systems: Design And Measurement

Credit Hours: 3.00. In this course wireless RF signals and microwave circuit designs are studied. Topics include signal analysis, RF signal measurement, microstrip design and analysis, Smith chart applications, RF circuit design, s-parameters, power dividers and couplers, filter design, and advanced RF PCB layout. Typically offered Fall Spring Summer.

ECET 46000 - Project Design And Development

Credit Hours: 3.00. An extensive individual or small group design project is carried out with guidance from a faculty advisor. This course includes determining customer requirements, considering design alternatives, prototyping, project integration, and testing. The project is completed as a robust prototype. The course concludes with a formal written report and a presentation of the project to faculty and invited industrial guests. Typically offered Fall Spring Summer.

ECET 46100 - International Capstone Project Execution

Credit Hours: 3.00. This course completes the development and execution of an international industry sponsored senior capstone project carried out jointly with students from a foreign academic institution. Project management and systems engineering methods are applied in the development of solutions to open-ended problems proposed by industry. Design tools including failure mode and effects analysis and configuration management are studied and applied. A manufacturing plan supported by both in process and validation test plans are developed and applied to demonstrate compliance to project requirements. The project is completed with the generation of a proof of concept demonstration that satisfies project requirements. The course concludes with a formal written report and presentation. Electronic and internet communication tools shall be used to maintain team and project progress. Foreign travel shall be required for at least one face to face team meeting during the execution of the project. Permission of Instructor required. Typically offered Fall Spring Summer.

ECET 47400 - Digital Communications

Credit Hours: 4.00. This is an advanced course in digital communications concepts and applications. Topics include analog message digitization, signal space representation of digital signals, binary and M-ary signaling methods, the detection of binary and M-ary signals, modulation of digital signals, signaling techniques, digital multiplexing and protocols. Applications of transport technologies using underlying communication protocols are discussed. Transfer of digital information through diverse communication media is emphasized. There is an introductory treatment of probability theory, including distribution and random

variables; with the applications of normal and exponential distributions to traffic analysis. Practical application of the technologies and protocols are investigated in the laboratory. Typically offered Fall Spring Summer.

ECET 48300 - Network Fundamentals With Microcontrollers

Credit Hours: 4.00. The principles of local-area network communications are studied. Emphasis is on hardware, signals, the hardware/software interface, and protocols commonly associated with embedded systems. Methods, tradeoffs, and performance of various addressing, error detection and correction, and collision detection are studied. Relationships with the 7-layer OSI model are examined. Typically offered Spring.

ECET 48400 - Digital Wireless Systems

Credit Hours: 3.00. This course investigates the theory and implementation of digital wireless systems for current and next generation communication systems. Cognitive radio systems and technologies will be studied and implemented. Typically offered Fall Spring.

ECET 48800 - Automatic Test Instrumentation

Credit Hours: 4.00. An introduction to automated test equipment (ATE). Emphasis is placed on understanding the philosophy of testing in maintaining product conformance and control. The operation of the GPIB, VXI bus, or other integrated automatic test sets with a high level computer language control interface with data logging and analysis is presented. Typically offered Summer Fall Spring.

ECET 49500 - Inten Project Design/Development

Credit Hours: 3.00. Credit will not be granted for both ECET 495 and ECET 49700. This course is an intensive conclusion to the senior design process begun in ECET 49600. The course concludes with a formal demonstration and oral presentation on the finished product and a written report on the final design. Typically offered Summer Fall Spring.

ECET 49600 - Project Design and Development, Phase I

Credit Hours: 1.00. An extensive individual or small-group design project is carried out with guidance from a faculty advisor. Phase I includes determining customer requirements, considering design alternatives, and issuing a formal project proposal. Software scheduling tools are used extensively. The course concludes with a report and demonstration of functionality of individual hardware and software design blocks. Typically offered Fall Spring Summer.

ECET 49700 - Project Design And Development, Phase II

Credit Hours: 1.00 or 2.00. This conclusion of the design project begun in ECET 49600 emphasizes system integration and testing. The course concludes with a formal demonstration of and oral presentation on the finished product and a written report on the final design. Typically offered Fall Spring Summer.

ECET 49900 - Electrical Engineering Technology

Credit Hours: 1.00 to 9.00. Hours and subject matter to be arranged by staff. Cannot be used to replace EET 48000, 49600, or 49700. Permission of instructor required. Typically offered Fall Spring Summer.

ECET 52400 - Applied Electromagnetics

Credit Hours: 3.00. This course provides an advanced treatment of electromagnetics and applications at the graduate level for engineering technology students. Electric and magnetic field theory is presented, including Maxwell's equations. Topics include vector analysis, electric and magnetic fields, Maxwell's equations, electromagnetic wave radiation, and propagation. A semester-long project based on applied electromagnetics is required for each student. Knowledge of RF measurement equipment, such as spectrum analyzers and vector network analyzers is required. Typically offered Fall Spring.

ECET 52500 - Applications In Forensic Engineering Technology

Credit Hours: 3.00. An interdisciplinary consideration of the applications of forensics in the American jurisprudence system. Topics include: failure analysis of electrical and mechanical systems, accident reconstruction, product liability, codes and standards, ethics, and expert witness testimony. Typically offered Spring.

ECET 53500 - Energy Management

Credit Hours: 3.00. A study of energy auditing, energy saving opportunities of commercial and industrial systems, utility rate structures, economic evaluation of investments, potential energy saving retrofits, maintenance considerations, and cogeneration opportunities. Data analysis and report writing are practiced using data from a real world energy audit. Typically offered Fall.

ECET 53600 - Embedded Systems Security

Credit Hours: 3.00. This course focuses on the implementation and application of cryptographic algorithms and protocols in embedded systems. An overview of the security problem and the science of cryptography and cryptanalysis is presented. The notion of the security perimeter in terms of physical access to assets in embedded hardware subsystems is studied. Students

implement and apply various ciphers on 8-bit to 32-bit embedded platforms, comparing and contrasting computational and data throughout performance. Permission of instructor required. Typically offered Fall Spring.

ECET 58100 - Workshop In Electrical And Computer Engineering Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Summer Fall Spring.

ECET 59000 - Special Problems In Electrical And Computer Engineering Technology

Credit Hours: 1.00 to 6.00. Independent study of a special problem under the guidance of a member of the staff. Does not substitute for either M.S. thesis or M.S. project credit. Permission of instructor required. Typically offered Summer Fall Spring.

ECET 59800 - Directed MS Project

Credit Hours: 1.00 to 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of instructor required. Typically offered Summer Fall Spring.

ECET 63800 - Selected Topics In Sensor Networks

Credit Hours: 3.00. This course examines general sensor network concepts, with a focus on a particular area of research and development. Current applications are studied, culminating with the analysis, characterization and/or examination of a sensor network. Permission of instructor required. Typically offered Fall Spring.

ECET 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Engineering Education

ENE 49800 - Undergraduate Research In Engineering Education

Credit Hours: 1.00 to 3.00. Individual research projects for students with the approval of their academic advisors. Requires prior approval of, and arrangement with, a faculty research advisor in the Department of Engineering Education. Written and oral final reports are required. Permission of instructor required. Typically offered Summer Fall Spring.

ENE 50100 - Professional Development In Engineering Education

Credit Hours: 1.00. This course provides beginning engineering education graduate students opportunities to define themselves with the engineering education department and within the field of engineering education. Students, faculty, and outside speakers present research topics, academic opportunities, and other information that will enhance students' graduate experiences. Permission of instructor required. Typically offered Fall.

ENE 50200 - History And Philosophy Of Engineering Education

Credit Hours: 3.00. Examines the history and philosophy of engineering education by: (1) exploring the history of engineering education through archival research and historical documents (critical moments, tensions, issues); (2) investigating philosophies of education and the philosophies that have guided engineering as a profession; and (3) critiquing the evolution of engineering education, identifying alternative scenarios, and imagining a future role in engineering education. This course introduces students to the field of engineering education while broadening their views of the roles of interrelationships between teaching and research. Open to students in Engineering Education. Permission of instructor required. Typically offered Fall.

ENE 50300 - Engineering Education Inquiry

Credit Hours: 3.00. This course is conceived as a bridge between beginning graduate students' knowledge of technical research and modes of inquiry appropriate to the new field of engineering education. It is designed as the entryway to required research method courses taken as part of the students' plan of study. By the end of this survey course, students will be able to critique research in terms of the quality of the authors' argument based on their chain of reasoning, and will recognize that the articulation of a research question, the significance of the question, the choice of methods in regards to the research goals, and the transparency of the explanation of the methodology are all the parts of the chain of reasoning. Permission of instructor required. Typically offered Fall.

ENE 50600 - Content, Assessment And Pedagogy: An Integrated Engineering Design Approach

Credit Hours: 3.00. The course is explicitly identified in the ENE -PhD requirements as a "foundation course" required for all students. This course is intended to be taken early in a graduate student's curriculum and therefore is designed to be a bridge between the student's previous experience with engineering (education, work, and teaching) and new engineering education research-based approaches. It is intended as an entryway to help students apply an engineering design approach to the design of instruction. To meet this aim, the course involves an iterative project-based approach in a context (design site) that is chosen by the student for its relevance, interest and potential application. Typically offered Spring.

ENE 55300 - Introduction To Globalization And Engineering

Credit Hours: 1.00. History and dynamics of globalization, and its impact on engineering practice and the lives and education of engineers. Topics include: global migration of highly-skilled people, free flow of capital and the globalization of R&D investment, world trade of commodities and high-tech products, global value chains and the process of innovation, role of multinational and metanational corporations, role of intellectual property and the global spread of technology, global outsourcing and off-shoring of engineering jobs and services, global convergence of engineering education and life-long learning. The course includes lectures by the instructor or by guest speakers representing industry and academia from all over the world. This course is designed assuming a maturity level congruent with students having work experience or planning to enter fulltime employment within a year. Typically offered Fall.

ENE 55400 - Globalization And Engineering

Credit Hours: 3.00. The focus is on the multifaceted dynamics of globalization, and its impact on engineering practice and the lives and education of engineers. The course emphasizes engineering and globalization from the perspectives of the emerging Asian economies and Europe, as well as the United States. This course is designed for practicing engineers and engineering educators. It is taught within a learner-centric, highly interactive, collaborative learning environment in which students are expected to learn from the experiences and thinking of each other, as well as from the instructor, and other course resources. The course places emphasis on reading, writing, web-based research, and discussion. Students are recommended (but not required) to have a minimum of two years work experience as a practicing engineer and strong communication skills (self-assessed). Permission of instructor is required. Typically offered Fall.

ENE 59000 - Special Problems In Engineering Education

Credit Hours: 1.00 to 6.00. Project or special topics of contemporary importance or of special interest that are outside the scope of the standard graduate curriculum. Interested students should seek a faculty advisor by meeting individual faculty members who work in their area of special interest and prepare a brief description of the work to be undertaken and expected outcomes and deliverables. An individual project must be approved by the faculty member supervising the project and the student's advisor before registering for the course. An approved written report is required. Permission of instructor required. Typically offered Summer Fall Spring.

ENE 59500 - Special Topics In Engineering Education

Credit Hours: 0.00 to 6.00. Primarily designed for specialized topic areas for which there is no specific course, workshop, or individual study plan, but having enough student interest to justify the formalized teaching of a course . Permission of instructor required. Typically offered Summer Fall Spring.

ENE 62000 - Design, Cognition And Learning

Credit Hours: 3.00. Design is central to engineering: it is an integral part of the engineering profession and how we educate future professionals. Design cognition and learning is an area of engineering education research that seeks to understand what designers know and how they learn, and what tools best support design activity (e.g., collaboration, innovation, etc.). This research draws from many perspectives including cognitive psychology and the learning sciences, organizational learning, engineering and product design, architecture, human-centered interaction, and creativity and innovation. Themes in the course include (1) design knowledge, (2) what theories help understand design knowing and learning, (3) what are ways to study designers and design activity, and (4) how may design research inform design education and practice? Permission of instructor required. Typically offered Fall.

ENE 63000 - Cognitive Devices In Science, Technology, Engineering And Mathematics Learning Environments

Credit Hours: 3.00. This course explores the nature of technologies we use to assist in thinking, learning and teaching. Specifical focus is on cognitive tools associated with engineering activities and how to blend these tools with science and mathematical knowledge. These will range from representational tools, computational tools and cognitive tools for supporting individual and group thinking and learning. Participants in this course will be able to evaluate various learning technologies relative to specific learning goals and outcomes and will design a technological tool to support thinking, learning and/or teaching about concepts in science, engineering, mathematics and technology. Participants will also be able to identify assessment methods that indicate cognitive change in learners as a measure of the effectiveness of a device/tool in context of an activity. Typically offered Spring.

ENE 68500 - Educational Methods In Engineering

Credit Hours: 3.00. (CHE 68500) Students will learn how to teach in an engineering environment where both classroom and laboratory instruction is intertwined. Classroom techniques, such as lectures, cooperative groups, mastery and PSI, TV and video, and guided design will be studied, in addition to class preparation issues, such as ABET accreditation and design content. Students will study motivation, learning theories and cycles, and personality types. Includes teaching practice and group projects. Student must be admitted into a Ph.D. program in Engineering or other technical discipline (Finished with MS or MS-bypass). Not open to students who have taken PSY 69500/EDPS 63400. Permission of Instructor required. Typically offered Fall Spring.

ENE 69000 - Seminar In Engineering Education

Credit Hours: 0.00. Seminar course covering a broad range of current discovery, learning, and engagement topics in Engineering Education. Seminar presentations by representatives from academia, industry, other external institutions, and members of the Purdue University community. This is a required course for the graduate program in the Department of Engineering Education. Typically offered Fall Spring.

ENE 69500 - Advanced Topics In Engineering Education

Credit Hours: 0.00 to 6.00. Primarily designed for specialized topic areas for which there is no specific course, workshop, or

individual study plan, but having enough student interest to justify the formalized teaching of a course. Permission of instructor required. Typically offered Summer Fall Spring.

ENE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

ENE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. PhD Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Engineering Projects in Community Service

EPCS 10100 - First Year Participation In EPICS

Credit Hours: 1.00. Together, Engineering Projects in Community Service (EPICS) courses create a vertical project track under which students work in multidisciplinary teams on long-term engineering-based design projects. Projects of at least one-year in duration are intended to solve real problems that are defined in consultation with "customers" from not-for-profit community and education organizations. EPCS courses are open to students from all disciplines; each student contributes expertise in his/her academic discipline. Each team consists of a mix of first year, sophomores, juniors, and seniors. Students are encouraged to participate in an EPICS project team for two or more semesters. First year students participating in EPCS 10100 gain insight into the specific project, and more generally, into the design and development process. They attend planning and reporting meetings with the customer and are expected attend all team meetings. Under the mentorship of the team's sophomores, juniors and seniors they perform and report upon tasks consistent with their level of discipline expertise. May be repeated for credit. Typically offered Fall Spring.

EPCS 10200 - First Year Participation In EPICS

Credit Hours: 2.00. Continuation of EPCS courses (see EPCS 10100). Participants in EPCS 10200 gain insight into the specific project, and more generally, into the design and development process. They attend planning and reporting meetings with the customer and are expected to attend all team meetings. Working with team's sophomores, juniors and seniors they perform and report upon tasks consistent with their level of discipline expertise. EPCS 10200 is offered for two credits and is intended for students who have exhibited significant achievement in EPCS 10100 and desire the level of responsibility that is appropriate for two credits. May be repeated for credit. Permission of department required. Typically offered Fall Spring.

EPCS 11100 - First Year Participation In EPICS I

Credit Hours: 1.00. Together, Engineering Projects in Community Service (EPICS) courses create a vertical project track under which students work in multidisciplinary teams on long-term engineering-based design projects. Projects of at least one-year in duration are intended to solve real problems that are defined in consultation with "customers" from not-for-profit community and education organizations. EPCS courses are open to students from all disciplines; each student contributes expertise in his/her academic discipline. Each team consists of a mix of first-year, sophomores, juniors, and seniors. Students are encouraged to participate in an EPICS project team for two or more semesters. First-year students participating in EPCS gain insight into the specific project, and more generally, into the design and development process. They attend planning and reporting meetings with the customer and are expected to attend all team meetings. Under mentorship from upper level students and instructors, they perform and report upon design tasks consistent with their level of discipline expertise. Typically offered Fall Spring.

EPCS 12100 - First Year Participation In EPICS II

Credit Hours: 1.00. Together, Engineering Projects in Community Service (EPICS) courses create a vertical project track under which students work in multidisciplinary teams on long-term engineering-based design projects. Projects of at least one year in duration are intended to solve real problems that are defined in consultation with "customers" from not-for-profit community and educational organizations. EPCS courses are open to students from all disciplines; each student contributes expertise in his/her academic discipline. Each team consists of a mix of first-year, sophomores, juniors, and seniors. Students are encouraged to participate in an EPICS project for two or more semesters. First-year students participating in EPICS gain insight into the specific project, and more generally, into the design and development process. Under mentorship from upper-level students and instructors, they perform and report upon design tasks consistent with their level of discipline expertise. Typically offered Fall Spring.

EPCS 20100 - Sophomore Participation In EPICS

Credit Hours: 1.00. Continuation of EPCS courses (see EPCS 10100). Sophomores participating in EPCS 20100 gain insight into the specific project, and, more generally, into the design and development process. They attend planning and reporting meetings with the customer and are expected attend all team meetings. Under the mentorship of the team's juniors and seniors they perform and report upon tasks consistent with their level of discipline expertise. EPCS 20100 is offered for 1 credit. Typically offered Summer Fall Spring.

EPCS 20200 - Sophomore Participation In EPICS

Credit Hours: 2.00. Continuation of EPCS courses (see EPCS 10100). Sophomores participating in EPCS 20100 gain insight into the specific project, and, more generally, into the design and development process. They attend planning and reporting meetings with the customer and are expected attend all team meetings. Under the mentorship of the team's juniors and seniors they perform and report upon tasks consistent with their level of discipline expertise. EPCS 20200 is offered for 2 credits. Permission of instructor required. Typically offered Summer Fall Spring.

EPCS 30100 - Junior Participation In EPICS

Credit Hours: 1.00. Continuation of EPCS courses (see EPCS 10100). The responsibilities of juniors include working with the seniors in the planning and organization of the project, contributing to the design process, problem solving by contributing expertise from their discipline, meeting with the customer, and the mentorship of sophomores and freshmen. EPCS 30100 is offered for 1 credit. The EPICS procedures manual provides information on expected relative workload for EPCS 30100 and EPCS 30200 students. May not be taken concurrently with EPCS 30200. Typically offered Summer Fall Spring.

EPCS 30200 - Junior Participation In EPICS

Credit Hours: 2.00. Continuation of EPCS courses (see EPCS 10100). The responsibilities of juniors include working with the seniors in the planning and organization of the project, contributing to the design process, problem solving by contributing expertise from their discipline, meeting with the customer, and the mentorship of sophomores and freshmen. EPCS 30200 is offered for 2 credits. The EPICS procedures manual provides information on expected relative workload for EPCS 30100 and EPCS 30200 students. May not be taken concurrently with EPCS 30100. Typically offered Summer Fall Spring.

EPCS 40100 - Senior Participation In EPICS

Credit Hours: 1.00. Continuation of EPCS courses (see EPCS 10100). Seniors are responsible for the management tasks of planning and organizing their team project activity. They are expected to contribute expertise from their discipline to the design of the team's projects throughout most of the design process phases of problem identification, specification development, design, production, and deployment. Seniors will also meet with the customer and mentor the freshman, sophomores and juniors. Seniors using EPCS 40100/EPCS 40200 to fulfill capstone or design requirements where approved for their major may be required to satisfy additional course requirements specified by their degree program. EPCS 40100 is offered for 1 credit. The EPICS procedures manual provides information on expected relative workload for EPCS 40100 and EPCS 40200 students. May not be taken concurrently with EPCS 40200. Typically offered Summer Fall Spring.

EPCS 40200 - Senior Participation In EPICS

Credit Hours: 2.00. Continuation of EPCS courses (see EPCS 10100). Seniors are responsible for the management tasks of planning and organizing their team project activity. They are expected to contribute expertise from their discipline to the design of the team's projects throughout most of the design process phases of problem identification, specification development, design, production, and deployment. Seniors will also meet with the customer and mentor the freshman, sophomores and juniors. Seniors using EPCS 40100/40200 to fulfill capstone or design requirements where approved for their major may be required to satisfy additional course requirements specified by their degree program. EPCS 40200 is offered for 2 credits. The EPICS procedures manual provides information on expected relative workload for EPCS 40100 and EPCS 40200 students. May not be taken concurrently with EPCS 40100. Typically offered Summer Fall Spring.

EPCS 41100 - Senior Design Participation In EPICS

Credit Hours: 1.00. Continuation of EPICS courses. Seniors using EPCS 41100 to fulfill capstone or design requirements where

approved for their major may be required to satisfy additional course requirements specified by their degree program. EPCS 41100 is offered for 1 credit. The EPICS procedures manual provides information on expected relative workload for EPCS 41100 and EPCS 41200 students. Seniors are responsible for the management tasks of planning and organizing their team project activity. They are expected to contribute expertise from their discipline to the design of the team's projects throughout most of the design process phases of problem identification, specification development, design, production, and deployment. Seniors will also meet with the customer and mentor the first year, sophomores and juniors. May not be taken concurrently with EPCS 41200. Typically offered Fall, Spring.

EPCS 41200 - Senior Design Participation In EPICS

Credit Hours: 2.00. Continuation of EPICS courses. Seniors using EPCS 41200 to fulfill capstone or design requirements where approved for their major may be required to satisfy additional course requirements specified by their degree program. EPCS 41200 is offered for 2 credit. The EPICS procedures manual provides information on expected relative workload for EPCS 41100 and EPCS 41200 students. Seniors are responsible for the management tasks of planning and organizing their team project activity. They are expected to contribute expertise from their discipline to the design of the team's projects throughout most of the design process phases of problem identification, specification development, design, production, and deployment. Seniors will also meet with the customer and mentor the first year, sophomores and juniors. May not be taken concurrently with EPCS 41100. Typically offered Fall, Spring.

EPCS 49000 - EPICS Special Topics Course

Credit Hours: 1.00 to 3.00. Projects of special interest outside the scope and structure of the standard EPICS courses. Interested students seek a faculty advisor in their area of special interest and together prepare a brief description of the work to be undertaken. Permission of instructor required. Typically offered Summer Fall Spring.

English

ENGL 10100 - English Composition I

Credit Hours: 3.00. The first half of the basic composition sequence. Extensive practice in writing clear and effective prose. Instruction in logic, structure, and style. Typically offered Fall Spring Summer.

ENGL 10200 - English Composition II

Credit Hours: 3.00. The second half of the basic composition sequence. Extensive practice in writing clear and effective prose. Instruction in logic, structure, and style. Students who receive an "A" in ENGL 10100 may, with their school's approval, substitute an elective course in English for ENGL 10200. Typically offered Fall Spring Summer.

ENGL 10300 - Comprehensive First Year Composition

Credit Hours: 3.00. An accelerated composition course that substitutes for ENGL 10100 for students showing superior writing ability. Students who pass ENGL 103 are excused from ENGL 10200; those who fail ENGL 103 must take ENGL 10100. Typically offered Summer Fall Spring.

ENGL 10500 - English Composition II

Credit Hours: 3.00. The secon half of the basic composition sequence. Extensive practice in writing clear and effective prose. Instruction in logic, structure, and style. Typically offered Fall Spring Summer.

ENGL 10600 - First-Year Composition

Credit Hours: 4.00. Extensive practice in writing clear and effective prose. Instruction in organization, audience, style, and research-based writing. Typically offered Fall Spring Summer. NOTE: Concurrent registration is not permitted for ENGL 10600 and COM 11400.

ENGL 10800 - Accelerated First-Year Composition

Credit Hours: 3.00. An accelerated composition course that substitutes for ENGL 10600 for students showing superior writing ability. Typically offered Summer Fall Spring.

ENGL 20300 - Introduction To Research For Professional Writers

Credit Hours: 3.00. Introduction to research sources and methods useful for professional writers, including electronic resources. Focus on collecting print and online information, interviewing, surveying, and conducting observations; and on evaluating, summarizing, analyzing, and reporting research. Typically offered Summer Fall Spring.

ENGL 20400 - Special Topics In Writing

Credit Hours: 3.00. A course in writing, with the special topic selected by the instructor. Typically offered Fall Spring.

ENGL 20500 - Introduction To Creative Writing

Credit Hours: 3.00. Practice in writing short prose narratives and poetry for students who have finished composition and wish to develop their skills further. Workshop criticism. Typically offered Summer Fall Spring. CTL:IEL 1230 Introduction To Creative Writing

ENGL 22700 - Elements Of Linguistics

Credit Hours: 3.00. A summary of what is known about human language, its structure, its universality, and its diversity; language in its social setting; language in relation to other aspects of human inquiry and knowledge. Credit will not be awarded for both ENGL 22700 and LC 26100. Typically offered Fall Spring Summer. CTL:IEL 1260 Introduction To Linguistics

ENGL 23000 - Great Narrative Works

Credit Hours: 3.00. Reading and discussion of great narratives from Homer's Odyssey to the present, considering works from a variety of cultures and time periods in order to develop an understanding of their ideas, structures, styles, and cultural values. Typically offered Fall Spring Summer.

ENGL 23100 - Introduction To Literature

Credit Hours: 3.00. Reading and discussion of great works of various types to develop an understanding of their ideas, structures, and styles. Includes poetry, drama, biography, essay, and prose fiction. Typically offered Fall Spring Summer. CTL:IEL 1270 Appreciation Of Literature

ENGL 23200 - Thematic Studies In Literature

Credit Hours: 3.00. Examination of a particular theme, such as the hero, death, or the city, and the techniques by which it is treated in various literary works, usually in more than one genre. Current offerings available from counselors. Typically offered Fall Spring Summer.

ENGL 23400 - Ecological Literature

Credit Hours: 3.00. Literary study of nature writing; writing from the natural sciences; and canonical poetry, fiction, and essays through an ecological lens. Introduces students to ecocritical thought and environmental literary history. Typically offered Summer Fall Spring.

ENGL 23500 - Introduction To Drama

Credit Hours: 3.00. Reading and discussion of plays of various styles from significant periods of dramatic literature aimed at enhancing the understanding and appreciation of the form and content of all drama. Typically offered Summer Fall Spring.

ENGL 23700 - Introduction To Poetry

Credit Hours: 3.00. How to read poetry intelligently; function of diction, metrics, figures of speech, and theme; place of a poem in history, uses of poetry. Typically offered Summer Fall Spring. CTL:IEL 1271 Introduction To Poetry

ENGL 23800 - Introduction To Fiction

Credit Hours: 3.00. Reading and discussion of short stories and seven novels to promote awareness, understanding, and appreciation of the range, values, techniques, and meanings of modern fiction. Typically offered Fall Spring Summer.

ENGL 23900 - Introduction To Biography

Credit Hours: 3.00. Reading and discussion of modern biographies and influential earlier texts. Special attention given to the history of biographical writing and to the study of biography as a recognizable form of writing and a means of understanding and ordering human experience. Typically offered Summer Fall Spring.

ENGL 24000 - Survey Of The British Literature: From The Beginnings Through The Neoclassical Period

Credit Hours: 3.00. Surveys authors, periods, and themes of British literature from the beginnings through the eighteenth century. Typically offered Fall Spring Summer.

ENGL 24100 - Survey Of The British Literature: From The Rise Of Romanticism To The Modern Period

Credit Hours: 3.00. Surveys authors, periods, and themes of British literature from the later eighteenth century through the modern period. Typically offered Fall Spring Summer.

ENGL 25000 - Great American Books

Credit Hours: 3.00. Selected works, such as The Scarlett Letter, Moby Dick, Uncle Tom's Cabin, Walden, Huckleberry Finn, Absalom, Absalom!, Their Eyes Were Watching God, Native Son, and Beloved, closely read and discussed as to their literary qualities and their cultural significance. Typically offered Fall Spring Summer.

ENGL 25700 - Literature Of Black America

Credit Hours: 3.00. A survey of literature written by black American authors. Close attention is paid to the history of black literature and to the historical context in which it was written, as well as to the texts of major works by black writers. Typically offered Summer Fall Spring.

ENGL 25800 - Nobel Prize Winners In Literature

Credit Hours: 3.00. A study of global issues, especially ethics, economics, education, media and environment, through a close reading of Nobel Prize winners in literature. Typically offered Summer Fall Spring.

ENGL 26200 - Greek And Roman Classics In Translation

Credit Hours: 3.00. Study of important works of Greek and Roman literature, their intrinsic literary values, and their influence on later European and American writing and thinking. Typically offered Summer Fall Spring.

ENGL 26400 - The Bible As Literature

Credit Hours: 3.00. A study of selections from the Old and New Testaments as examples of Hebrew and early Christian literature. Typically offered Summer Fall Spring.

ENGL 26600 - World Literature: From The Beginnings To 1700 A.D.

Credit Hours: 3.00. (CMPL 26600) World literature in translation. A comparative and chronological survey of the masterpieces of Eastern and Western literature. Typically offered Summer Fall Spring. CCN: IEL 1250 World Literature 1

ENGL 26700 - World Literature: From 1700 A.D. To The Present

Credit Hours: 3.00. (CMPL 26700) World literature in translation. A comparative and chronological survey of the masterpieces of Eastern and Western literature. Typically offered Summer Fall Spring. CCN: IEL 1251 World Literature 2

ENGL 27600 - Shakespeare On Film

Credit Hours: 3.00. Considers the relation of the written text of five or six Shakespeare plays to multiple film versions from a wide variety of times and cultures, e.g., the United States, England, France, Italy, Japan, Denmark, India, and Russia. Typically offered Fall Spring Summer.

ENGL 27900 - The American Short Story In Print And Film

Credit Hours: 3.00. Analysis of American short stories of the nineteenth and twentieth centuries, their filmed versions, their printed scenarios, and critical writings about the tales and their adaptations. Typically offered Summer Fall Spring.

ENGL 28600 - The Movies

Credit Hours: 3.00. (Lec/Lab offering at PWL.) The history and aesthetics of the movies from The Great Train Robbery and The Birth of a Nation or Intolerance to contemporary films. Comparison of the cinematic method with the methods of the drama and the novel. One afternoon or evening a week for the screening of films; two periods a week for discussion. Typically offered Fall Spring.

ENGL 30100 - Ways Of Reading

Credit Hours: 3.00. Close reading of and significant writing about selected literary texts informed by a variety of critical and/or theoretical perspectives. For English majors and minors only. Typically offered Fall Spring.

ENGL 30400 - Advanced Composition

Credit Hours: 3.00. Designed for students who wish additional training in composition beyond the basic requirements. Extensive practice in the writing of mature expository, critical, and argumentative prose. (The course satisfies the Indiana certification requirement of three hours of advanced composition.). Typically offered Fall Spring Summer.

ENGL 30600 - Introduction To Professional Writing

Credit Hours: 3.00. Development of skill in analyzing rhetorical situations in the workplace. Practice in planning, writing, evaluating, and revising a variety of documents typical of those used in the arts and industry. Typically offered Summer Fall Spring.

ENGL 30900 - Computer-Aided Publishing

Credit Hours: 3.00. The development of the ability to write and design documents using electronic publishing technologies. Students will receive instruction in writing, graphics, and publishing software and will write, design, produce, and critique a number of publications. Typically offered Summer Fall Spring.

ENGL 31600 - Craft Of Fiction From A Writer's Perspective

Credit Hours: 3.00. This course focuses on the craft of fiction with some consideration of its underlying principles from a writer's perspective. Topics of study may include works of fiction, statements of aesthetics and craft, and various fictional forms. Typically offered Fall Spring.

ENGL 31700 - Craft Of Poetry From a Writer's Perspective

Credit Hours: 3.00. This course focuses on the craft of poetry with some consideration of its underlying principles from a writer's perspective. Topics of study may include works of poetry, statements of aesthetics and craft, and various poetic forms. Typically offered Fall Spring.

ENGL 32700 - English Language I: History And Development

Credit Hours: 3.00. Introduction to the history of the English language, its sounds, inflections, words, and sentence structures. Cultural and historical events affecting this history, and the interplay between language and literature. Typically offered Fall Spring.

ENGL 32800 - English Language II: Structure And Meaning

Credit Hours: 3.00. The structure of American English and its dialects, with emphasis on syntax and semantics, including parts of speech, sentence structure, and meaning. Implications of recent theory for the teaching of English. Credit will not be given for both ENGL 32800 and LING 32100. Typically offered Fall Spring.

ENGL 32900 - English Language III: Sound And Form

Credit Hours: 3.00. The structure of American English and its dialects, with emphasis on phonology and morphology. Implications of recent theory to the teaching of English. Typically offered Fall Spring.

ENGL 33100 - Medieval English Literature

Credit Hours: 3.00. A survey of Saxon and Medieval English literature (700-1500 A.D.) through intensive reading of Old English heroic, elegiac, and religious poetry and Middle English romance, allegory, lyric, and drama, exclusive of Chaucer. Typically offered Fall Spring Summer.

ENGL 33300 - Renaissance English Literature

Credit Hours: 3.00. A survey of Renaissance literature in England through an intensive reading of representative works by such authors as Spenser, Jonson, and Donne (Shakespeare's plays not included.). Typically offered Fall Spring.

ENGL 33500 - Restoration And Eighteenth-Century English Literature

Credit Hours: 3.00. A survey of Restoration and eighteenth-century literature through an intensive reading of representative works by such authors as Dryden, Pope, Swift, and Johnson (the novel and the drama excluded for the most part). Typically offered Fall Spring.

ENGL 33700 - Nineteenth-Century English Literature

Credit Hours: 3.00. A survey of Romantic and Victorian literature through an intensive reading of representative works by such authors as Wordsworth, Byron, Keats, Tennyson, Browning, and Arnold (the novel excluded). Typically offered Fall Spring.

ENGL 33900 - Twentieth-Century British Literature

Credit Hours: 3.00. Focuses on twentieth-century British literature, with attention given to major cultural and historical movements, canonical and emerging authors, various genres. Typically offered Fall Spring.

ENGL 34100 - Topics In Science, Literature, And Culture

Credit Hours: 3.00. This course focuses on issues in and representation of science and technology in various texts, including literature, film, science, and theory. May be repeated for credit only under a different topic. Typically offered Fall Spring.

ENGL 35000 - Survey Of American Literature From Its Beginnings To 1865

Credit Hours: 3.00. Emphasizes such major literary figures as Edward Taylor, Franklin, Poe, Hawthorne, Melville, Emerson, Thoreau, and Whitman. The course also treats significant minor writers in relation to literary movements and ideas and includes the works of minority writers. Typically offered Fall Spring Summer. CTL:IEL 1210 American Literature I

ENGL 35100 - Survey Of American Literature From 1865 To The Post-World War II Period

Credit Hours: 3.00. Emphasizes such major literary figures as Dickinson, Twain, James, Crane, Frost, T. S. Eliot, Fitzgerald, Hemingway, and Faulkner. The course also treats significant minor writers in relation to literary movements and ideas and includes the works of minority writers. Typically offered Spring Summer Fall. CTL:IEL 1211 American Literature II

ENGL 35200 - Native American Literature

Credit Hours: 3.00. Study of literature by Native American authors in a variety of genres-novels, short stories, poetry, autobiography--using literary analysis, as well as historical, legal, and ethnographic materials. Typically offered Spring Fall.

ENGL 35400 - Asian American Literature

Credit Hours: 3.00. Study of Asian American Literature covering issues such as immigration, identity, class, and gender. Typically offered Spring.

ENGL 35800 - Black Drama

Credit Hours: 3.00. A critical analysis and discussion of selected representative works by African American dramatists - from William Wells Brown to the moderns. Typically offered Summer Fall Spring.

ENGL 35900 - Black Women Writers

Credit Hours: 3.00. (AAS 35900) This course introduces students to the rich and varied literary texts produced by black women

writers. Literary analysis, along with a consideration of historical, cultural, gender, and racial contexts will be emphasized. Typically offered Summer Fall Spring.

ENGL 36000 - Gender And Literature

Credit Hours: 3.00. An introduction to feminist approaches to the study of literature, including poetry, drama, fiction, and/or autobiography. Examines how gender intersects with race, ethnicity, sexual orientation, and class in shaping authorship, reading, and representation. Typically offered Summer Fall Spring.

ENGL 36500 - Literature And Imperialism

Credit Hours: 3.00. A study through cultural and theoretical works of the impact of imperialism on the ruling nations. Typically offered Fall Spring Summer.

ENGL 36600 - Postcolonial Literatures

Credit Hours: 3.00. A study of Third World Literature, film, and theory that emerged during and after Western rule. Typically offered Fall Spring Summer.

ENGL 36800 - Sociolinguistic Study Of African American English

Credit Hours: 3.00. (ANTH 36800, AUSL 36800, COM 36800, LC 36800, IDIS 37800, LING 36800) A study of the history, structure, uses, and educational concerns of African American English in African American speech communities and the United States culture at large. Typically offered Fall Spring.

ENGL 37000 - Nineteenth-Century American Literature

Credit Hours: 3.00. Focuses on nineteenth-century American literature, with attention given to major cultural and historical movements, canonical and emerging authors, various genres. Typically offered Fall Spring.

ENGL 37100 - Twentieth-Century American Literature

Credit Hours: 3.00. Focuses on twentieth-century American literature, with attention given to major cultural and historical movements, canonical and emerging authors, various genres. Typically offered Fall Spring.

ENGL 37300 - Science Fiction And Fantasy

Credit Hours: 3.00. Representative works of science fiction and fantasy examined in relation to both mainstream and popular literature. Emphasis is on technique, theme, and form. Typically offered Summer Fall Spring.

ENGL 37700 - Major Modern Poetry

Credit Hours: 3.00. The development of new trends in, and the interrelationships among, the poetry of Ireland, Britain, and the United States. Poets central to modernism, such as Yeats, Pound, Eliot, Williams, and Stevens, will be emphasized, and students also will read more recent poets. Typically offered Summer Fall Spring.

ENGL 37900 - The Short Story

Credit Hours: 3.00. A historical and critical study of nineteenth- and twentieth-century short stories - Irish, British, American, and Continental. Typically offered Summer Fall Spring.

ENGL 38100 - The British Novel

Credit Hours: 3.00. A survey of representative British novels of the eighteenth and nineteenth centuries by such authors as Defoe, Fielding, Austen, Dickens, Eliot, and Hardy. Typically offered Fall Spring.

ENGL 38200 - The American Novel

Credit Hours: 3.00. A survey of representative American novels of the nineteenth and twentieth centuries by such authors as Cooper, Hawthorne, Melville, Twain, James, and Faulkner. Typically offered Fall Spring.

ENGL 38300 - Modern Drama: Ibsen To The Absurdists

Credit Hours: 3.00. A survey of major works of Continental, English, and American drama, including such authors as Ibsen, Chekhov, Shaw, O'Neill, and Beckett. Typically offered Fall Spring.

ENGL 38600 - History Of Film To 1938

Credit Hours: 3.00. A survey of the American and European cinema from its origins in technology and realism to the aesthetic implications presented by the coming of sound. Emphasis on the feature film and on the prevalent aesthetic attitudes in the first decades of the motion picture. Typically offered Fall Spring.

ENGL 38700 - History Of The Film From 1938 To The Present

Credit Hours: 3.00. A survey of international cinema for the period indicated. Emphasis on the feature film and its development as a communication tool, popular art form, medium of personal expression, and self-exploring linguistic system. Typically offered Fall Spring.

ENGL 39000 - Practicum In Tutoring Writing

Credit Hours: 2.00. A practicum to teach undergraduates to teach writing in the one-to-one setting of a writing lab. Typically offered Fall Spring.

ENGL 39100 - Composition For English Teachers

Credit Hours: 3.00. Exploration of the theory, research, and pedagogy of teaching writing at the secondary level. Topics include the development of writing assignments and related activities, the study of writing process models, and the evaluation of student work in a variety of genres. Typically offered Fall Spring.

ENGL 39600 - Studies In Literature And Language

Credit Hours: 3.00. A course in the study of a special topic directed by an instructor in whose particular field of specialization the content of the course falls. Typically offered Summer Fall Spring.

ENGL 40100 - English Experience

Credit Hours: 1.00 to 3.00. Led by a faculty member, students will attend and prepare public events such as talks, performances, workshops, exhibits, colloquia, etc. that represent the scope of English studies. Required of all students enrolled in the honors program in English. Typically offered Fall Spring.

ENGL 40200 - English Honors Capstone

Credit Hours: 3.00. This course will focus on the significant revision and completion of a research paper or substantial portfolio. Workshop, individual conferences, readings, lectures, short writing assignments, and discussion of various topics in English scholarship will form the center of the course. Typically offered Fall.

ENGL 40600 - Review Writing

Credit Hours: 3.00. Intensive practice in the writing of book, film, and theatre criticism, as well as reviews of musical programs and art exhibits. Readings in critics to serve as possible models. Audience analysis of newspapers and periodicals that would be potential markets. Typically offered Fall Spring.

ENGL 40700 - Introduction To Poetry Writing

Credit Hours: 3.00. Study of basic methods of composing poetry, with primary emphasis on the student's own work, submitted frequently during the semesters. Workshop criticism. Typically offered Summer Fall Spring.

ENGL 40800 - Creative Writing Capstone

Credit Hours: 3.00. This course will focus on the writing and revision of the capstone thesis in Creative Writing, consisting of a substantial portfolio of either fiction or poetry with an introductory essay. Workshop and individual conferences will form the center of the course with readings, lecture, and discussion of various literary topics to be determined by the instructors. Permission of department required. Typically offered Fall Spring.

ENGL 40900 - Introduction To Fiction Writing

Credit Hours: 3.00. Writing of several short fictional narratives. Study of short story techniques in published stories and student manuscripts. Workshop criticism. Typically offered Summer Fall Spring.

ENGL 41100 - Studies In Major Authors

Credit Hours: 3.00. A study of the literary, critical, or cinematic works of one or two influential authors or directors. May be repeated for credit only with a different topic. Typically offered Summer Fall Spring.

ENGL 41200 - Studies In Genre

Credit Hours: 3.00. A study of literary or cinematic works that share distinctive formal features. May be repeated for credit only with a different topic. Typically offered Summer Fall Spring.

ENGL 41300 - Studies In Literature And History

Credit Hours: 3.00. A study of literature or film produced during a particular well-defined historical period from the point of view of its social, political, religious, and economic contexts. May be repeated for credit only with a different topic. Typically offered Summer Fall Spring.

ENGL 41400 - Studies In Literature And Culture

Credit Hours: 3.00. A study of literature or film from the perspective of the cultural norms and values it expresses, celebrates, challenges, and imaginatively opposes. May be repeated for credit only with a different topic. Typically offered Summer Fall Spring.

ENGL 41900 - Multimedia Writing

Credit Hours: 3.00. Multimedia writing for networked contexts. Emphasizes principles, and practices of multimedia design, implementation, and publishing. Typical genres include Web sites, interactive media, digital video, visual presentations, visual argument, and user documentation. Typically offered Summer Fall Spring.

ENGL 42000 - Business Writing

Credit Hours: 3.00. Workplace writing in networked environments for management contexts. Emphasizes organizational context, project planning, document management, ethics, research, team writing. Typical genres include management memos, reports, letters, e-mail, resumes (print and online), oral presentations. Typically offered Summer Fall Spring.

ENGL 42100 - Technical Writing

Credit Hours: 3.00. Workplace writing in networked environments for technical contexts. Emphasizes context and user analysis, data analysis/display, project planning, document management, usability, ethics, research, team writing. Typical genres include technical reports, memos, documentation, Web sites. Typically offered Fall Spring Summer.

ENGL 42201 - Writing For The Health And Human Sciences

Credit Hours: 3.00. This course applies rhetorical principles to writing in health, hospitality, nutrition, nursing and related fields in the Health and Human Sciences. Typically offered Fall Spring Summer.

ENGL 42400 - Writing For High Technology Industries

Credit Hours: 3.00. Applies principles of effective professional writing to the planning, production, and evaluation of computer user manuals and other writing tasks. Typically offered Fall Spring.

ENGL 44000 - Chaucer's Troilus And Criseyde

Credit Hours: 3.00. Critical readings of Troilus and Criseyde and related works in Middle English, with attention to the literary and cultural background. Typically offered Fall Spring.

ENGL 44100 - Chaucer's Canterbury Tales

Credit Hours: 3.00. Critical reading of The Canterbury Tales in Middle English, with attention to the literary and cultural background. Typically offered Fall Spring.

ENGL 44200 - Shakespeare

Credit Hours: 3.00. Shakespeare's dramatic craftsmanship, poetry, humor, characterization, psychology, and modern pertinence illustrated in representative tragedies, comedies, and history plays. Typically offered Summer Fall Spring.

ENGL 44400 - Milton

Credit Hours: 3.00. An in-depth study of Milton's work, including some of his early lyric poems, prose, and major works-Paradise Lost, Paradise Regained, and Samson Agonistes. Typically offered Summer Fall Spring.

ENGL 46000 - Studies In Women's Literature

Credit Hours: 3.00. A study of literary works by women according to a specific theme, historical period, genre, or culture, e.g., Nineteenth-Century Women Novelists, Madness in Women's Writing, Caribbean Women Writers. May be repeated only with different topic. Typically offered Fall Spring Summer.

ENGL 46200 - The Bible As Literature: The Old Testament

Credit Hours: 3.00. A study of the Old Testament - Pentateuch, Prophets, and other books such as Psalms, Proverbs, Job, and Ecclesiastes - with emphasis on its unique literary characteristics. Typically offered Fall Spring.

ENGL 46300 - The Bible As Literature: The New Testament

Credit Hours: 3.00. A study of the New Testament, with emphasis on its unique literary characteristics. Typically offered Fall Spring.

ENGL 46600 - Cultural Encounters

Credit Hours: 3.00. A study of cross-cultural works that address the encounters of the First and the Third worlds and the subsequent reshaping of history and culture in both contexts. Typically offered Fall Spring Summer.

ENGL 46800 - Problems In The History Of Criticism

Credit Hours: 3.00. Introduction to the history of literary criticism and theory through study of selected key terms, debates, figures, and texts. Concentration on such topics as representation, authorship, literary form, and interpretation. Typically offered Fall Spring.

ENGL 46900 - Issues In Contemporary Criticism And Theory

Credit Hours: 3.00. Study of recent critical movements and texts. Emphasis on methods of literary analysis, including philosophical, cultural, and formalist approaches. Discussion of, for example, structuralist, psychoanalytic, feminist, Marxist, poststructuralist, and emerging non-Western critical schools. The teaching schedule may incorporate screening time. Typically offered Fall Spring.

ENGL 47000 - Theories Of Rhetoric And Composition

Credit Hours: 3.00. A general introduction to the field of rhetoric and composition. Overview of studies in written discourse, including studies of the processes and contexts of written discourse as well as methods of research in the field. Typically offered Fall Spring.

ENGL 48800 - Internship In Professional Writing

Credit Hours: 3.00 to 6.00. This course provides on-the-job experience in various kinds of professional writing, combined with a seminar in applied rhetoric. Students work in selected internship settings, participate in seminar discussions of their work, and read selections appropriate to their internship. Permission of instructor required. Typically offered Summer Fall Spring.

ENGL 49000 - Worksite Internship Practicum

Credit Hours: 1.00 to 3.00. Course facilitates the transition between an English undergraduate degree and the workplace or professional life. The course has two components: a professor-guided component and a practicum component in a chosen area. Permission of instructor required. Typically offered Summer Fall Spring.

ENGL 49200 - Literature In The Secondary Schools

Credit Hours: 3.00. Exploration of the theory, research and pedagogy supporting the teaching of literature at the secondary level. Topics include text selection, instructional strategies, adolescent literacy, student engagement and the use of alternative texts. Typically offered Fall Spring Summer.

ENGL 49400 - Research Practicum For Undergraduates

Credit Hours: 2.00 or 3.00. This course introduces students to research techniques and trains them to participate in a research laboratory or a professor-sponsored research project. Permission of instructor required. Typically offered Summer Fall Spring.

ENGL 50100 - Introduction To English Studies

Credit Hours: 3.00. Introduction to graduate studies in English with special emphasis on research and reference tools, methods of bibliography, and the writing of scholarly papers. Prerequisite: Fulfillment of the basic composition requirement and 6 credit hours in English. Typically offered Fall Spring.

ENGL 50200 - Practicum In Teaching College Composition

Credit Hours: 1.00. Reading professional literature, preparing syllabi; evaluating student papers, leading discussions. Required of all teaching assistants in their initial semesters. Typically offered Fall Spring.

ENGL 50500 - Approaches To Teaching College English

Credit Hours: 3.00. Reading professional literature on the teaching of writing, linguistics, and ESL. Studies of methodologies, issues of assessment, and the relationship between theory and pedagogy. This course is not part of the degree requirement. Open only to teaching assistants in the Department of English. Permission of instructor required. Typically offered Fall Spring.

ENGL 50600 - Introduction To English And General Linguistics

Credit Hours: 3.00. General study of language and linguistic theory with emphasis on English. Problems and methods in phonology, morphology, syntax, and semantics. Current techniques of linguistics analysis. Typically offered Fall Spring.

ENGL 50700 - Poetry Writing

Credit Hours: 3.00. A workshop for those experienced in the writing of poetry. Criticism by class and instructor. Study of the work of established writers. Typically offered Fall Spring.

ENGL 50900 - Fiction Writing

Credit Hours: 3.00. Study of the techniques of writing short stories. Workshop. Typically offered Fall Spring Summer.

ENGL 51000 - History Of The English Language

Credit Hours: 3.00. Introduction to theories of linguistic change and their application to the historical development of English from its beginnings. Typically offered Fall Spring Summer.

ENGL 51100 - Semantics

Credit Hours: 3.00. (AUSL 58800) An introduction to and survey of current semantic theories and methods with an emphasis on English. Basic concepts of linguistic semantics and its relation to the other semantics. Compositional (transformational), model-theoretical (truth-conditional), pragmatic, and contextual semantics. Typically offered Fall Spring.

ENGL 51200 - English Syntax And Syntactic Theory

Credit Hours: 3.00. Introduction to English syntactic structure, syntactic argumentation, and syntactic theory. Emphasis on one current theory as the primary theoretical framework, with other theories considered. Typically offered Fall Spring Summer.

ENGL 51300 - English Phonology

Credit Hours: 3.00. Introduction to current phonological theory, with applications to descriptions of American and British English. Articulatory description of English phonological structure and contrastive analysis of phonetic variation across dialects. Evolution of the stress system of English and its utilization by poets writing metrical verse. Typically offered Fall Spring.

ENGL 51500 - Advanced Professional Writing

Credit Hours: 3.00. Production of documents and coordination of publishing projects for clients and users; application of advanced principles of document design, rhetoric, collaboration, and project management; and team writing in a computer-networked environment. Typically offered Spring.

ENGL 51600 - Teaching English As A Second Language: Theoretical Foundations

Credit Hours: 3.00. Survey of theories of learning and teaching English as a second/foreign/international language. Focus is on current theories and their implications for practice. Typically offered Fall Spring.

ENGL 51800 - Teaching English As A Second Language: Principles And Practices

Credit Hours: 3.00. Studies of issues and principles in ESL/EFL program development. Emphasis is on practical application of theory in a variety of English learning and teaching contexts in the U.S. and abroad. Typically offered Fall Spring.

ENGL 52700 - Medieval Drama In English Society

Credit Hours: 3.00. An examination of representative mysteries, moralities, and folk plays in their social, political, and religious contexts. Consideration of critical issues including patronage, carnival, subjectivity, and audience reception. Typically offered Fall.

ENGL 52800 - Medieval English Literature

Credit Hours: 3.00. A survey of selected works of Medieval English literature (700-1500 C.E.), exclusive of Chaucer's writings. Typically offered Fall Spring.

ENGL 52900 - Language Study For Educators

Credit Hours: 3.00. (EDCI 52600). Covers foundational knowledge in language and linguistics for teachers and educational researchers. Topics include structure and functions of language, language acquisition and development, language diversity, classroom discourse, language and media, and literacy-language arts curriculum. A foundation for work in Literacy and Language Education. Typically offered Summer Spring.

ENGL 53000 - English Language Development

Credit Hours: 3.00. (EDCI 53000). Focuses on theoretical and practical knowledge for teachers about how second languages are learned, and on the educational and philosophical basis for second language teaching and learning. Links English language development to teaching and learning strategies and is designed for undergraduate and graduate students in education and practicing teachers. Typically offered Fall Spring Summer.

ENGL 53100 - The Rise Of The Novel

Credit Hours: 3.00. A study of the history and theory of the emergent novel genre as it developed in 18th-century Britain and/or America. Typically offered Summer Fall Spring.

ENGL 53200 - The English Novel In The Nineteenth Century

Credit Hours: 3.00. A survey of fiction up to about 1880, including such novelists as Scott, Dickens, Thackeray, the Brontes, Eliot, and Meredith. Typically offered Spring.

ENGL 53400 - Seventeenth-Century Literature

Credit Hours: 3.00. Nondramatic literature from 1603 to 1660. Particular emphasis upon such figures as Jonson, Donne, Marvell, and Herbert, with representative prose from Bacon, Browne, Burton, and others. Typically offered Spring.

ENGL 53500 - Restoration And Early Eighteenth-Century Literature

Credit Hours: 3.00. A survey of nondramatic literature from 1660 to 1744, from Clarendon through Thomson. Emphasizes Bunyan, Dryden, Pope, and Swift. Typically offered Fall.

ENGL 53700 - Drama In Early Modern England

Credit Hours: 3.00. Analysis of plays by Marlowe, Jonson, Middleton, Webster, and others with attention to poetics, dramatic structure, and recent critical and cultural theory. Typically offered Fall.

ENGL 53800 - English Drama From The Restoration To The Modern Period

Credit Hours: 3.00. A survey of English drama from Dryden and Wycherley through Robertson and Pinero. Typically offered Spring.

ENGL 54100 - Studies In Chaucer's Canterbury Tales

Credit Hours: 3.00. Critical reading of The Canterbury Tales and related works in Middle English, with attention to the literary and cultural background and to secondary studies. Typically offered Spring.

ENGL 54200 - Shakespeare's Dramatic Art

Credit Hours: 3.00. Analysis of Shakespeare's plays within the dramatic tradition of comedy, tragedy, history, and romance. Consideration of matters such as poetics, dramatic structure and conventions, and textual problems. Typically offered Fall.

ENGL 54300 - Shakespeare In Critical Perspective

Credit Hours: 3.00. Shakespeare's plays read in context of historical and contemporary literary theory and criticism, considering such issues and approaches as structuralism, Marxism, deconstruction, new historicism, colonialism, sexuality, race, and gender. Typically offered Spring.

ENGL 54400 - Milton

Credit Hours: 3.00. A study of Milton's poetry and prose, with particular emphasis on Paradise Lost, and some attention to the social, political, and literary background. Typically offered Fall.

ENGL 54700 - British Romanticism

Credit Hours: 3.00. Readings from among the works of the High Romantics and other figures; discussion of historical, philosophical, cultural debates of the era, with attention to current critical and theoretical developments in the field. Typically offered Fall.

ENGL 54800 - Victorian Literature

Credit Hours: 3.00. A study of selected English poetry and prose, largely nonfiction, from circa 1830-1900. Includes readings from such figures as Arnold, Barrett, Bronte, Browning, Carlyle, Mill, Rosetti, Ruskin, and Tennyson. Typically offered Spring.

ENGL 54900 - Late Victorian And Edwardian Literature

Credit Hours: 3.00. A study of the rebellion against Victorian conventions that characterized the period from 1880 to 1910. Such movements as aestheticism, decadence, symbolism, and naturalism are examined in the works of such writers as Conrad, Dowson, Hardy, Mansfield, Schreiner, Wilde, and Yeats. Typically offered Spring.

ENGL 55000 - Studies In Major Early British Authors

Credit Hours: 3.00. A study of the works of one or two influential early British authors (700-1800 C.E.), exclusive of Chaucer, Shakespeare, and Milton. Typically offered Fall Spring.

ENGL 55200 - Studies In Major American Authors

Credit Hours: 3.00. A study of the works of one or two influential American authors. Typically offered Fall Spring.

ENGL 55300 - Colonial And Early American Literature

Credit Hours: 3.00. A survey of American literature to about 1820. Texts of major and minor authors, such as Bradford, Bradstreet, Rowlandson, and Cooper, are viewed within their cultural context. Typically offered Fall.

ENGL 55400 - American Literary Culture 1820-1860

Credit Hours: 3.00. Emphasizes cultural inventory, definition, and production in early nineteenth-century literary culture. The approach is intertextual, moving back and forth between the emerging culture and literary productions, and between one author and other authors. Typically offered Spring.

ENGL 55700 - Nineteenth-Century African-American Narrative

Credit Hours: 3.00. This course focuses on both fiction and nonfiction by a range of African American authors dating from the pre-Civil War years through the turn of the twentieth century. Appropriate for M.A. students seeking to fulfill 19th-century breadth requirements and/or build a foundation for future study in the field. Appropriate for Ph.D. students preparing for qualifying exams and/or preparing to write a dissertation in the field. Typically offered Fall Spring Summer.

ENGL 55800 - American Literature In The Later Nineteenth Century

Credit Hours: 3.00. Study of American literature from about 1865 to 1900. Addresses realism, regionalism, naturalism, and other related movements. Focuses on such writers as Whitman, Dickinson, Stowe, Davis, Stoddard, Alcott, Twain, Howells, James, Jewett, Chopin, Crane, Chesnutt, and Norris. Typically offered Fall.

ENGL 56000 - Modern American Poetry

Credit Hours: 3.00. A survey of modern American poetry. Emphasis will be on major writers such as Eliot, Pound, Frost, Stevens, and Lowell, but attention will be paid to lesser figures. Typically offered Fall.

ENGL 56100 - Modern British Poetry

Credit Hours: 3.00. Surveys modern British poetry from Hardy to Auden; relates it to the main currents of modern thought and feeling; introduces critical principles. Typically offered Spring.

ENGL 56300 - Historical Linguistics

Credit Hours: 3.00. (ANTH 56300, LC 56300) A survey of mechanisms and motivations of linguistic change. Topics include:

phonological, morphological, semantic and syntactic change, comparative and internal reconstruction, linguistic variation, language contact, and linguistic typology. Typically offered Fall Spring.

ENGL 56500 - Sociolinguistics

Credit Hours: 3.00. (ANTH 56500, COM 56500, LC 56500, LING 56500) An introduction to language in its social context, focusing on uses and users of language. Topics include social class, ethnic group, gender, language attitudes, and bilingualism. Typically offered Fall Spring.

ENGL 56900 - Contemporary Criticism And Theory

Credit Hours: 3.00. Study of contemporary criticism and theory generally focused on such schools and movements as structuralism, psychoanalysis, poststructuralism, feminism, new historicism, cultural studies, and gay and lesbian studies. Typically offered Fall Spring.

ENGL 57000 - Introduction To Semiotics

Credit Hours: 3.00. (ANTH 51900, AUSL 58900, COM 50700, LC 57000) The study of languages, literatures, and other systems of human communication. Includes a wide range of phenomena which can be brought together by means of a general theory of signs. The course deals with three fundamental areas: 1) verbal communication, 2) nonverbal communication (iconic systems, gestures, body language, etc.), and 3) communication through art forms. Typically offered Fall Spring.

ENGL 57300 - Tragedy

Credit Hours: 3.00. The chief tragic views of life, as illustrated in Greek, Shakespearean, and modern drama, as well as in the novel and poetry, with selected reading on the theory of tragedy. Typically offered Spring.

ENGL 57600 - Philosophy And Literary Theory

Credit Hours: 3.00. (PHIL 57600) Explores the interchanges between philosophy and literary theory that animate such areas as hermeneutics, phenomenology, existentialism, Marxism, feminism, African-American studies, postmodern theory, and cultural studies. Typically offered Fall Spring.

ENGL 57800 - Early Twentieth-Century American Fiction

Credit Hours: 3.00. Study of American fiction from about 1900 to 1945. Addresses naturalism, social realism, modernism, and related movements, and such writers as Dreiser, Wharton, Stein, Lewis, Toomer, Cather, Fitzgerald, Hemingway, Glasgow, Roth, Dos Passos, Miller, Faulkner, Hurston, Wright, and Welty. Typically offered Fall Spring.

ENGL 57900 - Modern British Fiction

Credit Hours: 3.00. Critical study of twentieth-century novels, mainly before World War II, by such writers as Conrad, Lawrence, Forster, Joyce, and Woolf. Typically offered Fall Spring.

ENGL 58000 - Theories Of Modernity And Postmodernity

Credit Hours: 3.00. Exploration of theories and models of modernity and postmodernity, with emphasis on cultural and critical issues. Typically offered Fall.

ENGL 58300 - U S Ethnic/Multicultural Literature

Credit Hours: 3.00. A critical examination of multicultural literature or the literature of a particular ethnic group or groups, such as African American, Asian American, Jewish American, Latina/o, Native American. Typically offered Fall Spring.

ENGL 58500 - Creative Nonfiction Writing

Credit Hours: 3.00. Creative nonfiction workshop, with emphasis on students' own work submitted frequently during the semester; discussion of creative nonfiction texts. Workshop criticism. Typically offered Spring.

ENGL 58600 - Theory Of Film

Credit Hours: 3.00. An intensive survey of film theory and aesthetics utilizing both films and written texts. Topics covered include: changing conceptions of film language, theories of authorship and genre, theories of narrative, social theory of film, film aesthetics as related to other forms. Typically offered Fall Spring Summer.

ENGL 58900 - Directed Writing

Credit Hours: 1.00 to 3.00. Writing (creative, popularly technical, biographical, historical, philosophical) on subjects of the

student's choice. Individual conferences only; no class meetings. Permission of instructor required. Typically offered Fall Spring Summer.

ENGL 59000 - Directed Reading

Credit Hours: 1.00 to 3.00. Directs the reading of students with special interests. Guides students in profitable reading in subjects of their own choice. Individual conferences; no class meetings. Permission of instructor required. Typically offered Fall Spring Summer.

ENGL 59100 - Introduction To Composition Theory

Credit Hours: 3.00. A survey of major contemporary theories of invention and style, including such topics as heuristics; the aims and modes of discourse; stylistics; readability theories; sentence-combining; error analysis; audience; and evaluation. Applications to teaching will be made. Typically offered Fall.

ENGL 59200 - Postcolonial Studies

Credit Hours: 3.00. Study of works from once colonized cultures in Africa, Asia, and the Caribbean, and/or postcolonial diasporas. Individual sections will focus on one or more of the following: literature, women's literature, film, or feminist and cultural theory. Typically offered Fall Spring.

ENGL 59300 - Contemporary British Fiction

Credit Hours: 3.00. Critical study of the British novel since World War II. Survey of scholarship and criticism. Typically offered Fall.

ENGL 59400 - Contemporary Poetry

Credit Hours: 3.00. Study of poetry of the past two or three decades, both American and foreign, and their interaction. Attention to influences, "schools," and little magazines, as well as to conventional sources. Typically offered Fall.

ENGL 59500 - Contemporary American Fiction

Credit Hours: 3.00. Intensive study of contemporary and postmodern American fiction within various formal, theoretical, and cultural contexts, including multiculturalism, postructuralism, and gender analysis, among others. Typically offered Fall.

ENGL 59600 - Advanced Studies In Literature Or Language

Credit Hours: 3.00. Advanced study of a topic within the instructor's fields of specialization. Emphasis on scholarly analysis and research. Typically offered Fall Spring Summer.

ENGL 59700 - Contemporary Black Feminist Literature

Credit Hours: 3.00. An intense examination of recent literary works by black women along with various critical theories constructed about black women's literature, beginning with the premise that black feminism is a "sign to be interrogated, a locus of contradictions.". Typically offered Fall Spring.

ENGL 59900 - Academic Language And Content Area Learning

Credit Hours: 3.00. (EDCI 55900) Course focuses on theoretical and practical knowledge for teachers about how second languages are learned, and on the educational and philosophical basis for second language teaching and learning. The course links English language development to teaching and learning strategies and is designed for undergraduate and graduate students in education and practicing teachers. Typically offered Fall Spring Summer.

ENGL 60100 - Teaching Literature At The College Level

Credit Hours: 3.00. Focuses on the practical and theoretical issues related to teaching literature at the college level. Topics include course design, literary canons and text selection, teaching and learning styles, close reading, writing about literature, assessment, and professional ethics. Prerequisite: ENGL 50100 or consent of department. Restricted to graduate students in the Department of English. Typically offered Summer Fall Spring.

ENGL 60500 - Computers In Language And Rhetoric

Credit Hours: 3.00. Seminar that investigates how computers figure in contemporary theories of text and text making. Typical topics: critiques of technology, hypertext, cyberspace, computer-mediated communication, Internet, electronic writing, online research, pedagogy, and publishing. Typically offered Fall.

ENGL 60600 - Seminar In Poetry Writing

Credit Hours: 3.00. An advanced course in the writing of poetry. Workshop criticism. Study of the work of established writers. Prerequisite: admission to the MA program in creative writing. Typically offered Fall Spring.

ENGL 60700 - The Theory And Craft Of Creative Writing

Credit Hours: 3.00. A study of the craft of poetry, fiction, or drama with some consideration of underlying theories. Prerequisite: admission to the MA program in creative writing. Typically offered Fall Spring.

ENGL 60900 - Seminar In Fiction Writing

Credit Hours: 3.00. An advanced course in the writing of fiction. Workshop critiques. Prerequisite: Admission to the creative writing program. Typically offered Fall Spring.

ENGL 61100 - Old English Language

Credit Hours: 3.00. A study of the principal prose and poetry from the beginnings to about 1100. Emphasis on the language. Typically offered Fall.

ENGL 61200 - Old English Literature

Credit Hours: 3.00. A survey of Old English literary works, including heroic poetry, religious epic, elegiac poetry, homilies, and secular prose, illustrative of the early development of English literature and culture. Prerequisite: ENGL 61100. Typically offered Spring.

ENGL 61300 - Middle English Language

Credit Hours: 3.00. A study of selected readings from the literature of about 1100 to about 1500. Emphasis on the language. Typically offered Spring.

ENGL 61400 - Middle English Literature

Credit Hours: 3.00. Study of representative works in the major literary traditions and genres of Middle English literature (exclusive of Chaucer): lyric, romance, satire, and allegory. Detailed examination of major works, such as Sir Gawain and the Green Knight, Piers Plowman, and Pearl. Prerequisite: ENGL 61300. Typically offered Fall.

ENGL 61500 - A Reading Of Beowulf

Credit Hours: 3.00. An intensive reading of Beowulf in the original with a consideration of background sources and interpretive theories. Prerequisite: ENGL 61100. Typically offered Spring.

ENGL 61700 - Contemporary English

Credit Hours: 3.00. Focus is on the form and function of contemporary English as it is used in original texts and on the development of course participants' ability to respond in an informed way to texts written or spoken by others. Prerequisite: ENGL 50600. Typically offered Fall Spring.

ENGL 61800 - Quantitative Research In Second Language Studies

Credit Hours: 3.00. A survey of quantitative research methods and designs associated with second language studies. Prerequisite: ENGL 51600. Typically offered Fall Spring Summer.

ENGL 61900 - Qualitative Research In Second Language Studies

Credit Hours: 3.00. Introduces graduate students to the theoretical concepts and practical tools associated with situated approaches to research in second language studies. Typically offered Fall Spring.

ENGL 62000 - Classroom Communication In ESL For Teaching Assistants

Credit Hours: 5.00. Student must be enrolled in the Graduate School and a non-native speaker of English. Permission of department required. Typically offered Fall Spring Summer.

ENGL 62100 - Written Communication For International Graduate Students

Credit Hours: 3.00. A course in English composition for non-native English speaking graduate students. Typically offered Fall Spring Summer.

ENGL 62200 - Issues In Composition Studies: Classical Period To The Renaissance

Credit Hours: 3.00. The course historicizes issues in composition studies from the sophists to the Renaissance. Prerequisite: ENGL 59100. Typically offered Spring.

ENGL 62400 - Issues In Composition Studies: Modern Period

Credit Hours: 3.00. The course historicizes issues in composition studies from the eighteenth century to the mid-twentieth century. Prerequisite: ENGL 59100. Typically offered Spring.

ENGL 62500 - Seminar On Empirical Research In Writing

Credit Hours: 3.00. An analysis and evaluation of empirical research concerned with composing processes, critical literacy, disciplinary writing, various writing cultures, and composition pedagogy. Students will study empirical research designs and develop a project in one of the above areas. Prerequisite: ENGL 59100. Typically offered Spring.

ENGL 62600 - Postmodernism And Issues In Composition Studies

Credit Hours: 3.00. The course historicizes how various postmodern theories and practices (cultural, political, ethical, philosophical, technological, aesthetic) influence the study and teaching of written discourse. Prerequisite: ENGL 59100. Typically offered Fall.

ENGL 62700 - Seminar In Linguistics

Credit Hours: 3.00. Investigation of a topic in advanced linguistics research. Typically offered Fall Spring Summer.

ENGL 62800 - Natural Language Processing

Credit Hours: 3.00. (ECE 66900) This course focuses on keyword-driven question answering systems; transition networks; parsing procedures for context-free grammars; theory of transformational grammars; implementation of recursive transition

networks; implementation of augmented transition networks; representation of conceptual dependencies; surface semantic conceptual analysis; conceptual dependency parsing; generating natural language from a conceptual base; scripts, plans, and goals; building conversationalist programs. Prerequisite: ENGL 50600 or ECE 57000. Typically offered Fall Spring.

ENGL 62900 - Seminar In English As A Second Language

Credit Hours: 3.00. In-depth study of variable subjects relating to the nature of English as a second/foreign/international language and its learning and teaching. Prerequisite: ENGL 51600. Typically offered Fall Spring.

ENGL 63000 - Seminar In Second Language Writing

Credit Hours: 3.00. An overview and examination of major issues in the theory, research, and practice of writing in English as a second language. Prerequisite: ENGL 51600 or ENGL 59100. Typically offered Fall Spring Summer.

ENGL 63100 - World Englishes

Credit Hours: 3.00. Investigation of the use, spread, and development of English as an international language. Topics include: non-native varieties, language contact and change, new English literatures, and the teaching of English as an international language. Prerequisite: ENGL 50600. Typically offered Fall Spring.

ENGL 63300 - Seminar In English Literature Before 1660

Credit Hours: 3.00. Variable subjects (authors, themes, periods, movements) in English literature from Beowulf to Paradise Lost. Typically offered Fall Spring Summer.

ENGL 63500 - Seminar In English Literature 1660-1783

Credit Hours: 3.00. Intensive consideration of one to three or four authors or of literary topics and genres, such as drama, fiction, literary criticism and literary history, the medieval revival, poetic and prose satire, the periodical essay, biography, etc. Typically offered Fall Spring Summer.

ENGL 64200 - Seminar In Shakespeare

Credit Hours: 3.00. Special topics in Shakespeare criticism, concentrating on one or more plays. Topics such as women in

Shakespeare's plays, performance theory and practice, and current theoretical approaches. Students investigate a single topic in depth. Typically offered Fall Spring Summer.

ENGL 64700 - Seminar In The Romantic Movement

Credit Hours: 3.00. A close investigation of the works of one or more outstanding writers of English literature from 1783 to 1832, their place in the Romantic Movement, and their historical and cultural relations to the times. Typically offered Fall Spring Summer.

ENGL 64800 - Seminar In Victorian Literature

Credit Hours: 3.00. A detailed study of the works of one or more figures of English literature from 1832 to 1880: their relation to the literary movements and historical and cultural backgrounds of the age. Typically offered Fall Spring Summer.

ENGL 64900 - Seminar In English Literature 1880-1920

Credit Hours: 3.00. Subjects will range from individual authors and specific literary types to transitional literary movements. Typically offered Fall Spring Summer.

ENGL 65700 - Seminar In American Literature 1630-1900

Credit Hours: 3.00. A variable content seminar on authors, themes, genres, movements, geographic regions, or cultural contexts. Typically offered Fall Spring Summer.

ENGL 66500 - Seminar In Comparative Literature

Credit Hours: 3.00. (CMPL 65000 and LC 63900) Advanced study of international literary movements, influence thematology, literary theory, and genre development. See Comparative Literature Program. Typically offered Fall Spring Summer.

ENGL 66700 - Seminar In Poetics And Aesthetics

Credit Hours: 3.00. Study of selected influential figures, concepts, and texts in the history of poetics and aesthetics from ancient times to the present. Typically offered Fall Spring.

ENGL 66800 - Seminar In Interpretation And Cultural Theory

Credit Hours: 3.00. Examination of selected developments in social, cultural, and hermeneutical theories from the eighteenth century to the present. Typically offered Fall Spring.

ENGL 67200 - Seminar In Women's Literature And Feminist Theory

Credit Hours: 3.00. A variable topic course investigating gender as a category of analysis. Intensive study of one or two women authors, of a particular genre or period, or of a critical issue relevant to women's literature and/or feminist theory. Typically offered Fall Spring.

ENGL 67300 - Seminar In Postcolonial Studies

Credit Hours: 3.00. Advanced study of works from once-colonized cultures in Africa, Asia, the Caribbean, and/or postcolonial diasporas in the first world. Individual sections will focus on one or more of the following: literature, women's literature, film, and feminist and cultural theory. Typically offered Fall Spring.

ENGL 67400 - Seminar In Language Testing

Credit Hours: 3.00. An introduction to the techniques, practices, and history of language testing. Introduces the basic tenets of measurement and the issues and controversies related to the measurement of language ability. Typically offered Fall Spring.

ENGL 67700 - Seminar In Modern Literature

Credit Hours: 3.00. Developments in English, American, and European literature in modern times. Individual seminars will ordinarily be concerned with drama, poetry, or fiction, but may treat all three types together. Typically offered Fall Spring Summer.

ENGL 67800 - Seminar In Modern American Literature

Credit Hours: 3.00. A variable content course, focusing on developments, movements, and authors in modern American literature and culture. Major research project required. Typically offered Spring.

ENGL 67900 - Seminar In Modern British Fiction

Credit Hours: 3.00. Study in depth of one or two major novelists, a literary movement, a group of writers, or a form of modern fiction. Oral reports and research papers required. Typically offered Fall Spring Summer.

ENGL 68000 - Seminar In Rhetoric And Composition

Credit Hours: 3.00. A variable content course dealing with topics such as cultural studies and composition, medieval rhetoric, renaissance rhetoric, literacy, historiographies of rhetoric, qualitative studies, and professional writing theory. Prerequisite: ENGL 59100. Typically offered Fall Spring.

ENGL 68100 - Hutton Lectures In Rhetoric And Composition

Credit Hours: 3.00. Reading and discussion of the work of contemporary scholarship in rhetoric and composition, accompanied by lectures by visiting scholars. Typically offered Fall Spring.

ENGL 69000 - Internship In Second Language Studies/ESL

Credit Hours: 1.00 to 3.00. Part-time or full-time practical work experience in selected situations related to the student's field of study. The internship must be located at an off-campus site. Permission of instructor required. Typically offered Fall Spring Summer.

ENGL 69100 - Seminar In The English Language Arts

Credit Hours: 3.00. (EDCI 61300) Problems in the teaching of English: literature, language, rhetoric. Attention to recent scholarship and to its application in the public schools. Typically offered Spring.

ENGL 69600 - Seminar In Literature

Credit Hours: 3.00. Advanced study of special subjects. Typically offered Fall Spring Summer.

ENGL 69800 - Research MA Or MFA Thesis

Credit Hours: 1.00 to 18.00. Research MA Or MFA Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

ENGL 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Entomology

ENTM 10500 - Insects: Friend And Foe

Credit Hours: 3.00. A one-semester course for nonscience students who want to know more about insects - the most numerous organisms on earth. An introduction to insects and their relationship with humankind, including interesting aspects of insect biology; insects in music, decoration, history; use of insects in teaching at the elementary school level; their use in art, photography, and drawing; insects as human food. Typically offered Fall Spring.

ENTM 11100 - Insects In Prose And Poetry

Credit Hours: 1.00. Intended for anyone with an interest in insects and related arthropods as they appear in written materials. Offered during weeks 9-16 of the semester. Typically offered Fall Spring.

ENTM 20600 - General Entomology

Credit Hours: 2.00. A general course on insect structure, function, biology, ecology and population management. Coordinated with the ENTM 20700 laboratory as an introductory course in entomology. Typically offered Fall Spring.

ENTM 20700 - General Entomology Laboratory

Credit Hours: 1.00. Laboratory exercises parallel topics presented in ENTM 20600. Insect structures and function are studied as a basis for learning to identify insects and other arthropods. Typically offered Fall Spring.

ENTM 21000 - Introduction To Insect Behavior

Credit Hours: 3.00. Description and introductory analysis of innate and learned insect behavior, including basic orientations and movements, behavioral periodicity, communication, chemical and structural defenses, host selection and feeding, reproduction, and insect societies. General biology and introductory entomology are desirable, but not essential. Typically offered Spring.

ENTM 21800 - Introduction To Forensic Science

Credit Hours: 3.00. Introduction to forensic investigation. Includes crime scene techniques, firearms, arson and explosives, entomology, blood spatter, blood chemistry, pathology, toxicology, anthropology, soils, botany, trace evidence, computer crime, behavioral analysis, courtroom activities and new trends in forensic investigations. The course features guest speakers with professional duties in forensics. Typically offered Fall Spring.

ENTM 21801 - Forensic Investigation Laboratory

Credit Hours: 1.00. This course is the companion Lab for ENTM 21800 for students interested in pursuing a minor in forensic sciences. This course focuses on forensic science investigation, crime scene management and data collection techniques. This includes crime scene recognition and the documentation, collection, preservation, and processing of crime scene evidence. Emphasizes the place of field data collection as the first step in a sequence that takes evidence from scene to the lab for analysis and finally into the court of law. Students may not receive credit for both ENTM 31800 and ENTM 21801. Typically offered Fall.

ENTM 22810 - Forensic Investigation

Credit Hours: 4.00. Forensic science investigation, crime scene management and field data collection techniques. Includes crime scene recognition and the documentation, collection, preservation, and processing of crime scene evidence. Emphasizes the place of field data collection as the first step in a sequence that takes evidence from scene to the lab for analysis and finally into the court of law. Typically offered Fall.

ENTM 22820 - Forensic Analysis

Credit Hours: 4.00. Forensic science evidence analysis, crime lab evidence management and data analysis techniques. Focuses on the accuracy, precision and integrity in evidence analysis for a survey of forensic disciplines. Emphasizes the place of forensic analysis as a necessary second step in a sequence that takes evidence from scene, to the lab for analysis and finally into the court of law. Typically offered Spring

ENTM 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first and second-year students. Courses offered must be approved by departmental or program faculty, and the College of Agriculture Honors Committee. Must be enrolled in an Honors program. Permission of department required. Typically offered Fall Spring Summer.

ENTM 29400 - Topics In Forensic Sciences

Credit Hours: 1.00 to 4.00. This course will address the needs for our students to have current information about important emerging areas of Forensic Science and will provide a mechanism for recording such studies on their transcript. Typically offered Fall Spring Summer.

ENTM 29410 - Laboratory Topics In Forensic Science

Credit Hours: 1.00 to 4.00. This course provides students with combined lecture and laboratory experience in important emerging areas of Forensic Science. Typically offered Fall Spring Summer.

ENTM 29500 - Topics In Entomology

Credit Hours: 1.00 to 4.00. Special topics in entomology not available in other entomology courses. Typically offered Fall Spring Summer.

ENTM 29510 - Laboratory Topics In Entomology

Credit Hours: 1.00 to 4.00. Special topics in entomology not available in other entomology courses that include laboratory. Typically offered Fall Spring Summer.

ENTM 31100 - Insect Ecology

Credit Hours: 3.00. Insect ecology investigates the fundamental concepts of ecology as they relate to insects, including insect interactions, other insects and their environment. Topics include population and community ecology, plant-insect interactions, insect biodiversity and biogeography, and theoretical and applied ecology. Examples from current entomological and ecological studies are used. Completion of college biology or an introductory course in entomology is recommended. Typically offered Spring.

ENTM 31800 - Criminalistics

Credit Hours: 4.00. Crime scene management, analysis and techniques. Includes crime scene recognition and the documentation, collection, preservation, and processing of crime scene evidence. The course features guest speakers with professional duties in forensics. A year of introductory chemistry is recommended. Typically offered Spring.

ENTM 33500 - Introduction To Insect Identification

Credit Hours: 4.00. This class is designed for learning more about the collection and identification of adult insects. Emphasis will be placed on collection and sampling techniques, the preparation of specimens for future study, and identification. Typically offered Fall.

ENTM 35100 - Bee Biology And Bee Keeping

Credit Hours: 3.00. A course that covers aspects of honey bee biology and agriculture intended for anyone interested in learning the necessary knowledge, skills, and confidence to become a hobby beekeeper. Colony life, social insects, bee behavior and anatomy, colony management, pollination and honey production are major topics studied. Typically offered Fall.

ENTM 39000 - Professional Experience Programs In Entomology

Credit Hours: 0.00. Supervised professional experiences in entomology, integrated pest management, or urban/industrial pest control. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit a summary report. Permission of instructor required. Typically offered Fall Spring Summer.

ENTM 39100 - Professional Experience Programs In Forensic Sciences

Credit Hours: 0.00 to 8.00. The course provides a mechanism for students to record unpaid internships and appropriate professional experiences in Forensic Science on their transcript. Permission of department required. Typically offered Fall Spring Summer.

ENTM 40000 - Entomology Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

ENTM 41800 - Advanced Criminalistics

Credit Hours: 3.00. (HSCI 41800) Advanced laboratory techniques for analysis of crime scene evidence. Includes toxicology, computer crime, behavior; field collection and analysis of biological evidence, DNA, bloodstains, and explosives; forensic microscopy, document examination and preparation of courtroom testimony. Typically offered Fall.

ENTM 42810 - Death Investigation

Credit Hours: 3.00. The course explores the complete death investigation process, including: homicide, suicide, accidental, natural, and undetermined. The course will address both objective and subjective parts of the investigation process, including: the scene, witnesses, suspects, persons of interest, the murder board, case notes, documentation, interviewing, interrogation, data mining, surveillance, legal aspects (search warrants, subpoenas, court orders) case management, arrest, and testifying in court. Typically offered Fall Spring Summer.

ENTM 42890 - Forensic Science Teaching

Credit Hours: 1.00. This course provides an opportunity for students who have completed forensic science courses to assist in that course previously taken, reinforcing the skills, expanding their mastery of the scientific method and how it pertains to forensic science as well as introducing basic pedagogical tools for instruction to the student. Permission of Instructor required. Typically offered Fall Spring.

ENTM 44100 - Forest Entomology

Credit Hours: 3.00. (FNR 44100) An introduction to the identity, natural history and management of insects affecting forest ecosystems. Topics include biodiversity, natural history and ecology of forest pests; forecasting and assessing the risk of insect outbreaks; and silvicultural, biological and chemical strategies for preventing and managing insect pests. Offered in odd-numbered years. Typically offered Fall.

ENTM 44300 - Arthropods And Diseases Of Turfgrass

Credit Hours: 3.00. (BTNY 44300) The course is designed to introduce students to the biology, ecology, and management of arthropods and diseases associated with turfgrass ecosystems. The course is divided into two discrete segments with a focus on arthropods during the first half of the semester and diseases during the second half of the semester. Typically offered Spring.

ENTM 44600 - Integrated Plant Health Management For Ornamental Plants

Credit Hours: 3.00. (BTNY 44600) Principles and practices for diagnosing and managing diseases, insects, and abiotic disorders of woody and herbaceous ornamental plants and turf. Designed for those students in urban forestry, horticulture, and turf management who want a one-semester course on integrated plant health management. A course in plant pathology is recommended, but not required. Typically offered Fall.

ENTM 47500 - Honors Course-Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third and fourth-year students. Courses offered must be approved by departmental or program faculty, and the College of Agriculture Honors Committee. Must be enrolled in an Honors program. Permission of department required. Typically offered Fall Spring Summer.

ENTM 49200 - Capstone Experience Entomology I

Credit Hours: 1.00. Requirements, options, procedures and skills needed for a successful Entomology capstone experience with emphasis on techniques and guidelines for formulating projects and principles of organizing and presenting information. A capstone experience proposal is produced. Typically offered Fall.

ENTM 49300 - Capstone Experience In Entomology II

Credit Hours: 1.00 to 3.00. Students complete capstone requirement for a project and oral and written communication about the capstone project. Permission of instructor required. Typically offered Summer Fall Spring.

ENTM 49400 - Advanced Topics In Forensic Sciences

Credit Hours: 1.00 to 4.00. This course will provide an avenue for students to pursue knowledge in emerging advanced areas of Forensic Science. Permission of department required. Typically offered Fall Spring Summer.

ENTM 49410 - Advanced Laboratory Topics In Forensic Science

Credit Hours: 1.00 to 4.00. This course will provide an avenue for students to pursue laboratory techniques in emerging advanced areas of Forensic Science. Permission of Department required. Typically offered Fall Spring Summer.

ENTM 49500 - Advanced Topics In Entomology

Credit Hours: 1.00 to 4.00. Special topics in entomology at upper division level not available in other entomology courses. Permission of department required. Typically offered Fall Spring Summer.

ENTM 49510 - Advanced Laboratories In Entomology

Credit Hours: 1.00 to 4.00. Special laboratories in entomology at upper division level not available in other entomology courses. Permission of Department required. Typically offered Fall Spring Summer.

ENTM 49700 - Special Problems In Forensic Science

Credit Hours: 1.00 to 4.00. This course will provide an opportunity for qualified sophomores, juniors and seniors to engage in the study of special Forensic Science problems not covered in regular coursework. It will also provide a mechanism for recording these independent studies on their transcript. Permission of department required. Typically offered Fall Spring Summer.

ENTM 49800 - Special Problems In Entomology

Credit Hours: 1.00 to 4.00. Open to qualified sophomores, juniors, and seniors who want to study special problems in entomology not covered in regular coursework. Permission of instructor required. Typically offered Fall Spring Summer.

ENTM 50600 - Advanced Insect Taxonomy

Credit Hours: 4.00. Classification and relationship of insects and related Arthropoda. Introduction to systematic principles. Survey of North American fauna, with emphasis on family identification of adults. Knowledge of college-level entomology is strongly recommended. Offered in even-numbered years. Typically offered Fall.

ENTM 51000 - Insect Pest Management

Credit Hours: 3.00. Concepts of pest management and dynamics of pest populations, with emphasis on population regulation in theory and practice. The principles of applied ecology that pertain to insects and agricultural crops and systems. Identification, biology, behavior, and relationships of pests of forage, fiber, and vegetable crops. A knowledge of introductory entomology is recommended. Offered in even-numbered years. Typically offered Fall.

ENTM 52100 - Urban And Industrial Insect Management

Credit Hours: 3.00. Principles and practices of insect pest management in and immediately around urban and industrial structures (pests of property, food, health, and turf and ornamental plants) with emphasis on issues, new technologies, diagnosis of pest problems, pest biology and behavior, implementation of management strategies, future directions and opportunities, and analysis of advances in urban pest management. Course offered in even-numbered years. Typically offered Fall.

ENTM 52500 - Medical And Veterinary Entomology

Credit Hours: 3.00. Introduction to the biology and control of arthropods of medical and veterinary importance, and coverage of the natural history and abatement of selected arthropod-related diseases, including arboviral encephalitis, filariasis, leishmaniasis, Lyme disease, malaria, plague, spotted fever, trypanosomiasis, and myasis. Offered in odd-numbered years. Typically offered Spring.

ENTM 52600 - Urban And Industrial Vertebrate Management

Credit Hours: 3.00. Principles and practices of vertebrate pest management in urban and industrial environments, with emphasis on the impact of these pests on our health, food supplies and property, diagnosis of pest problems, pest biology and behavior, practical implementation of management strategies, future directions and opportunities, and analysis of advances in pest vertebrate management. Course offered in odd-numbered years. Typically offered Spring.

ENTM 55100 - Insect Physiology And Biochemistry

Credit Hours: 3.00. Basic physiology and biochemistry of insects covering development, functions of internal systems, and interactions of insects with their environments. An introductory course in entomology, or familiarity with insects, and concurrent enrollment in a biochemistry course is recommended. Offered in even-numbered years. Typically offered Spring.

ENTM 59500 - Special Topics

Credit Hours: 1.00 to 4.00. Specialized topics not covered in other courses. May be repeated for credit if the course topic is not repeated. The specific topic offered is indicated on the student's record. . Permission of instructor required. Typically offered Summer Fall Spring.

ENTM 60000 - Graduate Student Orientation

Credit Hours: 1.00. Introduction and orientation to the requirements and culture of the Department of Entomology, the College of Agriculture, and Purdue University. Intended for graduate students in their first year. Typically offered Fall.

ENTM 60200 - Insect Biology

Credit Hours: 3.00. A comprehensive course in entomology, for graduate students with little entomological background, that introduces students broadly to insect structure, function, behavior, ecology, pest management, and systematics. Students apply broad knowledge in each of the topic areas to a specific insect and are expected to be able to read and critically evaluate primary literature and summarize it in written and oral presentations. One year of college biology is strongly recommended. Typically offered Fall.

ENTM 60300 - Insect Molecular Genetics, Systematics, And Phylogeny

Credit Hours: 3.00. An introduction of new concepts and methods in molecular genetics, systematics, and phylogeny. The new lines of inquiry are introduced via current significant journal publications. Sufficient background information is presented concurrently to make the concepts accessible to every student. Journal articles used are updated and/or changed frequently, as new publications appear. A college course in genetics (AGRY 32000 or equivalent) is strongly recommended. Typically offered Fall.

ENTM 61100 - Toxicology Of Insecticides

Credit Hours: 3.00. The chemistry, mode of action, and metabolism of insecticides and related compounds in both insect and vertebrate systems. Evaluation of toxic action, principles of selective toxicity, insecticide resistance, and environmental effects are also discussed. A minimal knowledge of entomology is required. Knowledge of biochemistry and neurobiology is useful. Offered in even-numbered years. Typically offered Fall.

ENTM 61500 - Advanced Insect Behavior

Credit Hours: 3.00. The first half of the course examines the design and implementation of behavioral experiments, including subject selection, types of questions that can be tested, observation techniques, data collection, equipment used to conduct behavioral experiments, ethogram construction, and data analysis. The second half of the course examines specifics of reproductive, migratory, defense, communication, and feeding behaviors. Class time is a mixture of traditional lecture, class discussion of published literature, and observational periods of demonstrating research techniques. Typically offered Fall.

ENTM 69000 - Seminar

Credit Hours: 0.00 or 1.00. Current problems in the field of entomology, with special reference to technical research. Typically offered Fall Spring Summer.

ENTM 69100 - Special Problems

Credit Hours: 1.00 to 12.00. Special research topics of interest to graduate students and not included in assigned coursework. Permission of instructor required. Typically offered Fall Spring Summer.

ENTM 69200 - Special Topics

Credit Hours: 1.00 to 4.00. Advanced topics in specialties of department members such as, but not limited to: biochemistry and physiology; biological control; insect pest management; veterinary entomology; nematode systematics; pathology; systematics. The field in which work is offered will appear on the student's record. Doctoral student standing. Permission of instructor required. Typically offered Fall Spring.

ENTM 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ENTM 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Environmental and Ecological Engineering

EEE 25000 - Environmental, Ecological, and Engineering Systems

Credit Hours: 3.00. An overview of systems thinking and examples, and applications to environmental, ecological, and engineering systems. Students will develop an understanding of complex and global systems, along with the tools and analysis methods required to deal with them. Basic environmental and ecological science concepts are also included. Typically offered Fall.

EEE 29000 - Introduction to Environmental And Ecological Engineering Seminar

Credit Hours: 1.00. Seminar lectures and discussions to introduce students to the program and aspects of professional planning within Environmental and Ecological Engineering. Topics include planning a course of study, internship, research, study abroad

opportunities, career planning and placement skills, professional responsibility and ethics, and functioning as a professional. Typically offered Fall.

EEE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional experience in environmental and ecological engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. Professional experience in Environmental and Ecological Engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 30000 - Environmental And Ecological Systems Modeling

Credit Hours: 3.00. Introduction to computational methods for describing physical, chemical, and microbiological processes that occur in natural and engineered aqueous systems, including rivers and lakes, and within water and wastewater treatment systems. Emphases on understanding and conceptualizing important processes, data analysis, algorithm development, and competency in the use of programming tools. Typically offered Spring.

EEE 35000 - Introduction To Environmental And Ecological Engineering

Credit Hours: 3.00. Introduction to water pollution, air pollution, noise, hazardous and solid wastes, and their control. Environmental impact statements and global pollution issues. Field trips required. Typically offered Fall Spring Summer.

EEE 35500 - Engineering Environmental Sustainability

Credit Hours: 3.00. (CE 35500) An introduction to the examination of global-scale resource utilization, food, energy and commodity production, population dynamics, and their ecosystem impacts. Typically offered Fall Spring.

EEE 36000 - Environmental And Ecological Engineering Laboratory

Credit Hours: 1.00 to 3.00. An introduction to laboratory methods of analysis of Environmental and Ecological Engineering systems. Topics will change from semester to semester and will be announced in advance. The list of possible topics includes experimental design, treatment of data, the analytical determination of chemical and biological constituents in water, soil, and air; analysis of environmental and ecological engineering processes; analysis of life-cycle characteristics and impacts of consumer products and commodities; methods of prevention and remediation of manufacturing waste streams. Typically offered Fall Spring.

EEE 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. Professional experience in Environmental and Ecological Engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. Professional experience in Environmental and Ecological Engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. Professional experience in Environmental and Ecological Engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 39000 - Environmental And Ecological Engineering Professional Practice Seminar

Credit Hours: 1.00. Seminar lectures and discussions to introduce students to aspects of professional practice within Environmental and Ecological Engineering. Topics include career planning and placement skills, professional responsibility and ethics, functioning as a professional, and other current important topics in the profession. Students will interact with several practicing Environmental and Ecological Engineers. Typically offered Spring.

EEE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional experience in Environmental and Ecological Engineering. Program coordinated by EEE with

cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional experience in Environmental and Ecological Engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional experience in Environmental and Ecological Engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

EEE 39699 - Professional Practice Internship

Credit Hours: 0.00. One-session professional experience in environmental and ecological engineering. Program coordinated by EEE with cooperation of participating employers and the Office of Professional Practice. Students submit summary report and company evaluation. Permission of department required.Typically offered Fall Spring Summer.

EEE 43000 - Industrial Ecology And Life Cycle Analysis

Credit Hours: 3.00. The outputs and processes associated with industrial systems are examined, with special emphasis placed on interactions of these systems with environmental and ecological systems. A full product life cycle perspective is stresses, including energy and material flows, processes used to produce materials and realize products, and the management of end-of-life products. Typically offered Spring.

EEE 48000 - Environmental And Ecological Engineering Senior Design

Credit Hours: 1.00 to 3.00. Senior-level environmental and ecological engineering design projects. Projects will integrate knowledge and skills earlier in the degree program and stress the application of the design process to interdisciplinary environmental and/or ecological engineering systems. Typically offered Fall Spring.

EEE 49500 - Environmental And Ecological Engineering Projects

Credit Hours: 0.00 to 6.00. Topics Vary. Arrange hours and credit. Permission of instructor required. Typically offered Fall Spring Summer.

Entrepreneurship

ENTR 20000 - Introduction To Entrepreneurship And Innovation

Credit Hours: 3.00. A survey course designed to introduce students to the concept of entrepreneurship and the commercialization of new technology, its importance in the world economy, and related career options. Students completing this course will understand entrepreneurial roles and possibilities, begin developing required skills required of successful entrepreneurs, including leadership and basic business skills, and will develop a sense of their own aptitude for entrepreneurial endeavors, thereby allowing an informed decision regarding the pursuit of the full 15 credit Certificate in Entrepreneurship and Technology Innovation. Typically offered Fall Spring.

ENTR 31000 - Marketing And Management For New Ventures

Credit Hours: 3.00. Second in a two course sequence designed to develop a foundation of basic skills in the areas of entrepreneurship and innovation. Students completing this course will gain greater depth in areas essential to the creation and management of new ventures, including marketing and selling, finance and accounting, project management leadership, team building and ethics. Typically offered Fall Spring.

ENTR 39000 - Special Topics In Entrepreneurship And Innovation

Credit Hours: 1.00 to 3.00. The requested course will provide the opportunity to develop courses which fulfill the "option" course requirement for the Certificate in Entrepreneurship and Innovation Program. Option courses are designed to provide depth in certain disciplines related to entrepreneurship and innovation, and/or entrepreneurship and innovation in relation to specific industries or markets. Typically offered Summer Fall Spring.

ENTR 47000 - Women And Leadership

Credit Hours: 3.00. This course is designed to expose advanced undergraduate students to the topic of women leaders. The first half of the class will cover the social and historical perspective of women in leadership and second half of the course will cover practical skills that women leaders can use to develop their leadership skills. This class will be team taught and the course will largely be based on class discussion. The readings will consist of articles from various publications, including the Harvard Business Review and The Wall Street Journal in order to expose students to important publication that business leaders often read regularly. Assignments will include a research paper, a book review, and leading class discussion. Typically offered Fall Spring.

ENTR 48000 - Entrepreneurship Capstone

Credit Hours: 3.00. The requested course will provide the opportunity to develop capstone courses for the Certificate in Entrepreneurship and Innovation Program. Capstone courses are designed to provide students with the opportunity to apply the knowledge acquired in Certificate Program "core" and "option" courses to hands-on, real world activities related to entrepreneurship and innovation. Typically Fall Spring.

ENTR 48100 - Consulting For Emerging Enterprises

Credit Hours: 3.00. In this course, students are put into student teams and conduct an actual consulting engagement with a local entrepreneurial firm or non-profit for the semester. The course enables students to develop skills in consulting as well as to reinforce and hone their knowledge in entrepreneurship. The consulting engagement utilizes a three-stage model intended to guide teams as they contract, gather data, and ultimately create value for the entrepreneurial enterprise through a set of recommendations. Classroom time is focused on learning key consulting skills which are then applied directly in the consulting engagement. Permission of Instructor required. Typically offered Fall Spring.

ENTR 49000 - Senior Level Special Topics In Entrepreneurship And Innovation

Credit Hours: 1.00 to 3.00. The requested course will provide the opportunity to develop capstone courses for the Certificate in Entrepreneurship and Innovation Program. Capstone courses are designed to provide students with the opportunity to apply the knowledge acquired in Certificate Program "core" and "option" courses to hands-on, real world activities related to entrepreneurship and innovation. Typically offered Summer Fall Spring.

ENTR 50000 - Seminar In Technology Realization Topics

Credit Hours: 2.00. This course is a seminar that focuses on topics related to technology realization, commercialization, and entrepreneurship. Topics pertaining to these areas are covered through readings, class discussion, and presentations by invited speakers. . Typically offered Fall.

ENTR 50100 - Technology Realization Workshop

Credit Hours: 2.00. This course introduces a variety of cross-disciplinary topics to develop the skills needed to realize technology. Each week, students learn specific methodologies and techniques and apply these through case studies and class projects. . Typically offered Spring.

ENTR 59000 - Graduate Level Special Topics In Entrepreneurship And Innovation

Credit Hours: 1.00 to 3.00. The requested course will provide the opportunity for graduate students to participate in entrepreneurship courses focused on the skills and knowledge necessary to launch and lead new business ventures, the examination of the feasibility and market potential of new technologies, and/or the development of business plans. Typically offered Fall Spring Summer.

Film and Video Studies

FVS 26100 - Technical Video Production I

Credit Hours: 3.00. The course introduces students to the principles and practice of professional video production. Through lectures, viewing, discussions, and laboratory exercises, students will acquire the tools necessary to transform their concepts, or those of their clients, into successful video productions. Film Video Studies majors have priority. Typically offered Fall Spring.

FVS 33200 - Technical Video Production II

Credit Hours: 1.00 to 4.00. This experiential course furthers the students' understanding of technical video production. Lectures, viewings, discussions, and laboratory exercises increase the students' proficiency with the technology and equipment as well as the art involved in the craft. Film Video Studies majors have priority. Typically offered Fall Spring.

FVS 33600 - Screenwriting

Credit Hours: 3.00. Students will gain a working knowledge of basic narrative elements and how these elements work to form a story. Writing and re-writing a three act outline and an original screenplay will give you an understanding of script language and process. (Film Video Studies majors have priority.). Typically offered Fall Spring.

FVS 33700 - Editing I

Credit Hours: 3.00. The course introduces students to the principles of non-linear/non-destructive editing. Lectures, viewings, discussions, and laboratory exercises expose students to the technical and artistic aspects of the editing process. Film Video Studies majors have priority. Typically offered Fall Spring.

FVS 33800 - Editing II

Credit Hours: 3.00. This course instructs students in advanced principles of non-linear/non-destructive editing. Lectures,

viewings, discussions, and laboratory exercises will be used to help the student learn advanced technical and artistic aspects of the editing process. Permission of department required. Typically offered Fall Spring.

FVS 44200 - Digital Film Production

Credit Hours: 4.00. Students will gain knowledge of all phases of film production in the course of completeling two short digital films. This class will emulate standard film industry practices and guidelines. Film Video Studies majors have priority. Typically offered Fall Spring.

FVS 45000 - Internship In Film/Video/Media Production

Credit Hours: 1.00 to 4.00. Internships in one of the professional areas of film, video or media production. Internships are supervised by appropriate faculty in a particular field of specialization. Permission of department required. Typically offered Fall Spring Summer.

FVS 49000 - Directed Readings In Film/Video Studies

Credit Hours: 1.00 to 4.00. Readings under the direction of the instructor in a particular field of study. Typically offered Fall Spring Summer.

FVS 49100 - Special Topics In Film/Video Studies

Credit Hours: 1.00 to 4.00. Special topics or projects under the direction of an instructor in a particular field of specialization. Typically offered Fall Spring Summer.

Engineering

ENGR 10000 - First-Year Engineering Lectures

Credit Hours: 1.00. An introduction to the engineering profession. Typically offered Fall Spring.

ENGR 10300 - Introduction To Careers In Engineering

Credit Hours: 1.00. Weekly small group seminars led by faculty, supplementing First-Year Engineering Lectures, enabling a broader understanding of engineering as a career and providing skills for academic success. Typically offered Fall.

ENGR 10400 - Introduction To Engineering And Purdue

Credit Hours: 1.00. Weekly small group seminars led by upper-class engineering students supplementing First-Year Engineering Lectures, enabling a broader understanding of engineering disciplines at Purdue and providing skills for transition to the professional schools and academic success. Typically offered Fall.

ENGR 10500 - First-Year Engineering Seminar

Credit Hours: 1.00. A selection of invited lectures, participation exercises, and lab tours designed to acquaint exceptionally well-motivated students with opportunities to enhance their undergraduate engineering education through independent study, special research projects, overseas study, and other opportunities that may be available for students who are inclined to seek extraordinary challenges. Typically offered Spring.

ENGR 11700 - First-Year Engineering Honors Seminar

Credit Hours: 3.00. A course in computer programming, covering fundamentals of the C programming language. Other language(s) or materials will be covered to prepare Honors students to do the best possible work in their professional school courses. Students will be introduced to structured problem solving and top-down programming techniques. Laboratory exercises will accelerate learning of fundamental materials through supervised repetitive practice, while more traditional individual and team projects will provide practice in the decomposition and solution of larger problems. Typically offered Spring.

ENGR 12600 - Engineering Problem Solving and Computer Tools

Credit Hours: 3.00. Introduction to the solving of open-ended engineering problems and the use and of computer software, including UNIXTM, computer communications, spreadsheets, and MATLAB. Explicit model-development activities are utilized, and students are expected to develop skill at working in teams. This is emphasized both in laboratories and on projects. Typically offered Summer Fall Spring.

ENGR 13100 - Transforming Ideas To Innovation I

Credit Hours: 2.00. A partnership between Schools and Programs within the College of Engineering, introduces students to the engineering professions using multidisciplinary, societally relevant content. Developing engineering approaches to systems, generating and exploring creative ideas, and use of quantitative methods to support design decisions. Explicit model-development

activities (engineering eliciting activities, EEAs) engage students in innovative thinking across the engineering disciplines at Purdue. Experiencing the process of design and analysis in engineering including how to work effectively in teams. Developing skills in project management, engineering fundamentals, oral and graphical communication, logical thinking, and modern engineering tools (e.g., Excel and MATLAB). Typically offered Fall Spring Summer.

ENGR 13200 - Transforming Ideas To Innovation II

Credit Hours: 2.00. A partnership between Schools and Programs within the College of Engineering continues building on the foundation developed in ENGR 13100. Students take a more in depth and holistic approach to integrating multiple disciplines perspectives while constructing innovative engineering solutions to open-ended problems. Extending skills in project management engineering fundamentals, oral and graphical communication, logical thinking, team work, and modern engineering tools (e.g., Excel and MATLAB). Typically offered Fall Spring Summer.

ENGR 13300 - Transforming Ideas To Innovation, EPICS

Credit Hours: 2.00. Introduces students to the engineering professions using multidisciplinary, societally relevant content. Students will develop engineering approaches to systems, generate and explore creative ideas, and use quantitative methods to support design decisions. Students will experience the process of design and analysis in engineering including how to work effectively in teams, and will develop skills in project management, engineering fundamentals, oral and graphical communication, logical thinking, and modern engineering tools (e.g., Excel and MATLAB). An emphasis will be placed on computing logic development and builds upon the co-requisite experience of the students in the EPICS class. Typically offered Fall Spring Summer.

ENGR 14100 - Honors Creativity And Innovation In Engineering Design I

Credit Hours: 3.50. This course introduces students to the engineering professions using multidisciplinary, societally relevant content. Students develop engineering approaches to systems, generate and explore creative and innovative ideas, and use of computational methods to support design decisions. Design challenges and projects engage students in innovative thinking across the engineering disciplines at Purdue. Students experience the process of design and analysis in engineering including how to work effectively in teams. Students also develop skills in project management, engineering fundamentals, oral and graphical communication, logical thinking, and modern engineering tools (e.g., Excel®, LabView®, MATLAB®, and Python). Typically offered Fall Spring.

ENGR 14200 - Honors Creativity And Innovation In Engineering Design II

Credit Hours: 3.50. This course continues building on the foundation developed in ENGR 14100. Students take a more in depth and holistic approach to integrating multiple disciplines perspectives while constructing innovative engineering solutions to open-ended problems. The students extend and continue to develop skills in project management, engineering fundamentals, oral and graphical communication, logical thinking, team work, and modern engineering tools (e.g., C, Excel®, LabView®, MATLAB®, and Python). Typically offered Fall Spring.

ENGR 17600 - Professional Internship I

Credit Hours: 0.00. Professional experience in engineering. Program coordinated by department with cooperation of participating employers. Students submit a summary report. Typically offered Summer Fall Spring.

ENGR 18000 - Minorities In Engineering Seminar

Credit Hours: 1.00. Explores the challenges that minority engineering students have in making a smooth and informed transition to college from high school. The content and activities may be of particular interest to engineering students from underrepresented groups as they adjust to the University's environment. The course provides a setting for entering students to explore career opportunities in the various fields of engineering. Open to all entering engineering students. Typically offered Fall.

ENGR 18500 - Engineering Career Planning

Credit Hours: 1.00. An engineering-oriented course designed to assist students in planning for their educational, career, and personal development. Individual and group projects, computer-aided guidance. Course will incorporate autobiographies, resumes, and academic and career planning exercises. Interest inventories and personal appraisal surveys will be utilized. Computer-based guidance systems will be utilized, including ESCAPE (Engineering Specific Career Advisory Problem-solving Environment). (Eight week session.). Typically offered Fall Spring.

ENGR 19400 - Women In Engineering Seminar

Credit Hours: 1.00. An overview of the career opportunities for women in engineering. The content and activities of the course may be of particular interest to women. Speakers from a variety of engineering organizations discuss their career paths and share their strategies for success. Students also meet weekly in small groups led by engineering seniors for additional information, interaction, and support from their peers in engineering. Open to all entering engineering students. Typically offered Fall.

ENGR 19500 - First-Year Engineering Projects

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Summer Fall Spring.

ENGR 20100 - Engineering In Global Context

Credit Hours: 3.00. This course provides students with opportunities to study how engineering is intertwined with larger economic, social, cultural, and technological dynamics in an era of intensified globalization. Its major goals are to help students understand and appreciate what engineering is, how engineers are trained, what engineers do, and how engineering and society interact. The course approaches these themes through discussion of: the relation and interaction of engineering, science, technology, and society; the historical origins and development of engineering as a profession; diversity issues in engineering and other STEM fields; engineering in cross-national/cultural contexts; and contemporary challenges related to globalization, ethics, and sustainability. In summary, the course is designed to help students understand what it means to identify as, and/or work with, engineers. Recitation sections and/or independent projects (at the instructor's discretion) provide further opportunities for students to expand their knowledge and improve their skills in relation to course themes. Typically offered Fall Spring.

ENGR 29199 - Professional Practice Extensive I

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 29299 - Professional Practice Extensive II

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 29701 - Global Engineering Orientation - GEARE

Credit Hours: 1.00. Forum in preparation of study and work abroad as part of undergraduate GEARE program. Understanding of cultural differences and collaborating across cultural boundaries, professionalism and ethics in foreign work and academic environments, leadership and team work options in foreign environments. Permission of Instructor required. Typically offered Fall.

ENGR 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 39399 - Professional Practice Extensive III

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 39499 - Professional Practice Extensive IV

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 39501 - Breakthrough Thinking Complex Challenges

Credit Hours: 3.00. This course is intended to help students understand and effectively employ the principles underlying breakthrough thinking. Students will participate in cross-disciplinary teams to design solutions to a complex societal challenge in conjunction with a partner organization, in an experiential learning setting. Case discussions of historical breakthroughs will be used to introduce techniques for the identification of opportunities, the design of solutions, and the launch, test, and iteration of such solutions. Emphasis will be placed on the effective use of techniques from various fields, such as business, design, problem-solving, engineering, and the social sciences. Typically offered Fall.

ENGR 39599 - Professional Practice Extensive V

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 39699 - Professional Practice Internship

Credit Hours: 0.00. Professional experience in Engineering. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students submit a summary report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 39799 - GEARE Domestic Internship

Credit Hours: 0.00. Domestic internship experience for GEARE program. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students to obtain professional practice with domestic employers within industry, government or small business. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 39899 - GEARE Global Internship

Credit Hours: 0.00. Global internship experience for GEARE program. Program coordinated by Office of Professional Practice with cooperation of participating employers. Students to obtain professional practice with global employers within industry, government or small business. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 40400 - Instruction, Mentorship And Leadership

Credit Hours: 1.00. Selected students enrolled in professional programs in the Schools of Engineering lead sections of ENGR 10400. Common instruction on appropriate teaching methods, ENGR 10400 content, mentorship, and leadership. Preparation of class outlines, development of teaching evaluation method, and formal reflection on performance and growth resulting from the teaching experience. Permission of instructor required. Typically offered Fall.

ENGR 40600 - Engineering Ambassador Leadership Seminar

Credit Hours: 1.00. Students will engage in a weekly seminar that includes topics such as leadership, professional skills, teamwork, and Purdue culture. Students will utilize these skills while representing Purdue College of Engineering to current and prospective students, alumni, donors, legislators, and other supporters of Purdue College of Engineering. Student must be selected as a College of Engineering Ambassador; be currently enrolled full-time in the College of Engineering; have completed no less than three academic semesters at Purdue; have a cumulative GPA of 2.8 or higher. Permission of department required. Typically offered Fall Spring.

ENGR 50000 - Global Design Team V

Credit Hours: 0.00 to 3.00. Global Design Team brings together undergraduate and graduate students from different disciplines, inside and outside of the College of Engineering to design solutions to solve real-world problems over the course of one academic semester. Depending on the size and scope of the project, teams may range from one to twenty students under the advisement of a faculty member. GDTs partner student teams with non-governmental organizations, businesses and/or other research institutions in international development projects. Approval for registration is granted based on an application process that takes into consideration previous design experience, level of interest in the topic and GPA. Permission of Department required. Typically offered Fall Spring.

ENGR 69199 - Professional Practice Graduate Co-Op I

Credit Hours: 0.00. Graduate cooperative education experience. Program coordinated by the Office of Professional Practice with cooperation from academic disciplines and participating employers. Students submit technical report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 69299 - Professional Practice Graduate Co-Op II

Credit Hours: 0.00. Graduate cooperative education experience. Program coordinated by the Office of Professional Practice with cooperation from academic disciplines and participating employers. Students submit techncial report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 69399 - Professional Practice Graduate Co-Op III

Credit Hours: 0.00. Graduate cooperative education experience. Program coordinated by the Office of Professional Practice with cooperation from academic disciplines and participating employers. Students submit techncial report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 69499 - Professional Practice Graduate Co-Op IV

Credit Hours: 0.00. Graduate cooperative education experience. Program coordinated by the Office of Professional Practice with cooperation from academic disciplines and participating employers. Students submit techncial report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

ENGR 69699 - Professional Practice Graduate Internship

Credit Hours: 0.00. Graduate internship experience. Program coordinated by the Office of Professional Practice with cooperation

from academic disciplines and participating employers. Students submit technical report and company evaluation. Permission of Instructor required. Typically offered Fall Spring Summer.

Food Science

FS 16100 - Science Of Food

Credit Hours: 3.00. Chemical and physical properties of foods; issues pertaining to safety, food-diet-health relationship; government regulations pertaining to food safety, quality and additives; preservation techniques and transformation of agricultural commodities to food products; Food facts, myths, and practices that are important for making intelligent food decisions. Course may also be offered for dual credit with cooperating Indiana high schools upon documented approval by the Department of Food Science. Typically offered Fall.

FS 16200 - Introduction To Food Processing

Credit Hours: 1.00. Application of introductory food science principles (e.g. food chemistry, food microbiology, and unit operations) to food processing; emphasis will be placed on food formulation, pilot-scale process design, and resulting food quality. May require class trips . Typically offered Spring.

FS 24500 - Food Packaging

Credit Hours: 1.00. Elements of packaging science and technology applied to preservation, distribution, and marketing of food products; packaging materials; principles of diffusion and permeability; procedures for developing, evaluating, and testing food packages; packaging requirements for specific types of foods; other special topics of current interest. Typically offered Spring.

FS 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first- and second-year students. Courses offered must be approved by instructor and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

FS 29100 - Special Assignments

Credit Hours: 1.00 to 3.00. Open to primarily freshmen and sophomores who desire to study special problems in science not

covered in regular coursework. May be repeated for credit with instructor permission. Permission of instructor required. Typically offered Summer Fall Spring.

FS 29800 - Sophomore Seminar

Credit Hours: 1.00. Current food science issues will be discussed by students, staff, and guest speakers. Career planning and improvement of communication skills will be emphasized. Typically offered Fall.

FS 33000 - Culinary Arts For The Food Scientist

Credit Hours: 2.00. Course bridges the gap between culinary arts and product development. It includes real-world case studies of science-based food product development by industry specialists on commercial development. In addition there are hands-on applications of textbook culinary arts topics under the direct supervision of the specialists. Typically offered Fall.

FS 34000 - Introduction To Food Law And Regulations

Credit Hours: 1.00. This course will cover basic knowledge and familiarity of the principal law and regulations governing raw and processed foods. Class meets during weeks 1-5. . Typically offered Spring.

FS 34100 - Food Processing I

Credit Hours: 2.00. Applications of the fundamentals of food engineering, microbiology, and chemistry to methods of food processing and preservation; emphasis will be on processing concepts, preparation for food processing, food formulation, and thermal processing. Typically offered Fall.

FS 34200 - Food Processing I Laboratory

Credit Hours: 1.00. This laboratory course applies food engineering principles and thermal processing methods for production of safe and high quality foods. The course will include applications of mathematics and physics principles in food processing operations, engineering problem solving exercises and laboratory demonstrations. Engineering concepts such as heat transfer, fluid flow, mass and energy balances applied to various food systems will be a major portion of this laboratory. Typically offered Fall.

FS 36100 - Food Plant Sanitation

Credit Hours: 1.00. Relation of food-plant sanitation to good manufacturing practices and regulations affecting sanitation; organization of a food-plant sanitation program; sanitary building and equipment construction; selection of cleaning, sanitizing, and pesticidal compounds; water, air, and waste treatment; food storage and transportation. Typically offered Fall.

FS 36200 - Food Microbiology

Credit Hours: 3.00. Microbiology of foods, with emphasis on the conditions for growth of microorganisms and degradation of food components, preservation methods, use of Hazard Analysis and Critical Control Point (HACCP) concepts, and microorganisms associated with foodborne illness, and modern detection methods. Typically offered Fall.

FS 36300 - Food Microbiology Laboratory

Credit Hours: 2.00. Classic and molecular methods for enumerating, isolating, and identifying spoilage, fermentative, and pathogenic food microorganisms in food systems. Typically offered Fall.

FS 36800 - Dairy Products

Credit Hours: 2.00. Scientific and technical aspects of procurement, processing, packaging, and quality control of milk products and frozen dairy foods. Emphasis is placed on process unit operations. Typically offered Fall.

FS 36900 - Dairy Products Laboratory

Credit Hours: 1.00. Practical laboratory applications of processing, packaging, and quality control of fluid milk products and frozen dairy foods. May require field trips. Students are responsible for providing their own laboratory coats. Permission of instructor required. Typically offered Fall.

FS 39000 - Food Science Cooperative Work Experience

Credit Hours: 0.00. Supervised professional experiences in the food science industry. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit a summary report. Permission of department required. Typically offered Fall Spring Summer.

FS 40000 - Food Science Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

FS 43100 - Physical Chemistry For Food And Agriculture

Credit Hours: 3.00. Introduction to the principles of physical chemistry applied to food and agricultural materials. Topics: state of matter, work, heat, enthalpy, entropy, free energy, phase equilibrium and transitions, chemical equilibrium, chemical kinetics, surfaces, and introduction to macromolecules, transport and spectroscopy. Examples and problems taken from the agricultural sciences. Teaches functional properties in terms of structure, energetics, and dynamics. Offered in odd-numbered years. Typically offered Fall.

FS 43500 - Sensory Science

Credit Hours: 1.00. Introduction to the fundamental concepts and practices of sensory analysis of food products. Technical aspects of planning and conducting human sensory panels on food products including analysis and interpretation of collected data. Course meets weeks 1-8. Typically offered Spring.

FS 44200 - Food Processing II

Credit Hours: 2.00. Study of food processing and preservation methods based on the integrated knowledge of microbiology, chemistry, and food engineering; emphasis will be on temperature reduction, water activity, concentration, dehydration, irradiation, and extrusion. Typically offered Fall.

FS 44300 - Food Product Design (Capstone)

Credit Hours: 3.00. Teams develop a new product from concept through marketing. Final case study defense is presented to faculty and peers. Classes include guest lectures from the food industry. Typically offered Spring.

FS 44400 - Statistical Process Control

Credit Hours: 1.00. Basic concepts and techniques of solving quality problems and assuring the quality of production processes; emphasis is on quality improvement programs, problem-solving tools, control charts for variables and attributes, process capability analysis, and sampling methods. Course meets during weeks 6-10. Typically offered Fall.

FS 44600 - Food Process Automation

Credit Hours: 2.00. Practical and descriptive aspects of automatic control of food manufacturing processes. Use of control systems simulation; tuning of control loops; sensors; data acquisition and transmission; simple statistical process control. Students will have hands-on experience in the pilot lab. Intended for non-engineers. Offered in odd-number years. Typically offered Spring.

FS 44700 - Food Processing II Laboratory

Credit Hours: 1.00. This lab is designed to build upon fundamental concepts associated with the preservation and processing of various food products. Concepts to be covered include water activity, dehydration (drum, spray and freeze drying), frying, high pressure, microwave and ohmic heating. The focus of this lab will be hands-on production of various food products and the demonstration of fundamental food processing unit operations and calculations related to each preservation method. Typically offered Fall.

FS 45300 - Food Chemistry

Credit Hours: 3.00. Application of fundamental laws and concepts of chemistry, physics, and biology to the properties, composition, and storage of foods. Typically offered Spring.

FS 45400 - Food Chemistry Laboratory

Credit Hours: 1.00. Laboratory to demonstrate application of fundamental laws and concepts of chemistry, physics, and biology to the properties, composition, and storage of foods. Typically offered Spring.

FS 45500 - Cereal Chemistry And Processing

Credit Hours: 1.00. Cereal grain structure, chemical and functional properties, and nutritional aspects related to grain milling and processing. Cereal processing covers dry and wet milling, brewing, baked products, pasta, breakfast cereals, snack foods, and traditional cereal foods from other countries. (Offered in even-numbered years.). Typically offered Fall.

FS 46700 - Food Analysis

Credit Hours: 3.00. Application of quantitative and qualitative physical, chemical, and instrumental methods of analysis to the examination of food products; evaluation of methods for specific applications. Typically offered Spring.

FS 46900 - Food Analysis Laboratory

Credit Hours: 2.00. Practical laboratory applications of food analysis, including relevant calculations using data gathered and interpretation of data. (Intended for upper-division students.) Typically offered Spring.

FS 47000 - Wine Appreciation

Credit Hours: 3.00. A study of wine production and marketing principles with an emphasis upon consumption responsibility. Historical perspectives form the foundations for wine classification systems and traditional serving procedures. Cardinal scale sensory evaluations are conducted in relationship to various food pairings. Must be 21 years of age or older to register for this course. Permission of department required. Typically offered Fall.

FS 47500 - Honors Course - Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third- and fourth-year students. Courses offered must be approved by instructor and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

FS 48200 - Food Science Senior Seminar

Credit Hours: 1.00. Oral and written reports on selected food science topics. Typically offered Fall.

FS 49100 - Special Assignments In Food Science

Credit Hours: 1.00 to 3.00. Open primarily to qualified seniors who desire to study special problems in science not covered in regular coursework. Permission of instructor required. Typically offered Fall Spring Summer.

FS 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. For honors students doing independent research. Permission of instructor required. Typically offered Fall Spring Summer.

FS 50600 - Commerical Grape And Wine Production

Credit Hours: 3.00. (HORT 50600) A study of professional grape growing and wine production with an emphasis on Midwestern climates, adapted varieties, and recommended wine styles. This course is especially intended for upper level undergraduate, or graduate students in the College of Agriculture that have completed basic course work in plant sciences, biology and chemistry. Students will learn the principles of viticulture and enology and the practices of commercial grape growing and wine making. Must be 21 years old. Permission of instructor required. Typically offered Fall.

FS 53000 - Food Ingredient Technology

Credit Hours: 1.00. Identifies functions of ingredients listed on ingredient labels of food products and discusses alternative ingredient choices for food products. Typically offered Spring.

FS 54100 - Postharvest Technology Of Fruits And Vegetables

Credit Hours: 1.00. (HORT 54100) Theoretical and applied aspects of methods being used for enhancing the quality and shelf life of harvested fruits and vegetables. Factors that affect the longevity of produce and technology used to control these factors and reduce deterioration of produce between harvest and consumption/processing will be emphasized. Meets during weeks 11-15). Typically offered Spring.

FS 55001 - Food Chemistry

Credit Hours: 1.00. Principles and concepts of the effects of heat, light, oxygen, and water activity on chemical reactions and physical events involved in processing, storage, and preparation of food products and their relationships to nutritional quality, organoleptic quality, stability, and safety. Class meets for 5 weeks. Typically offered Fall.

FS 55101 - Food Analysis

Credit Hours: 1.00. Principles and applications of chemical, physical, and sensory techniques to analyze foods. Class meets for 5 weeks. Typically offered Fall.

FS 55201 - Nutritional Sciences

Credit Hours: 1.00. Study of perspectives on established nutrition knowledge, concepts, and principles pertinent to the field of food science. Contemporary information about diet as it relates to health and safety issues. Controversies regarding nutrients and functional foods. Class meets 5 weeks. Typically offered Fall.

FS 55301 - Food Microbiology

Credit Hours: 1.00. Principles and applications of the microbiology of foods. Focuses on many of the important conditions that may lead to foodborne illness and food spoilage. Structured in three main sections related to foodborne hazards: 1) identification, 2) control and prevention, and 3) detection. Class meets weeks 1-5. Typically offered Spring.

FS 55401 - Food Processing And Packaging

Credit Hours: 2.00. Covers relevant basic engineering concepts and their applications to solve food processing and packaging problems. Key unit operations and regulations or recommended practices for manufacture of a variety of foods also will be covered. Students work in teams on a project and present their findings to the entire class. Class meets weeks 6-15. Typically offered Spring.

FS 55501 - Case Study

Credit Hours: 1.00. A brief overview of problem-solving and teamwork concepts will be presented in class. A problem will be given by an industrial sponsor, and work groups (teams) will be assigned to solve the problem and present the findings. Typically offered Fall.

FS 56400 - Commercial Food And Beverage Fermentations

Credit Hours: 2.00. This course will provide a study of the principles and practices of international food and beverage fermentations with emphasis on the microbiology, biochemistry and processing techniques used in commercial fermentations that utilize fruits, vegetables, grains, dairy, and meats. Instructional Format: This is a two credit lecture that can be linked to a separate optional one credit hour laboratory combination. Students must be 21 years of age with ID check for proof of age. Permission of department required. Typically offered Spring.

FS 56500 - Microbial Foodborne Pathogens

Credit Hours: 3.00. The primary focus is to study the microbial pathogens involved with foodborne diseases. Course emphasis is on molecular and genetic basis of virulence of foodborne pathogens and host parasite interactions. Topics include incidence and source of pathogens, immune response to infection, virulence factors, and mechanism of pathogenesis of specific infectious and intoxicating foodborne bacteria, mycotoxins, viruses and parasites. Typically offered Spring (odd years).

FS 56600 - Microbial Techniques For Food Pathogens

Credit Hours: 2.00. Molecular biology, immunochemistry and tissue culture-based rapid and automated techniques currently used for detection and identification of foodborne pathogens. The techniques include metabolic fingerprinting identification system, enzyme immunoassay and dot blotting, lateral flow assay, polymerase chain reaction, genomic fingerprinting, cytotoxicity assays, and selected biosensor tools. Laboratory experiments are scheduled for four hours, with up to two additional hours of arranged time. Offered in even-numbered years. (Weeks 6-16). Typically offered Spring.

FS 59000 - Special Problems

Credit Hours: 1.00 to 5.00. Specialized study in research laboratories, libraries, or computer laboratories for problems related to food science that are not taught in regular courses. Permission of instructor required. Typically offered Fall Spring Summer.

FS 59100 - Special Topics

Credit Hours: 1.00 to 3.00. Specialized topics not covered in other courses will be offered as one-credit minicourses. Topics, requirements, and credits will be determined yearly. Permission of instructor required. Typically offered Fall Spring Summer.

FS 60900 - Food Lipids

Credit Hours: 1.00 to 3.00. (NUTR 60900) Importance of lipids in the diet and food systems with emphasis on changes occurring during processing, preparation, and storage. Nomenclature, physical attributes, and oxidation of lipids as well as properties and characteristics of antioxidants will be major components of the course. Offered in alternate years. Prerequisite: BCHM 56100 and FS 65000 or FS 45300/NUTR 45300. Typically offered Fall.

FS 61000 - Food Proteins

Credit Hours: 3.00. (NUTR 61000) Chemical and physical properties, distribution and function, and alteration of proteins in food. Protein toxicology and nutritional quality. Offered in alternate years. Prerequisite: BCHM 56100 and FS 65000. Typically offered Spring.

FS 62000 - Scientific Writing In Food Science

Credit Hours: 2.00. This course covers the essential elements of publishing original research at professional meetings (oral presentations and papers) and in peer-reviewed journals (original research manuscripts). Topics include: ethics in writing, effective reading of the literature, organizing research data, choosing a journal, writing the manuscript (results, materials and methods, introduction, discussion, title, abstract, references), publication process, revising and reviewing, poster presentation, and

short oral presentations. Each student will write a paper, prepare a 12-minute oral presentation, and prepare a poster, based on data from his/her graduate research project. Permission of instructor required. Typically offered Spring.

FS 63000 - Carbohydrates

Credit Hours: 3.00. (NUTR 63000) Carbohydrates with an emphasis on those of low molecular weight in foods. Structures, reactions, and properties of mono- and oligosaccharides. Introduction to polysaccharides and food gums. Offered in alternate years. Prerequisite: 6 credit hours in Organic Chemistry. Prerequisite: Nine credits of chemistry. Typically offered Fall.

FS 63200 - Laboratory In X-Ray Fiber Diffraction

Credit Hours: 2.00. Molecular model building and X-ray diffraction analysis of fibrous polymer structures such as nucleic acids, polysaccharides, and polypeptides. Permission of instructor required. Typically offered Fall Spring.

FS 64000 - Aseptic Processing Technologies

Credit Hours: 1.00. Overview of aseptic processing and packaging systems; thermal processing and fluid flow in continuous heat exchangers; food microbiology, chemistry, and packaging as applied to aseptic processing. Establishing processes for aseptic processing of liquid and particulate foods. Typically offered Summer.

FS 66000 - Intestinal Microbiology And Immunology

Credit Hours: 1.00. (ANSC 66000) Discussion and critique of recent journal articles related to intestinal microbiology/immunology. The specific areas covered under this forum are: (1) intestinal microbiology, (2) food microbiology as it relates to gastrointestinal diseases, (3) probiotics and prebiotics-related to intestinal health or pathogen control, and (4) mucosal immunity with major emphasis on intestinal immunology. Typically offered Fall.

FS 68400 - Food Science Seminar

Credit Hours: 1.00. Current topics in food science. Typically offered Fall Spring.

FS 69000 - Special Topics In Food Science

Credit Hours: 1.00 to 3.00. Individual study of specialized materials. Permission of instructor required. Typically offered Fall Spring.

FS 69700 - Supervised University Teaching In Food Science

Credit Hours: 1.00. Students assist a faculty member in teaching a food science course to obtain training and experience in various aspects of classroom and laboratory teaching. Permission of instructor required. Typically offered Fall Spring.

FS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

FS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Forestry and Natural Resources

FNR 10000 - Introduction To Forestry: Luger-Purdue Future Of Forestry

Credit Hours: 3.00. The Lugar-Purdue Future of Forestry Program is an academic program designed to introduce students to the science of forestry. The program consists of two parts. One part is this online course. The second part is a research project that is designed and implemented by the student under the guidance of a natural resource professional and the program facilitator. The general intent of the program is to introduce students to forest science and to encourage students to pursue forestry as a career. Permission of instructor required. Typically offered Fall Spring Summer.

FNR 10300 - Introduction To Environmental Conservation

Credit Hours: 3.00. Introduction to ecological principles, history of conservation, natural resource management, human impacts on the environment, and environmental ethics. For all students interested in an introductory natural resource or environmental science elective. Typically offered Fall Spring.

FNR 19800 - Introductory Topics In Forestry And Natural Resources

Credit Hours: 1.00 to 3.00. Subjects and problems of interest to the student. Permission of instructor required. Typically offered Fall Spring Summer.

FNR 20100 - Marine Biology

Credit Hours: 3.00. An introduction to the major groups of marine organisms and their habitats. Emphasis on application of ecological principles to the conservation of important marine species. Offered in even numbered years. Typically offered Fall.

FNR 20300 - Freshwater Ecology

Credit Hours: 3.00. Comprehensive overview of the form, function, and biological organisms of freshwater ecosystems. Students will learn the fundamental biological and ecological components of continental streams, rivers, and lakes with some additional consideration given to global freshwaters. Concepts will be taught based upon two lectures and one laboratory each week during the fall semester. Labs are partially field-based and require outside activities. Typically offered Fall.

FNR 21000 - Natural Resource Information Management

Credit Hours: 3.00. Introduction to natural resource and land information systems and data management technologies. Principles of data storage, organization, and retrieval for both textual and spatial data (geographic information systems), data acquisition, accuracy assessment, mapping, and use of this data in natural resource management are presented. Typically offered Spring.

FNR 22310 - Introduction To Environmental Policy

Credit Hours: 3.00. (POL 22300) Study of decision making as modern societies attempt to cope with environmental and natural resources problems. Focuses on the American political system, with some attention to the international dimension. Current policies and issues will be examined. Typically offered Fall Spring.

FNR 22500 - Dendrology

Credit Hours: 3.00. Field identification, taxonomy, and ecological characteristics of trees, shrubs, and herbs found in forests, prairies, old fields, and wetlands. Typically offered Fall.

FNR 23000 - The World's Forests And Society

Credit Hours: 3.00. Examination of structure, function, and environmental and cultural significance of forest ecosystems throughout the world. Typically offered Fall.

FNR 24000 - Wildlife In America

Credit Hours: 3.00. History of the occurrence, exploitation, and management of North America's wildlife resources. Life histories, habitat relationships, and human impacts on selected species. Current conservation practices and future prospects. Typically offered Fall.

FNR 24100 - Ecology And Systematics Of Fishes And Mammals

Credit Hours: 3.00. Introduction to the ecology and systematics of fishes and mammals. Discuss the evolutionary adaptations and ecological processes of these vertebrate groups at the individual, population, and community levels. Examine the roles of phylogeny, physiology, morphology, and behavior in influencing organismal responses to the environment. Assess issues related to the conservation of fishes and mammals. Typically offered Fall.

FNR 24200 - Laboratory In Ecology And Systematics Of Fishes And Mammals

Credit Hours: 1.00. Basic anatomy, classification, and identification of fishes and mammals. Identification deals with representative species from selected phylogenetic and geographic groupings in North America. Typically offered Fall.

FNR 25100 - Ecology And Systematics Of Amphibians, Reptiles, And Birds

Credit Hours: 3.00. Introduction to the ecology and taxonomy of amphibians, reptiles, and birds. Discuss the evolutionary adaptations and ecological processes of these vertebrate classes at the individual, population, and community levels. Examine the roles of phylogeny, physiology, morphology, and behavior in influencing organismal responses to the environment. Assess the issues related to the conservation of amphibians, reptiles, and birds. Typically offered Spring.

FNR 25200 - Laboratory In Ecology And Systematics Of Amphibians, Reptiles, And Birds

Credit Hours: 1.00. Basic anatomy, classification, and identification of amphibians, reptiles, and birds. Identification deals with representative species from selected phylogenetic and geographic groupings in North America. Typically offered Spring.

FNR 30100 - Wood Products And Processing

Credit Hours: 3.00. Wood processing methods, including hardwood and softwood sawmilling, veneering, pallets, lumber drying, plywood, particleboard, medium density fiberboard, and oriented strandboards; wood preservation including crossties, poles, and pilings; furniture; cabinets; millwork; pulp and paper; and wood residues. In addition to processing methods, the grading of material, including logs, and consideration of applicable standards, and trade journals are emphasized. Typically offered Spring.

FNR 30110 - Sustainable Forest Products Manufacturing

Credit Hours: 3.00. Sustainable wood processing methods for hardwood and softwood sawmilling; veneering; plywood; pallets; lumber drying; reconstituted products including particleboard, medium density fiberboard, and oriented strand board; wood preservation including lumber, crossties, poles, and piling; secondary products including furniture, cabinets, millwork; and others; wood residues, woody biomass and others as appropriate will be covered. In addition to processing methods, the grading of material, including logs, hardwood and softwood lumber and consideration of applicable standards, sustainability initiatives, and trade press and trade associations will be covered. Typically offered Spring.

FNR 30500 - Conservation Genetics

Credit Hours: 3.00. Fundamentals and principles of genetics, including Mendelian inheritance, genetic mapping & linkage, DNA fingerprinting, phylogeography, and speciation. Topics cover the theoretical and empirical evidence illustrating how mutation, migration, drift, and natural selection influence the evolution of genes in natural populations. Designed for ecologists and natural resource professionals. Typically offered Spring.

FNR 31000 - Harvesting Forest Products

Credit Hours: 2.00. Principles and techniques of timber harvesting. Terminology, machine performance, operating costs, and efficient management of labor, capital, machines, and timber. Typically offered Spring.

FNR 31100 - Wood Structure, Identification, And Properties

Credit Hours: 3.00. An outline of the macroscopic, and to a lesser extent, the microscopic characteristics of commercial North American woods. These characteristics allow identification of most woods on sight. Uses, availability, distribution, and unique characteristics are discussed. Typically offered Spring.

FNR 31110 - Structure, Identification And Properties Of Woody Biomaterials

Credit Hours: 3.00. An outline and the identification of macro characteristics of commercially important woody biomaterials (color, odor, cellular arrangement, grain patterns, character marks, etc.) through laboratory exercises and field trips. Students will study the cellular structure and arrangement of woody biomaterials, their manufacturing characteristics and uses. Typically offered Spring.

FNR 32200 - Forest Soil: Properties, Processes, And Management

Credit Hours: 3.00. Forest soil characteristics with respect to site evaluation, watershed management, planting, problems, and silvicultural applications. Typically offered Fall.

FNR 33100 - Forest Ecosystems

Credit Hours: 3.00. Introduction to ecosystem processes, with emphasis on structural dynamics, energy flows, nutrient cycling, spatial patterns, classification and interaction of plant and animal populations. Processes will be related to human activities. Typically offered Fall.

FNR 33300 - Fire Effects In Forest Environments

Credit Hours: 1.00. Use of natural and set prescribed fire as a tool in management of forest and prairie ecosystems. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Spring.

FNR 33900 - Principles Of Silviculture

Credit Hours: 3.00. Silviculture systems; establishment of stands; control of stand composition, growth, and quality. Typically offered Fall.

FNR 34100 - Wildlife Habitat Management

Credit Hours: 3.00. Principles, practices, and justification of the habitat management approach to the manipulation of wildlife populations. Typically offered Spring.

FNR 34800 - Wildlife Investigational Techniques

Credit Hours: 3.00. An introduction to current wildlife research techniques that are used in managing populations and habitats. Laboratory and field exercises are used to gather and analyze data; basic data analysis and written dissemination of results is emphasized. Typically offered Spring.

FNR 35100 - Aquatic Sampling Techniques

Credit Hours: 3.00. An introduction to laboratory and field sampling methods in aquaculture, limnology, and fisheries biology. Emphasis will be placed on the proper use of laboratory equipment and sampling gears, as well as the development of sampling protocols for collecting representative, non-biased fisheries and aquatic sciences data. Typically offered Spring.

FNR 35300 - Natural Resources Measurement

Credit Hours: 3.00. An introduction to sampling techniques and fundamental principles for measuring natural resources. Typically offered Spring.

FNR 35500 - Quantitative Methods For Resource Management

Credit Hours: 3.00. Application of analytical and computational techniques for the purpose of making decisions regarding the management of forests. Typically offered Spring.

FNR 35700 - Fundamental Remote Sensing

Credit Hours: 3.00. Introduction to the principles of remote sensing, aerial photo interpretation, photogrammetry, geographic information systems, and global positioning systems. Primary applications of geospatial science and technology in forestry and natural resources. Typically offered Fall.

FNR 35900 - Spatial Ecology And GIS

Credit Hours: 3.00. Introduction to the principles of landscape ecology and biogeography with a laboratory devoted to the analysis of spatial data using geographic information systems. Typically offered Fall.

FNR 36500 - Natural Resources Issues, Policy, And Administration

Credit Hours: 3.00. The process, history, and development of natural resource conservation laws and policies, and current issues as they affect resource management in the United States. Typically offered Fall.

FNR 37000 - Natural Resources Practicum

Credit Hours: 2.00. Field instruction and practice during the summer following the sophomore year. All students focus on land measurement and surveying, inventory of forest, wildlife, and aquatic resources, and integrated resource management. Followed by specific modules in fisheries, foresty, and wildlife management. Students pay university tuition plus a fee for living facilities and subsistence. Typically offered Summer.

FNR 37010 - Natural Resources Practicum

Credit Hours: 1.00. Specific field instruction in forestry, fisheries and aquatic sciences and wildlife. Students pay university tuition plus a fee for living facilities and subsistence. Typically offered Summer.

FNR 37050 - Forest Habitats And Communities Practicum

Credit Hours: 1.00. Specific field instruction in forestry and wildlife. Students pay university tuition plus a fee for living facilities and subsistence. Typically offered Summer.

FNR 37100 - Fisheries And Aquatic Sciences Practicum

Credit Hours: 5.00. Specific field instruction in fisheries and aquatic sciences. Students pay university tuition plus a fee for living facilities and subsistence. Typically offered Summer.

FNR 37200 - Forestry Practicum

Credit Hours: 4.00. Specific field instruction in forestry. Students pay university tuition plus a fee for living facilities and subsistence. Typically offered Summer.

FNR 37300 - Wildlife Practicum

Credit Hours: 4.00. Specific field instruction in wildlife science and management. Students pay university tuition plus a fee for living facilities and subsistence. Typically offered Summer.

FNR 37400 - International Natural Resources Practicum

Credit Hours: 4.00. This is an international alternative to the required departmental summer practicum that may be elected by students in the different disciplines in FNR. Field instruction and practice in an international setting during the summer following the sophomore year. Students take two weeks of common coursework with FNR 37000 students in forestry, wildlife, fisheries, and natural resources, and then undertake international training according to area of interest for three or more weeks. The location of international training is open, but a plan of study, and a cooperating institution must be approved by departmental faculty. Students pay university tuition plus a fee for living facilities and subsistence. Typically offered Summer.

FNR 37500 - Human Dimensions of Natural Resource Management

Credit Hours: 3.00. An introduction to the human dimensions of foresty, wildlife, and recreation; students will learn how values, attitudes, community, and behavior relate to natural resource management and decision-making; various natural resource management stakeholders such as private landowners, natural resource agencies, the judiciary, and environmental and natural resource interest groups will be discussed; course will utilize case studies specific to Indiana and the Midwest; course includes weekly discussions during recitations. Typically offered Spring.

FNR 39000 - Cooperative Professional Program

Credit Hours: 0.00. Supervised professional experience in forestry. Programs must be preplanned and conducted under the direction of a forestry faculty coordinator with the cooperation of an employer. Students must submit a summary report. Admission to forestry Co-op program. Typically offered Fall Spring Summer.

FNR 40000 - Forestry And Natural Resources Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

FNR 40600 - Natural Resource And Environmental Economics

Credit Hours: 3.00. (AGEC 40600) Introduction to economic models of renewable and nonrenewable natural resources and the use of these models in the analysis of current resource use and environmental issues. Typically offered Fall.

FNR 40700 - Forest Economics

Credit Hours: 3.00. Implications of unique economic characteristics of forest resources, including a tree as both capital and output, high capital to output ratio, location utility of in-forest uses, long investment periods, and non-market outputs. Typically offered Spring.

FNR 40800 - Natural Resources Planning

Credit Hours: 3.00. Management concepts and decision making emphasizing formal planning processes including development of objectives, analysis of alternatives, and decision making within the constraints of changing social and political trends, economic feasibility, and sustainability of ecosystem functions for a property. Laboratory activities are focused on the development of a management plan by an interdisciplinary team for a specific area and set of objectives. Typically offered Spring.

FNR 40900 - Timber Management

Credit Hours: 3.00. Application of financial and biological principles to determine optimal production of wood as a raw material on industrial and non-industrial ownerships. Optimal rotation and stocking level for individual trees and stands. Forest regulation for both even-aged and uneven-aged stands for long-term sustainability and certification. Timber harvest scheduling using mathematical programming techniques. Typically offered Fall.

FNR 41200 - Natural Resources Decision Making

Credit Hours: 3.00. Students will learn decision analysis and how to apply it to a mix of natural resource problems. Students will learn the elements of a decision model, how to structure decision problems, making choices, and conducting sensitivity analyses under certainty. Decision making under conditions of uncertainty and the preferences of one or more decision makers will be introduced to reflect real world decision making. Typically offered Spring.

FNR 41800 - Properties Of Wood Related To Manufacturing

Credit Hours: 3.00. Orthotopic nature of wood, grain, texture, moisture content, shrinking, swelling, specific gravity, machining, thermal properties, electrical properties, elastic properties, strength properties, vibration properties, bending, natural characteristics affecting mechanical properties, effect of manufacturing and service environment on mechanical properties, changing quality of available resources and implications of wood quality changes for manufacturing. Typically offered Fall.

FNR 41900 - Furniture And Cabinet Design And Manufacture

Credit Hours: 3.00. Qualitative and quantitative principles of furniture construction, performance testing of furniture, and computer-based applications and solutions. Course features laboratory evaluation of fasteners and furniture joints. Typically offered Spring.

FNR 41910 - Furniture Product Development And Strength Design

Credit Hours: 3.00. Qualitative and quantitative principles of furniture construction, product development methodology and strength design principles, furniture performance testing, product sustainability and end of life options (LCA, computer-based applications and solutions). Course features laboratory evaluating, furniture joints and furniture structures. Typically offered Spring.

FNR 42500 - Secondary Wood Products Manufacturing

Credit Hours: 3.00. Secondary wood products manufacturing; structure of the industry, organization of a furniture factory, raw materials, rough mill, finish mill, assembly, finishing, machinery, wood machining, plant layout, production methods, modern industrial engineering concepts; includes visits to manufacturing operations. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

FNR 43400 - Tree Physiology

Credit Hours: 3.00. Study of physiology of growth and development of woody plants. Emphasis on the structure and function of trees and their physiological response to environmental factors. Typically offered Fall.

FNR 44100 - Forest Entomology

Credit Hours: 3.00. (ENTM 44100) An introduction to the identity, natural history and management of insects affecting forest ecosystems. Topics include biodiversity, natural history and ecology of forest pests; forecasting and assessing the risk of insect outbreaks; and silvicultural, biological and chemical strategies for preventing and managing insect pests. Offered in odd-numbered years. Typically offered Fall.

FNR 44400 - Arboricultural Practices

Credit Hours: 4.00. Course covers a broad spectrum of arboriculture principles and techniques, including pruning, transplanting,

fertilization, climbing, rigging, removal, cabling, bracing, lightning protection, hazard tree evaluation, tree appraisal, and street tree inventory. Typically offered Fall.

FNR 44500 - Urban Forest Issues

Credit Hours: 3.00. This course presents an array of topics germane to the management of trees in the urban environment. This includes the benefits of trees and general tree care, tree appraisal, tree ordinances, tree inventory and management plans, and tree preservation and construction. Typically offered Spring.

FNR 44700 - Vertebrate Population Dynamics

Credit Hours: 4.00. Estimation and analysis of populations; computer modeling of sampling methods, population dynamics, population and habitat management. Knowledge of computer programming not required. Typically offered Fall.

FNR 45200 - Aquaculture

Credit Hours: 3.00. Historical perspectives and current practices in aquaculture, including production systems, feeds, water quality requirements, and diseases of commercially important species. Typically offered Spring.

FNR 45300 - Fish Physiology

Credit Hours: 3.00. Presentation and discussion of physiological mechanisms exhibited by freshwater and marine invertebrates and vertebrates. Primary materials used for class presentation and discussions will be examples from primary research literature. Topics include respiration, osmoregulation, stress physiology, absorption and metabolism of compounds, and hormonal control of selected physiological mechanisms. Offered in odd-numbered years. Typically offered Spring.

FNR 45400 - Fisheries Science And Management

Credit Hours: 3.00. Theory and practice of fisheries management, with emphasis on strategies utilized for the management of freshwater and marine fisheries. Application of quantitative methodologies for the assessment and manipulation of aquatic habitats, sport and commerical fish populations, and human resource users and non-users are considered as in the setting of appropriate goals and objectives for effective, science-based management. One weekend field laboratory is required. Typically offered Fall.

FNR 45500 - Fish Ecology

Credit Hours: 3.00. The relationship of fishes to the physical, chemical, and biological features of the environment in both natural and perturbed aquatic ecosystems. An emphasis will be placed on diversity in morphology, behavior, feeding, and reproductive strategies as they relate to individual and population adaptation, community structure, and anthropogenic effects. Offered in even-numbered years. Typically offered Spring.

FNR 46000 - International Natural Resources Summer Program

Credit Hours: 3.00. A four-week, intensive program examining the management and conservation of natural resources in Europe and the United States. Jointly taught with faculty and students from the Swedish University of Agricultural Sciences. The program topic and venue change each year, but emphasis is placed on student interaction and internationalization as well as on cross-cultural communication skills within a natural resources framework. Offered in even-numbered years at Purdue University and in odd-numbered years at the Swedish University of Agricultural Sciences in Sweden. Typically offered Summer.

FNR 47000 - Fundamentals Of Planning

Credit Hours: 1.00. This course will overview key steps involved in natural resources planning, expose students to a variety of different natural resource plans, and engage students in critically evaluating the effectiveness of planning. (Course meets during weeks 1-5.). Typically offered Fall.

FNR 48400 - Design For Computer Numerical Controlled Manufacturing

Credit Hours: 3.00. The course objective is to familiarize students with Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Computer Numerical Controlled (CNC) router operation, rapid prototyping and basics of secondary wood products manufacturing. Permission of instructor required. Typically offered Fall.

FNR 48800 - Global Environmental Issues

Credit Hours: 3.00. Examination of the state of the world in terms of natural resource consumption, environmental quality, and global change. Techniques to analyze and evaluate information. Survey threats to soil productivity, the changing atmosphere, water quality and quantity, energy impacts, and biodiversity from an ecosystem perspective. Typically offered Fall.

FNR 49800 - Special Assignments

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

FNR 49900 - Thesis

Credit Hours: 1.00 to 6.00. Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

FNR 51100 - Population Genetics

Credit Hours: 3.00. (AGRY 51100, ANSC 51100) Basic concepts of population genetics. Characterization of populations using gene frequencies, gametic and zygotic disequilibrium; forces changing gene frequencies (mutation, migration, selection, and random genetic drift) and genotypic frequencies (mating systems: inbreeding, crossbreeding, and phenotypic assortative) and related hypothesis testing; gene trees and the coalescent process; and molecular phylogenies. Typically offered Fall.

FNR 52200 - Advanced Forest Soils Science

Credit Hours: 3.00. A study of the nutrient dynamics of forest ecosystems with emphasis on the physical, chemical, and biological processes influencing nutrient cycling, roots and soil-root interactions, in-depth study of the C, N, and P cycles, and the impact of environmental change on the processes controlling these cycles. Special topics include fertilization, soil management, and acidic deposition. Class trips may be required. Students will pay individual lodging or meal expenses when necessary. Offered in even-numbered years. Typically offered Fall.

FNR 52600 - Aquatic Animal Health

Credit Hours: 2.00. This is an introductory course designed to provide instruction on the methodology of diagnosis and treatment of parasitic, fungal, bacterial, viral, nutritional, and environmental diseases of fishes and other aquatic organisms (amphibians, reptiles, and bivalves). Courses in chemistry and biology are expected and in animal physiology is preferred, but not required. Typically offered Fall.

FNR 52700 - Ecotoxicology

Credit Hours: 2.00. This course covers theoretical and applied approaches to the science of ecotoxicology, including application of the tools and procedures used to understand toxicant fate and effects in free-ranging animals and ecosystems. Students are expected to be knowledgeable in chemistry, biology, and animal physiology. Typically offered Fall.

FNR 53500 - Forest Regeneration

Credit Hours: 3.00. An overview of the dynamics associated with the regeneration of forestlands in North America. Topics

include: seed collection and handling, forest tree nursery operations, seedling quality, managing for environmental stresses, planting operations, early stand management, and natural regeneration. Offered in odd numbered years. Typically offered Fall.

FNR 53600 - Ecology Of Disturbance

Credit Hours: 2.00. Advanced lecture-and discussion-based class examining how disturbance shapes the composition and structure of communities and landscapes across major terrestrial biomes. Students will examine and discuss the relationships between disturbance intensity, frequency, and spatial extent and how these characteristics affect ecological processes and ecologically-based management of forest and grassland ecosystems. The class will also examine the synergistic effects of multiple disturbances and the restoration of endemic disturbance regimes in contemporary ecosystems. Course is reading intensive; students will read and discuss on average 3-8 journal articles per week. Typically offered in even years. Typically offered Spring.

FNR 53601 - Ecology Of Disturbance Practicum

Credit Hours: 1.00. This course is the practicum for FNR 53600, hence enrollment is contingent upon enrollment in FNR 53600. Course consists of a one or two week long field trip to a remote site; prior trips have been taken to the Great Smokey National Park over spring break. Course requires an addition travel fee, depending on location visited. Typically offered in even years. Typically offered Spring, but may be offered occasionally during summer session.

FNR 54300 - Conservation Biology I

Credit Hours: 3.00. Introduction to conservation biology, including population dynamics and genetic structure of rare organisms. Recovery planning, restoration ecology, environmental policy making, and sustainable developments are considered, as is ethics in conservation of biological diversity. Offered in odd-numbered years. Permission of instructor required. Typically offered Summer Fall Spring.

FNR 54400 - Conservation Biology II

Credit Hours: 3.00. Advanced study of specific topic within the field of conservation biology. Topic varies from year to year, depending on interests of students enrolled, and emphasizes current advances or issues in the field. Offered in even-numbered years. Permission of instructor required. Typically offered Fall.

FNR 55000 - Fisheries Stock Assessment And Modeling

Credit Hours: 3.00. Theory and application of models and other quantitative analyses for the assessment and management of recreational, commercial, and non-game fishes. Emphasis is placed on the estimation of basic fish population dynamics, and the

development and application of models used to predict and assess fisheries management outcomes. (Offered in odd-numbered years.). Typically offered Spring.

FNR 55100 - Advanced Ichthyology

Credit Hours: 3.00. Advanced ichthyology presents an advanced study of the biology of fishes. In particular, the course covers aspects of the morphology, physiology, development, behavior, evolution, diversity, and ecology of fish throughout the world. Typically offered Spring.

FNR 55200 - Advanced Freshwater Ecology

Credit Hours: 3.00. Advanced freshwater ecology presents a comprehensive overview of the form, function, and biological organisms of freshwater ecosystems. Specifically, students learn the fundamental biological and ecological components of continental streams, rivers, and lakes, with some additional consideration given to global freshwaters. Typically offered Spring.

FNR 55800 - Digital Remote Sensing And GIS

Credit Hours: 3.00. Advanced course in the use of digital remote sensing techniques and geographic information systems (GIS) for renewable natural resources management. Emphasizes the physical principles behind the digital remote sensing of vegetative features, present-day instrument technology, spatial data processing and analysis algorithms, error analysis and accuracy assessment procedures, and multi-source data integration. Provides hands-on experience with forest canopy modeling, atmospheric modeling, image processing, and GIS software on microcomputer and workstation platforms. Typically offered Fall.

FNR 56700 - Advanced Mammalogy

Credit Hours: 3.00. The class explores approaches to mammalian research and wildlife management through readings, discussions, field, and laboratory exercises. Topics such as mammalian behavior, ecology, phylogeny, taxonomy, and conservation are emphasized. The intention of this class is to help students who have a sincere interest in mammalian research and management to progress beyond identification in their understanding of mammals. Typically offered Spring.

FNR 57100 - Advanced Ornithology

Credit Hours: 3.00. Study of current avian research topics and techniques. Class discussion of recent scientific literature; field and laboratory exercises to illustrate approaches to ornithological research. One weekend field trip is offered. (Offered in odd-numbered years.). Typically offered Spring.

FNR 57200 - Community Involvement In Natural Resource Management

Credit Hours: 2.00. Engaging the public in natural resource decision making is an increasingly important and complex task. This course provides an overview of how to include diverse stakeholders in decision making, collaboration, and conflict resolution through readings, class discussions, and role plays. Typically offered Fall.

FNR 57300 - Community Involvement Practicum

Credit Hours: 1.00. Students who enroll in this course will participate in a service learning activity that enables them to apply course concepts from FNR 57200 to a "real life" context. Students enrolling in FNR 57200 are not required to take this course. Permission of instructor required. Typically offered Fall Spring Summer.

FNR 58000 - Research Methods For Natural Resource Social Science

Credit Hours: 3.00. This class covers basic elements of research design for social scientists, with an emphasis on issues pertinent to natural resource management. Topics to be covered include the role of theories and paradigms in designing sound research, writing research questions and hypotheses, and the importance of validity and reliability in research design. Qualitative, quantitative, and mixed methods designs are presented and discussed. Typically offered Fall.

FNR 59800 - Topical Problems In Forestry And Natural Resources

Credit Hours: 1.00 to 3.00. Subjects and problems of interest to the student. Permission of instructor required. Typically offered Spring Fall Summer.

FNR 60500 - Molecular Ecology And Evolution

Credit Hours: 3.00. Lectures cover the genetic attributes of both conventional and contemporary molecular markers. Discussions focus primarily on the use of DNA-based markers to address conceptual issues in ecology and evolutionary biology (e.g., mating systems, systematics, phylogeography). Offered in even-numbered years. Prerequisites: AGRY 32000 or BIOL 24100. Typically offered Fall.

FNR 63900 - Stand Dynamics

Credit Hours: 3.00. Advanced lecture and discussion based class examining wood formation and growing-use efficiency during the first unit, and stand development after natural or arthropogenic disturbance during the second unit. Other topics include introduction to disturbance ecology and disturbance-based management. Students will learn basic dendrochronology techniques

while completing two independent lab projects that correspond to each of the aforementioned units. At least one class trip may be required. Typically offered in odd-numbered years. Prerequisites: FNR 33100 and FNR 33900 and (STAT 50300 or STAT 51100.) Typically offered Fall.

FNR 64700 - Quantitative Methods For Ecologists

Credit Hours: 3.00. Examines the assumptions and utility of statistical and other data analytic techniques that are encountered commonly or increasingly being used in ecological research. Emphasis is placed on the potential applications of these quantitative methods in an ecological context. Offered in alternate years. Prerequisite: STAT 51200. Typically offered Spring.

FNR 67900 - Forest Resources Seminar

Credit Hours: 0.00 or 1.00. Required for graduate students in forestry and natural resources. Topics vary. Prerequisite: Required of graduate students in forestry, natural resources. Typically offered Summer Fall Spring.

FNR 69100 - Topical Problems In Forestry

Credit Hours: 1.00 to 3.00. Subjects and problems of interest to the student. Permission of instructor required. Typically offered Spring Fall Summer.

FNR 69300 - Topical Problems In Wildlife Biology

Credit Hours: 1.00 to 3.00. Subjects and problems of interest to the student. Permission of instructor required. Typically offered Spring Fall Summer.

FNR 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

FNR 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

French

FR 10100 - French Level I

Credit Hours: 3.00. A beginning French course with emphasis on communicative skills (listening and speaking), literacy skills (reading and writing) and culture. Permission of department required. Typically offered Fall Spring Summer. CTL:IWL 1901 French Level I

FR 10200 - French Level II

Credit Hours: 3.00. Continuation of FR 10100. Typically offered Fall Spring Summer. CTL:IWL 1902 French Level II

FR 11200 - Elementary French Conversation

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice to enhance communicative competence. Small group discussions in French on practical topics. Typically offered Fall Spring Summer.

FR 20100 - French Level III

Credit Hours: 3.00. A lower intermediate French course with emphasis on communicative skills (listening and speaking), literacy skills (reading and writing) and culture. Typically offered Fall Spring Summer. CTL:IWL 1903 French Level III

FR 20200 - French Level IV

Credit Hours: 3.00. Continuation of FR 20100. Typically offered Fall Spring Summer. CTL:IWL 1904 French Level IV

FR 21100 - Elementary French Conversation II

Credit Hours: 1.00. Continuation of FR 11200. May be taken concurrently with FR 20100 . Typically offered Fall Spring Summer.

FR 21200 - Intermediate French Conversation

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in conversation to enhance communicative competence. Small group discussions in French on practical topics. Not open to students enrolled in or having credit for FR 30100 or above. Typically offered Fall Spring Summer.

FR 22400 - French Level IV Business French

Credit Hours: 3.00. Practical reading, writing, speaking, and listening comprehension skills will be developed toward use of French for business purposes. Course materials cover daily business dealings as well as national and international trade. Typically offered Fall Spring.

FR 23000 - French Literature In Translation

Credit Hours: 3.00. Reading and analysis of selected French writers and their works, with particular emphasis on the social, political, and intellectual climate of their times. The course content will change from semester to semester. Knowledge of French not required. Typically offered Fall Spring Summer.

FR 24100 - Introduction To The Study Of French Literature

Credit Hours: 3.00. Reading and discussion of selected poetry, prose, and theatre from France and the Francophone world; introduction to critical discourse and basic concepts of literary theory. Texts, discussion, and written assignments in French. Typically offered Fall Spring.

FR 28000 - Second-Year French: Special Topics

Credit Hours: 3.00. Selected topics on the civilization, culture, and literature of France. Lectures and readings primarily in English, but knowledge of French at the first-year level necessary. Typically offered Fall Spring Summer.

FR 30100 - French Level V

Credit Hours: 3.00. Continued development of French speaking, listening, reading, and writing abilities, using materials dealing primarily with everyday life and civilization in France and the other French-speaking countries from various sources (e.g., newspapers, magazines, TV, recent literature, etc.). Conducted primarily in French. Typically offered Summer Fall Spring.

FR 30200 - French Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading, and writing abilities in French on the basis of materials dealing with the ideas and events that have shaped present-day France and the other French-speaking countries. Conducted primarily in French. Typically offered Fall Spring.

FR 31200 - Advanced French Conversation

Credit Hours: 1.00. One credit hour advanced French conversation focused on the development of oral and aural skills for self-expression. Course provides students with guided practice in conversation to enhance communicative competence. Discussions in French on various topics. Course may be taken concurrently with FR 30100, FR 30200, FR 40100 or FR 40200. Typically offered Fall Spring.

FR 32400 - Business French

Credit Hours: 3.00. Practical reading, writing, speaking, and listening comprehension skills at an intermediate level will be developed toward the use of French for business purposes. Course materials cover daily business dealing as well as national and international trade. Typically offered Fall Spring Summer.

FR 33000 - French Cinema

Credit Hours: 3.00. A general survey of major French cinematic trends from the earliest examples (Melies, Lumiere) to the New Wave (Chabrol, Truffaut, Resnais, Godard, etc.), with a discussion of the historical, social, political, aesthetic, and literary contexts. The French film in relation to world cinema. The relationship between the French cinema and French literature. Reading and analysis of scripts and historical and critical materials. Knowledge of French not required. Typically offered Fall Spring Summer.

FR 34100 - French Literature I: From The Middle Ages To The Enlightenment

Credit Hours: 3.00. Reading of selected poetry, prose, and theatre of France from the Middle Ages through the Enlightenment in historical and cultural context. Readings, discussion, and papers in French. Typically offered Fall Spring.

FR 34200 - French Literature II: The 19th And 20th Centuries

Credit Hours: 3.00. Reading of selected French poetry, novels, theatre, and short fiction of the 19th and 20th centuries in historical and cultural context. Readings, discussion, and papers in French. Typically offered Fall Spring.

FR 36100 - The Structure Of French I: Pronunciation And Sound Structure

Credit Hours: 3.00. This course presents the sound system of French by examining the structural patterning of various levels (phonetic, phonemic, etc.). The course provides models and sufficient practice for students to develop good pronunciation and intonation. Typically offered Fall Spring.

FR 36200 - The Structure Of French II: Grammar And Sentence Structure

Credit Hours: 3.00. This course presents the grammatical structure of French, dealing both with word-level phenomena (inflectional and derivational morphology, etc.) and with phrase- and sentence-level phenomena (syntactic structure, sentence constituents, word order, etc.). Typically offered Fall Spring.

FR 38000 - Special Topics In French Culture And Civilization

Credit Hours: 3.00. Selected topics on the contemporary civilization of the French-speaking world and on the development of its culture throughout history. Explores trends in society, daily life, the arts, ideas, and technology. Conducted in French. Typically offered Fall Spring Summer.

FR 39400 - Special Topics In French Literature

Credit Hours: 3.00. Studies a particular aspect in French literature (e.g., theme, device, character type, motif, place) by reading a varied selection of works of different genres, styles and/or periods. Readings, discussion, and papers in French. Typically offered Fall Spring.

FR 39600 - Special Topics In French Language Science

Credit Hours: 3.00. Examines a particular aspect entailed in the study of French language, e.g., language acquisition and teaching, language in society, regional dialects of France, French around the world, French creoles. Conducted in French. Typically offered Fall Spring.

FR 39900 - Special Study Abroad Credit In French

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in French earned while enrolled at a

foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

FR 40100 - French Level VII

Credit Hours: 3.00. Advanced work on development of French speaking, listening, reading, and writing abilities, focusing on materials dealing primarily with culture and the arts in France and the other French-speaking countries. Conducted primarily in French. Typically offered Fall Spring.

FR 40200 - French Level VIII

Credit Hours: 3.00. Further advanced work on speaking, listening, reading, and writing abilities in French. Course materials will cover a variety of topics illustrated by film and other media, both print and nonprint. Conducted primarily in French. Typically offered Fall Spring.

FR 42400 - Business French

Credit Hours: 3.00. A study of the terminology and techniques used in commercial transactions, including the interpretation and writing of business materials. Development of the four language skills, with emphasis on writing and speaking. Typically offered Fall Spring Summer.

FR 44300 - Introduction To Francophone Literature

Credit Hours: 3.00. The study of the most representative Francophone poets, playwrights, and novelists from various countries, such as Leopold Senghor, Aime Cesaire, Jacques Romain, Gabrielle Roy, Michel Tremblay, Mohamed Dib. Typically offered Fall Spring.

FR 48000 - French Civilization

Credit Hours: 3.00. The study of modern French life, with special emphasis on the customs and daily life of the people. Lectures in French. Typically offered Fall Spring Summer.

FR 51900 - Teaching College French

Credit Hours: 3.00. A course designed to provide a forum for ideas connecting theory and research to teaching practice. Explores issues related to how learning and teaching can be enhanced and presents practical ideas that can be implemented in the classroom. Permission of department required. Typically offered Fall.

FR 52700 - Etudes de Style

Credit Hours: 3.00. Study of the expression of affective and artistic values in literary French. Detailed grammatical analyses and study of stylistic procedures. Comparison with English usage. Introduction to explication de texte as an approach to literature. Permission of department required. Typically offered Spring Fall Summer.

FR 54100 - Renaissance French Literature

Credit Hours: 3.00. Major works in verse and prose of the sixteenth century. Marot, du Bellay, Ronsard, Rabelais, Montaigne. Permission of department required. Typically offered Summer Spring Fall.

FR 54200 - The Classical Age

Credit Hours: 3.00. The social background and the formation of the classical traits of the seventeenth century in France. Readings from Corneille, Racine, Moliere, and other minor authors. Permission of department required. Typically offered Spring Fall Summer.

FR 54300 - The Age Of Reason

Credit Hours: 3.00. The political writers, the encyclopedists, and the social philosophers of the eighteenth century, such as Voltaire, Diderot, Montesquieu, Beaumarchais, Le Sage, and Rousseau. Permission of department required. Typically offered Spring Fall Summer.

FR 54900 - French Literature And Film

Credit Hours: 3.00. An examination of the interrelationships of contemporary French literature and film. Discussion of the potential of each medium as an art form, problems of visual transposition of literary works, and extension of literary concepts such as Dadaism and Surrealism into cinema. Permission of department required. Typically offered Spring Fall.

FR 55800 - French Novel Of The Twentieth Century

Credit Hours: 3.00. Consideration of the character, aesthetics, and evolution of the twentieth-century French novel. Readings from such representative novelists as Proust, Gide, Bernanos, Giono, Malraux, Camus, Robbe-Grillet, Saporta. Permission of department required. Typically offered Spring Fall Summer.

FR 56100 - The Structure Of French I: Phonetics And Phonology

Credit Hours: 3.00. This course presents the sound system of French by examining descriptive and theoretical issues in the patterning of segments on various levels (phonetics, phonemics, morphology, etc.). Students will study current phonological and phonetic issues in recent literature. Credit will not be given for both FR 35100 and 56100. Typically offered Spring Fall.

FR 56200 - The Structure Of French II: Syntax And Morphosyntax

Credit Hours: 3.00. This course presents descriptive and theoretical issues concerning the grammatical structure of French, dealing both with word-level phenomena (inflectional and derivational morphology, etc.) and with phrase-, sentence-, and discourse-level phenomena (syntactic structure, sentence constituents, word order, etc.). Credit will not be given for both FR 36200 and 56200. Typically offered Spring Fall.

FR 56300 - History Of The French Language

Credit Hours: 3.00. A survey of the historical development of the French language from Vulgar Latin to the present and of the French language of today as a reflection of past cultural and socio-political conditions. Knowledge of a Romance language or of Latin is recommended but not required. Typically offered Spring Fall Summer.

FR 56400 - Introduction To Old French

Credit Hours: 3.00. Introduction to the study of Old French. Phonetic, syntactic, and stylistic questions will be addressed through the analysis of original texts. Typically offered Spring Fall.

FR 58100 - French Culture

Credit Hours: 3.00. Development of the cultural life of the French people as reflected in architecture, art, history, literature, music, and philosophy. Lectures in French. Typically offered Spring Fall Summer.

FR 58200 - Francophone Cultures

Credit Hours: 3.00. Examines at least three French-speaking regions outside of France (e. g., Caribbean, Maghreb, Quebec, West Africa), including contemporary civilization and the development of cultures throughout history. Explores trends in society, daily life, the arts, and the ideas. Lectures in French. Typically offered Spring Fall.

FR 59000 - Directed Reading In French

Credit Hours: 1.00 to 4.00. Directed readings in French. Permission of instructor required. Typically offered Spring Fall Summer.

FR 59400 - Special Topics In French Literature

Credit Hours: 1.00 to 4.00. Special topics in French Literature. Permission of instructor required. Typically offered Spring Fall.

FR 59600 - Special Topics In French Linguistics

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

FR 60100 - First Course To Establish Reading Knowledge

Credit Hours: 3.00. First Course To Establish Reading Knowledge. Typically offered Spring Fall Summer.

FR 60500 - Second Course To Establish Reading Knowledge

Credit Hours: 3.00. Second Course to Establish Reading Knowledge. For those in the humanities and social sciences. Prerequisite: FR 60100. Permission of instructor required. Typically offered Spring Fall Summer.

FR 63000 - Bibliography And Literary Criticism

Credit Hours: 3.00. The use of general and specific reference materials and bibliographical aids in literary research: the basic concepts and terminology of literary criticism. Required of all MA candidates in French. Typically offered Spring Fall Summer.

FR 65900 - Seminar In French Literature

Credit Hours: 3.00. Advanced study of special subjects. Topics to be announced in advance. Permission of instructor required. Typically offered Spring Fall Summer.

FR 67900 - Seminar In French Linguistics

Credit Hours: 3.00. Advanced study and research on a significant topic in French linguistics. Topic to be announced in advance. Permission of instructor required. Typically offered Spring Fall Summer.

FR 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

FR 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Global Engineering Program

GEP 10000 - Global Design Team I

Credit Hours: 1.00. Global Design Team (GDT) brings together undergraduate and graduate students from different disciplines inside and outside of the College of Engineering, to design solutions to solve real-world problems over the course of one academic semester. Depending on the size and scope of the project, teams may range from one to twenty students under the advisement of a faculty member. GDTs partner student teams with non-governmental organizations, businesses, and/or other research institutions in international development projects. Approval for registration is granted based on an application process that takes into consideration previous design experience, level of interest in the topic, and GPA. Department approval required. Typically Fall Spring.

GEP 20000 - Global Design Team II

Credit Hours: 1.00 or 2.00. Global Design Team (GDT) brings together undergraduate and graduate students from different disciplines inside and outside of the College of Engineering, to design solutions to solve real-world problems over the course of

one academic semester. Depending on the size and scope of the project, teams may range from one to twenty students under the advisement of a faculty member. GDTs partner student teams with non-governmental organizations, businesses, and/or other research institutions in international development projects. Approval for registration is granted based on an application process that takes into consideration previous design experience, level of interest in the topic, and GPA. Department approval required. Typically Fall Spring.

GEP 30000 - Global Design Team III

Credit Hours: 1.00 to 3.00. Global Design Team (GDT) brings together undergraduate and graduate students from different disciplines inside and outside of the College of Engineering, to design solutions to solve real-world problems over the course of one academic semester. Depending on the size and scope of the project, teams may range from one to twenty students under the advisement of a faculty member. GDTs partner student teams with non-governmental organizations, businesses, and/or other research institutions in international development projects. Approval for registration is granted based on an application process that takes into consideration previous design experience, level of interest in the topic, and GPA. Department approval required. Typically Fall Spring.

GEP 40000 - Global Design Team IV

Credit Hours: 1.00-3.00. Global design Team (GDT) brings together undergraduate and graduate students from different disciplines inside and outside of the College of Engineering, to design solutions to solve real-world problems over the course of one academic semester. Depending on the size and scope of the project, teams may range from one to twenty students under the advisement of a faculty member. GDTs partner student teams with non-governmental organizations, businesses, and/or other research institutions in international development projects. Approval for registration is granted based on an application process that takes into consideration previous design experience, level of interest in the topic, and GPA. Department approval required. Typically Fall Spring.

German

GER 10100 - German Level I

Credit Hours: 3.00. A beginning course in German reserved exclusively for students who have had less than two years of German at the ninth-grade level or above. Students with two years or more of previous German study may not take this course for credit. Permission of department required. Typically offered Fall Spring Summer. CTL:IWL 1920 German Level I

GER 10200 - German Level II

Credit Hours: 3.00. Continuation of GER 10100. Typically offered Spring Summer Fall. CTL:IWL 1921 German Level II

GER 11200 - Elementary German Conversation

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in conversation to enhance communicative competence. Small group; discussions in German on various topics. Typically offered Fall Spring Summer.

GER 20100 - German Level III

Credit Hours: 3.00. Readings from the works of nineteenth-century and contemporary German writers; practice in speaking and writing German. Typically offered Fall Spring Summer. CTL:IWL 1922 German Level III

GER 20200 - German Level IV

Credit Hours: 3.00. Continuation of GER 20100. Typically offered Fall Spring Summer. CTL:IWL 1923 German Level IV

GER 21100 - Elementary German Conversation II

Credit Hours: 1.00. Continuation of GER 11200. May be taken concurrently with GER 20100. Typically offered Fall Spring Summer.

GER 21200 - Intermediate German Conversation

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in German conversation to enhance communicative competence. Small group discussions in German on various topics. Not open to students enrolled in or having credit for GER 30100 or above. Typically offered Fall Spring Summer.

GER 22300 - German Level IV: Scientific

Credit Hours: 3.00. Practical reading, writing, speaking, and listening comprehension skills, directed toward use of German in science and technology. Work on grammar as needed. Use of materials from recent publications in science and technology. Introduction to general and technical vocabulary. Conducted primarily in German. Credit will not be given for both GER 20200 and 22300. Typically offered Fall Spring Summer.

GER 22400 - German Level IV: Business German

Credit Hours: 3.00. Practical reading, writing, speaking, and listening comprehension skills directed toward use of German for business purposes. Work on grammar as needed. Course materials cover daily business dealings as well as national and international trade, living conditions, environmental and social problems. Typically offered Fall Spring.

GER 23000 - German Literature In Translation

Credit Hours: 3.00. Reading and analysis of selected German writers and their works, with particular emphasis on the social, political, and intellectual climate of the times. The course content will change from semester to semester. Knowledge of German not required. Typically offered Fall Spring Summer.

GER 24100 - Introduction To The Study Of German Literature

Credit Hours: 3.00. An introduction to the study of German literature based on an overview of the formal elements of poetry, fiction, and drama as well as basic concepts of literary theory. Texts in German; conducted primarily in German. Typically offered Fall Spring.

GER 28000 - German Special Topics

Credit Hours: 3.00. Selected topics on the civilization and culture of German speaking countries. Lectures and readings all in English. No knowledge of German necessary. Typically offered Fall Spring Summer.

GER 30100 - German Level V

Credit Hours: 3.00. Continued development of German speaking, listening, reading, and writing abilities, using materials dealing primarily with everyday life and civilization in Germany from a variety of sources (e.g., newspapers, magazines, TV, recent literature, etc.). Conducted primarily in German. Typically offered Fall Spring.

GER 30200 - German Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading, and writing abilities in German on the basis of materials dealing with the ideas and events that have shaped present-day Germany. Conducted primarily in German. Typically offered Fall Spring.

GER 31200 - Advanced German Conversation

Credit Hours: 1.00. One credit hour advanced German conversation course focused on the development of oral and aural skills for self-expression. Course provides students with guided practice in conversation to enhance communicative competence. Discussions in German on various topics. Course may be taken concurrently with GER 30100, GER 30200, GER 40100 or GER 40200. Typically offered Fall Spring.

GER 32300 - German Level VI: Science And Engineering

Credit Hours: 3.00. Continued development of German speaking, listening, reading, and writing abilities, using materials from recent publications in science and technology. Building of general and technical vocabulary. Conducted in German. Typically offered Fall Spring.

GER 33000 - German Cinema

Credit Hours: 3.00. Viewing and analysis of major German contributions to the cinema from the earliest period to the present. Emphasis on relevant aesthetic theories and on the schools of literature and painting that served as sources. Evaluation of the German film on the basis of social, artistic, and political criteria. Knowledge of German not required. Typically offered Fall Spring Summer.

GER 34100 - German Literature I: From The Middle Ages To The 18th Century

Credit Hours: 3.00. Reading and discussion of selected texts (poetry, prose, dramatic texts, cultural documents, and artworks) in German from the Middle Ages to the Eighteenth Century. Typically offered Fall Spring.

GER 34200 - German Literature II: From The 18th Century To The 21st Century

Credit Hours: 3.00. Reading and discussion of selected texts in German with the dual context of literary movements and historical developments between the 18th and 21st centuries. Typically offered Fall Spring.

GER 39900 - Special Study Abroad Credit In German

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in German earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

GER 40100 - German Level VII

Credit Hours: 3.00. Advanced work on development of German speaking, listening, reading, and writing abilities, focusing on materials dealing primarily with culture and the arts in Germany. Conducted in German. Typically offered Fall Spring.

GER 40200 - German Level VIII

Credit Hours: 2.00. Further advanced work on speaking, listening, reading, and writing abilities in German. Course materials will cover a variety of topics illustrated by film and other media, both print and nonprint. Conducted in German. Typically offered Fall Spring.

GER 42400 - Business German

Credit Hours: 3.00. A study of the terminology and techniques used in commercial transactions, including the interpretation and writing of business materials. Development of the four language skills, with emphasis on writing and speaking. Typically offered Fall Spring Summer.

GER 48000 - German Civilization

Credit Hours: 3.00. The study of modern German life, with special emphasis on the daily life and customs of the people. Lectures in German. Typically offered Fall Spring Summer.

GER 49800 - Advanced Topics In German

Credit Hours: 3.00. Special topics on literature, linguistics and culture of contemporary German-speaking countries. Conducted in German. Typically offered Fall Spring.

GER 51900 - Teaching College German

Credit Hours: 3.00. A course designed to provide a forum for ideas connecting theory and research to teaching practice. Explores issues related to how learning and teaching can be enhanced and presents practical ideas that can be implemented in the classroom. Permission of instructor required. Typically offered Fall.

GER 52400 - German For International Trade

Credit Hours: 3.00. A broad spectrum of business and cultural materials to prepare students for work in international firms. Intensive study of technical terminology used in business transactions; stylistics in business correspondence and report writing; training for accurate oral expression in business negotiations. Typically offered Spring Fall.

GER 54200 - German Classicism

Credit Hours: 3.00. The study of the classical period in German literature as revealed in the works of Goethe and Schiller. Typically offered Spring Fall Summer.

GER 54300 - The Age Of Enlightenment And The Storm And Stress Movement

Credit Hours: 3.00. A study of the literature of the Age of Enlightenment, the cult of feeling, and the Storm and Stress works of Goethe and Schiller. Typically offered Spring Fall Summer.

GER 54400 - German Romanticism

Credit Hours: 3.00. A study of the rise and degeneration of the romantic ideal in German literature. Particular attention is paid to aesthetics, literary criticism, and the revival of a national heritage. Typically offered Spring Fall Summer.

GER 54500 - German Prose From Naturalism To The Present

Credit Hours: 3.00. Development of the novel and short story of the period, with special emphasis on the major authors. Typically offered Spring Fall Summer.

GER 54600 - German Literature Since 1945

Credit Hours: 3.00. Major literary movements and tendencies in East and West Germany, Austria, and Switzerland since 1945. Involves the close reading of literary texts, investigation of major problems addressed by literary criticism, and discussion of historical context. Typically offered Spring Fall.

GER 55100 - Lyric Poetry From Romanticism To The Present

Credit Hours: 3.00. A study of the German lyric from Romanticism to the present. The study of motif, form, and style as reflections of the aesthetic ideals of their age. Typically offered Spring Fall Summer.

GER 55400 - German Drama Before Naturalism

Credit Hours: 3.00. German drama from its beginnings up to the advent of Naturalism. A study of the most significant German dramatists of the first part of the nineteenth century and earlier periods. Typically offered Spring Fall Summer.

GER 55500 - German Drama From Naturalism To The Present

Credit Hours: 3.00. Developments of the drama through the various literary movements of the period, including consideration of the underlying social and ideological forces. Typically offered Spring Fall Summer.

GER 56100 - The Structure Of German I: Phonology And Derivational Morphology

Credit Hours: 3.00. Linguistic analysis of German, focusing on phonetics, phonology, and word structure. The course will treat various problems of pronunciation, structural sound patterns, and word derivation. One weekly class is devoted to theoretical issues affecting German phonology and morphology. Credit will not be given for both GER 36100 and 56100. Typically offered Spring Fall.

GER 56200 - The Structure Of German II: Inflectional Morphology And Syntax

Credit Hours: 3.00. Linguistic analysis of German, focusing on inflectional morphology, syntax, and semantics. The course will present the grammatical structure of German, dealing with word-level phenomena (inflectional morphology), and phrase- and sentence-level phenomena (constituents, word order, syntactic structure, etc.). Credit will not be given for both GER 36200 and 56200. Typically offered Spring Fall.

GER 56300 - History Of The German Language

Credit Hours: 3.00. A survey of the development of the German language, with emphasis on the factors and events that brought about the ultimate unification of the major German dialects into the standard form of the present. The German language of today as a reflection of past cultural and sociopolitical conditions. Typically offered Spring Fall Summer.

GER 57500 - Theories Of German Language Acquisition

Credit Hours: 3.00. Advanced course designed to provide an overview of major theoretical issues in German language acquisition research. Permission of instructor required. Typically offered Summer Fall Spring.

GER 58100 - German Culture

Credit Hours: 3.00. The development of the cultural life in German-speaking lands as reflected in architecture, art, history, literature, music, and philosophy. Lectures in German. Typically offered Spring Fall Summer.

GER 59000 - Directed Reading In German

Credit Hours: 1.00 to 4.00. Directed readings in German. Permission of instructor required. Typically offered Spring Fall Summer.

GER 59400 - Special Topics In German Literature

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

GER 59600 - Special Topics In German Linguistics

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

GER 60100 - First Course To Establish Reading Knowledge

Credit Hours: 3.00. First Course To Establish Reading Knowledge. Typically offered Spring Fall Summer.

GER 60300 - Second Course To Establish Reading Knowledge

Credit Hours: 3.00. Second Course To Establish Reading Knowledge. For those in the physical sciences, mathematics, and engineering. Prerequisite: GER 60100. Typically offered Spring Fall Summer.

GER 60500 - Second Course To Establish Reading Knowledge

Credit Hours: 3.00. Second Course To Establish Reading Knowledge. For those in the humanities and social sciences. Prerequisite: GER 60100. Typically offered Spring Fall Summer.

GER 63000 - Bibliography And Literary Criticism

Credit Hours: 3.00. The use of general and specific reference materials and bibliographical aids in literary research; the basic concepts and terminology of literary criticism. Required of all MA candidates in German. Typically offered Spring Fall Summer.

GER 64400 - Seminar In German Expressionism

Credit Hours: 3.00. The prose, drama, and poetry from 1910-1925. Will also examine selected political-literary essays as they relate to this artistic avant-garde generation. Typically offered Spring Fall.

GER 65900 - Seminar In German Literature

Credit Hours: 3.00. Advanced study of special subjects. Topics to be announced in advance. Permission of instructor required. Typically offered Spring Fall Summer.

GER 66400 - Middle High German

Credit Hours: 3.00. This course introduces students to the Middle High German language, the language of medieval literary texts written in German between 1050 and 1350. The language of this period is significantly different in spelling, vocabulary, and grammar when compared to Modern Standard German. The course also provides an introduction to various genres of medieval German literary texts from this period. Many of the foundational works in the German tradition come from this period, including those of the so-called "golden age" of medieval German literature from 1170 to 1230. Typically offered Fall Spring.

GER 67900 - Seminar In German Linguistics

Credit Hours: 3.00. Advanced study and research on a significant topic in German linguistics. Topic to be announced in advance. Permission of instructor required. Typically offered Spring Fall.

GER 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

GER 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

General Science

SCI 10000 - Multicultural Leadership Seminar

Credit Hours: 1.00. Exposes students to career opportunities via presentations from corporate and academic representatives; provides an opportunity for minority science students to share concerns and to become aware of existing academic and non-academic support systems on campus. Provides an overview of the significant contributions to the sciences by minority groups; reinforces good study habits for academic success. Typically offered Fall.

SCI 11000 - Science Honors Seminar

Credit Hours: 1.00. Wide-ranging lectures on contemporary science and current research by faculty members and alumni from throughout the School of Science. Typically offered Fall.

SCI 11100 - Science Honors Seminar

Credit Hours: 1.00. Continuation of SCI 11000. Typically offered Spring.

SCI 19100 - Part-Time Curricular Practical Training

Credit Hours: 0.00. A part-time scientific work experience for Science majors. This internship experience is intended to complement the student's academic plan of study and help prepare for a future role as a practicing scientist. A letter from the prospective employer stating the period of employment, hours per week, job title, job qualifications, and job description must be provided to the Dean of Science's office for approval before registration will be permitted. A minimum period of employment is required. Permission of department required. Typically offered Fall Spring Summer.

SCI 19500 - Special Topics In Science

Credit Hours: 0.00 to 3.00. This is a special projects course that will be used for special circumstances with individual study or for experimental courses, pointed toward students who are first- or second-year students. Typically offered Summer Fall Spring.

SCI 20100 - Special Topics: Integrated Science And Engineering Learning Community

Credit Hours: 1.00. This course will expose students to interdisciplinary problems scientists and engineers routinely need to solve. Students will gain an appreciation for working with individuals from diverse disciplines and backgrounds. Participation in hands-on activities is a key component of the course. Typically offered Fall Spring Summer.

SCI 21000 - Teaming Principles

Credit Hours: 1.00. College of Science students will learn the principles and concepts involved in teaming, such as recognizing different learning styles, developing shared goals, addressing conflict, utilizing collaborative problem solving and utilizing strengths of team members. These foundations will allow students to enter collaborative situations, such as lab groups and study sections, fully prepared to maximize the value of their educational experiences as well as develop positive working relationships with their fellow students. Typically offered Fall Spring Summer.

SCI 29000 - Special Topics In Science

Credit Hours: 3.00. Introductory, integrated science course for engineering and science students. Beginning lectures will cover the basic chemistry of life, the organization of cells. This will be followed by more advanced topics such as photosynthesis. Each topic will emphasize how understanding the biological system requires concepts and tools from other disciplines such as chemistry and physics. Permission of instructor required. Typically offered Fall Spring Summer.

SCI 31000 - Ubuntu Service Learning Experience

Credit Hours: 1.00 or 2.00. Ubuntu Service Learning Experience is a two week Maymester/summer service learning/study abroad experience in South Africa hosted by the Ubuntu institute. This program includes full days (9am-6pm) of service learning with evenings devoted to group presentation, discussions and reflection centered around the day's events. Typically offered Summer Fall Spring.

SCI 36000 - Great Issues In Science And Society

Credit Hours: 3.00. This course provides a survey of Great Issues facing our global society. The focus of the course is on the integration of different perspectives and the need for interdisciplinary approaches to solve the challenges facing students' local, national, and global communities. The course format is discussion intensive, team-oriented ,and stresses the need to continually ingest and integrate new information, as the technologies and social proposed action that can contribute to the solution of a Great issue. The course also provides a forum to show how Purdue faculty from across the university (scientist and non-scientists) are addressing Great issues in their research and engagement programs. This course satisfies the CoS team experience. Permission of department required. Typically offered Fall Spring.

SCI 46000 - Science And Society

Credit Hours: 3.00. The course consists of two (75-minute) class meetings per week. The first meeting will be used to introduce the scientific and societal issues related to a particular technological development. In the second meeting, students will work in teams to make presentations that explore these issues in greater depth. Typically offered Fall.

SCI 49000 - Topics In Science For Undergraduates

Credit Hours: 1.00 to 5.00. Selected interdisciplinary topics. Offered as a scheduled course when appropriate. Also available for supervised reading and reports of an interdisciplinary nature. Permission of instructor required. Typically offered Fall Spring.

General Studies

GS 10000 - Reading, Writing, And Speaking For International Students

Credit Hours: 3.00. Improve reading, writing, and speaking ability. The students will develop an approach to reading that enhances their understanding, reading, efficiency, and critical reading skills. Typically offered Fall Spring.

GS 10100 - Reading, Writing, And Speaking For International Students II

Credit Hours: 3.00. This course focuses on developing effective communication skills and strategies. Moreover, students will strengthen their own cultural awareness. Students will learn about American culture, Purdue tradition, and pop culture as a result of this course. Typically offered Fall Spring Summer.

GS 11500 - Introduction To Career Decisions

Credit Hours: 1.00. This course is designed to guide the student through self-exploration and an investigation of the world of work. The class format will be short lectures followed by class discussions and activities. Not open to students who have completed GS 11900. Typically offered Spring.

GS 11900 - Introduction To Academic Programs At Purdue

Credit Hours: 1.00. To provide a comprehensive program describing each of the baccalaureate degree-granting schools at Purdue. The course is designed to assist students in the clarification of their degree objectives. Not open to students who have completed GS 11500. Typically offered Fall Spring.

GS 17500 - Information Strategies

Credit Hours: 0.00 or 1.00. Designed to build and sharpen students' information-gathering skills. Guides students in developing systematic methods for finding, evaluating, and presenting information. Organization and use of electronic and print tools will be explained through discussion, hands-on exercises, and homework assignments. Typically offered Fall Spring.

GS 19700 - Purdue Promise First-Year Experience Course

Credit Hours: 1.00. A combined lecture and experiential seminar course for new Purdue Opportunity Awards scholars. The course will focus on the transition issues for these first-year students. Permission of instructor required. Typically offered Fall.

GS 19900 - Strategies For A Successful First Year

Credit Hours: 3.00. This course focuses on student adjustment to university life and development skills. Content includes testing to determine skills, attitudes, and interests; group activities to foster student adjustment; and training in computer usage, time management, and University policies. Open to Horizons students only. Typically offered Fall Spring.

GS 20000 - Preparing Tomorrow's Leaders: Purpose And Connection

Credit Hours: 1.00. A one-credit course designed to provide Purdue Promise students with skills and connections to be successful at Purdue and post graduation. This course will provide Purdue Promise students in their second year with a foundation in leadership and career development skills. Typically offered Fall Spring.

GS 21000 - Leadership Development Seminar

Credit Hours: 1.00. A one-credit course designed to provide Student Access, Transition and Success programs students with skills and connections to be successful student leaders at Purdue. This course will provide students a foundation I leadership skills. Permission of instructor required. Typically offered Spring.

GS 25000 - College Reading Skills And Applications

Credit Hours: 1.00 to 3.00. Focus is on three areas: analysis and study of word structure and context in improving vocabulary; comprehension of author's purpose and tone; and efficiency in reading skills. Materials include critical reading of contemporary writers from current publications. Typically offered Fall Spring.

GS 29000 - Study Skills Seminar

Credit Hours: 3.00. Designed to help students improve their college grades by learning to study more efficiently and effectively. Deals with improving study habits, such as time scheduling, attitudes, and specific study skills, such as note-taking, listening, test-taking, memory techniques, and reading skills. Typically offered Fall Spring.

GS 29001 - Academics Success Skills

Credit Hours: 1.00. Designed to help students improve their college grades by learning to study more effectively. Typically offered Fall Spring.

GS 29400 - Reading Efficiency

Credit Hours: 1.00 or 2.00. To enable each student to read with greater efficiency and flexibility. Rate and comprehension are measured in a variety of materials. Appropriate motor skill strategies are practiced in both the classroom and computer laboratory. Typically offered Spring Fall.

GS 29500 - Effective Study Methods

Credit Hours: 1.00. The primary learning skills areas are taught through audiovisual/audio modules designed for self-study in the Learning Study Laboratory. Credit may not be obtained for both G S 295 and GS 29000. Typically offered Fall Spring Summer.

GS 30000 - Liberal Arts Influentials

Credit Hours: 1.00. As a lecture/discussion course, Liberal Arts Influentials features speakers from a diverse range of Liberal Arts majors and introduces students to the myriad career opportunities available to Liberal Arts graduates. Speakers represent careers in the arts, media, industry, politics and more. Students are encouraged to initiate dialogue with working professionals. Only students enrolled in the College of Liberal Arts may register for GS 30000: LA Influentials. Typically offered Fall Spring.

GS 31500 - Internship Strategies

Credit Hours: 1.00. This course offers sophomore and junior students the opportunity to gain key skills to prepare for a professional internship. Topics range from "Why intern" to conducting searches, to resume writing and interview techniques to establishing a professional identity. Typically offered Spring.

GS 40500 - Advancing Tomorrow's Leaders: Preparing For Employment And Life After College

Credit Hours: 1.00. A one-credit course designed to prepare Purdue Promise students for the next chapter of their professional journey through the reflection of past experiences and the acquisition of new knowledge, expectations, and skills necessary to be successful citizens and employees post-graduation. This course is only for students in the Purdue Promise program. Permission of instructor required. Typically offered Fall.

GS 41000 - Advancing Tomorow's Scholars: Graduate And Professional School Preparation

Credit Hours: 1.00. A one-credit course designed to prepare Purdue Promise students for a smooth transition into graduate or professional school. This course will inform Purdue Promise students of the necessary preparation, required paperwork, and skills needed to be successful in post-baccalaureate education. This course is only for students participating in the Purdue Promise program. Permission of instructor required. Typically offered Fall.

GS 41500 - Senior Job Search Seminar

Credit Hours: 2.00. This course is designed to get LA seniors actively started on their job search. Highly intensive assignments, in-class activities, presentations and projects are designed to better prepare students for all aspects of the job search process. Typically offered Spring.

GS 49000 - Directed Reading In General Studies

Credit Hours: 1.00 to 4.00. Reading to be done under the direction of the instructor in the particular field of specialization. Permission of instructor required. Typically offered Fall Spring Summer.

Graduate Studies

GRAD 59000 - Special Topics

Credit Hours: 1.00 to 3.00. Hours and credits to be arranged. For the use of interdisciplinary programs and in other situations when appropriate departmental courses are not available or general Graduate School identification is desirable. To be used only with the consent of the dean of the Graduate School. Typically offered Fall Spring Summer.

GRAD 60100 - PULSe Scientific Communications

Credit Hours: 1.00. To begin to create an atmosphere in which students learn to communicate across disciplinary lines by providing the opportunity to develop skills in presenting and evaluating research results. Students will develop short scientific presentations, an abstract, and a poster and learn to present their findings to others and to ask and answer questions from their peers. Permission of department required. Typically offered Fall Spring.

GRAD 60200 - Peer To Peer Mentoring For ESE IGP Students

Credit Hours: 1.00. This Peer-to Peer (P2P) mentor experience is geared to enhance the professional development of our ESE students and foster enhanced success and professional development for our first year students. The P2P mentors meet once a week with Independent of GRAD 59000 and also meet with GRAD 59000. P2P mentors have to shape the syllabus for each semester including identifying readings; develop, lead, and facilitate classroom activities through both traditional and innovative and creative strategies; and provide verbal and written input on weekly student critiques. Permission of instructor required. Typically offered Fall Spring.

GRAD 61200 - Responsible Conduct Of Research

Credit Hours: 1.00. Overview of values, professional standards, and regulations that define responsible conduct in research. Students learn the values and standards of responsible research through readings and lecture/discussion and practice application of these values and standards to research situations through class discussion of case studies from life sciences research. Students must be registered for M.S. or Ph.D. thesis research in their home department. Typically offered Fall Spring.

GRAD 68900 - Special Seminars

Arrange Hours and Credit. Hours and credits to be arranged. For use in interdisciplinary seminars and in other cases where general Graduate School identification is desirable. To be used only with the consent of the dean of the Graduate School. Typically offered Fall Spring Summer.

GRAD 69300 - Interdisciplinary Internship/Practicum

Arrange Hours and Credit. For the use of interdisciplinary programs and in other situations when appropriate departmental courses are not available or general Graduate School identification is desirable. To be used only with the consent of the dean of the Graduate School. Typically offered Fall Spring Summer.

GRAD 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Greek

GREK 10100 - Ancient Greek Level I

Credit Hours: 3.00. Introduction to the grammar of Attic Greek of the Classical period, and first forays into the reading of connected prose. Emphasis on accidence, syntax, and vocabulary building. Typically offered Fall Spring.

GREK 10200 - Ancient Greek Level II

Credit Hours: 3.00. Continuation of the study of Attic Greek grammar and reading of connected prose of the Classical period. Typically offered Fall Spring.

GREK 20100 - Ancient Greek Level III

Credit Hours: 3.00. Intermediate reading course in New Testament Greek, designed to strengthen students' grasp of grammar and syntax, broaden vocabulary, and develop skills in reading and translation. Typically offered Fall Spring.

GREK 20200 - Ancient Greek Level IV

Credit Hours: 3.00. Upper intermediate reading course in ancient Greek, designed to consolidate students' knowledge of grammar and syntax, broaden vocabulary, and develop precision and confidence in reading and translation. Typically offered Fall Spring.

GREK 34300 - Greek Oratory

Credit Hours: 3.00. A study of ancient Greek (Attic) orators from textual, historical, and social perspectives. Typically offered Fall Spring.

GREK 34400 - Greek Epic

Credit Hours: 3.00. Readings and discussion of the Greek epic, including selected passages from Homer and Hesiod. Typically offered Summer Fall Spring.

GREK 35300 - Greek Tragedy

Credit Hours: 3.00. Reading and discussion of selected Greek tragedies of the 5th century BCE. Typically offered Fall Spring.

GREK 35400 - Greek Comedy

Credit Hours: 3.00. Readings and discussion of selected Greek comedies of the 4th and 5th centuries BCE. Typically offered Summer Fall Spring.

GREK 44200 - Greek Lyric

Credit Hours: 3.00. Reading and discussion of Greek lyric poetry, both monodic and choral. Typically offered Summer Fall Spring.

GREK 44600 - Greek Historians

Credit Hours: 3.00. A study of the writings of the classical historians in the original Greek. Typically offered Summer Fall Spring.

GREK 49000 - Directed Reading In Classical Greek

Credit Hours: 1.00 to 3.00. Directs the reading of students with special interests. Guides students in profitable reading in subjects of their own choice. Permission of instructor required. Typically offered Summer Fall Spring.

GREK 59000 - Directed Reading In Classical Greek

Credit Hours: 1.00 to 4.00. Directed Reading In Classical Greek. Permission of instructor required. Typically offered Summer Fall Spring.

Health and Kinesiology

HK 10100 - Clinical Practice in Athletic Training - Orientation

Credit Hours: 1.00. Under supervision of the certified athletic trainer, students will undertake observation of training room operations and duties of the athletic trainer. Acquisition of basic skills and knowledge is expected. Typically offered Spring Fall.

HK 10300 - Creative Rhythms And Dance

Credit Hours: 1.00. Designed for students to experience creative movement, elementary folk dance, and activity involving small apparatus, with emphasis placed on structured rhythms. For majors and minors only. Typically offered Fall Spring.

HK 10400 - Educational Gymnastics And Adventure Education

Credit Hours: 2.00. Development and analysis of performance skills used in educational gymnastics and adventure education. Typically offered Fall Spring.

HK 10500 - Development And Analysis Of Invasion Games

Credit Hours: 2.00. Development and analysis of performance skills used in invasion games. Typically offered Fall Spring.

HK 10600 - Development And Analysis Of Net/Wall Games

Credit Hours: 2.00. Development and analysis of performance skills used in net/wall games. Typically offered Fall Spring.

HK 10700 - Development And Analysis Of Target And Field Games

Credit Hours: 2.00. Development and analysis of performance skills used in target and field/run/score games. Typically offered Fall Spring.

HK 10900 - Physical Education Curricular Activities

Credit Hours: 2.00. Instruction and practice in selected team individual sports and recreational games. Students will develop fitness models for K-12 physical education classes. For majors and minors only. Typically offered Fall Spring.

HK 11100 - Clinical Practice In Personal Training - Orientation

Credit Hours: 1.00. Under the supervision of program coordinator, students will undertake observation of fitness facilities operations and duties of the personal fitness trainer. Acquisition of basic skills and knowledge is expected. Typically offered Fall Spring.

HK 11101 - Practical Applications Of Health/Fitness Concepts I

Credit Hours: 2.00. This course will provide students with the essential foundations of basic and advanced exercise training techniques in cardiorespiratory, resistant, and flexibility/balance training. Typically offered Fall.

HK 11200 - Aquatics

Credit Hours: 1.00. Provides prospective physical education teachers knowledge and skills related to the performance, analysis, and teaching of aquatic movement forms. For majors and minors only. Typically offered Fall Spring.

HK 11300 - Practical Applications Of Health/Fitness Concepts II

Credit Hours: 2.00. This course will provide Health/Fitness students with the essential foundations of basic and advanced exercise techniques, looking at safety in exercise of specific muscle groups and various forms of exercise training. Permission of department required. Typically offered Spring.

HK 11400 - Teaching Fitness In Physical Education

Credit Hours: 2.00. Introduces the field of youth exercise and physical fitness. It emphasizes the importance of exercise for youth, physiological responses to structured exercise programs, exercise prescription for individualized and team sports, and physical fitness assessment. For majors only. Typically offered Fall Spring.

HK 11500 - Individual And Dual Movement Forms I

Credit Hours: 2.00. Provides prospective physical education teachers knowledge and skills related to the performance, analysis, and teaching of individual and dual movement forms in an indoor setting. These movement forms include gymnastics, golf, and bowling. Special fee required. For majors and minors only. Typically offered Spring Fall.

HK 11600 - Individual And Dual Movement Forms II

Credit Hours: 2.00. Provides prospective physical education teachers knowledge and skills related to the performance, analysis, and teaching of individual and dual movement forms in an outdoor setting. These movement forms include badminton, tennis, and track and field. For majors and minors only. Typically offered Fall Spring.

HK 11700 - Team Movement Forms

Credit Hours: 2.00. Provides prospective physical education teachers knowledge and skills related to the performance, analysis, and teaching of team movement forms. These movement forms include soccer, softball, volleyball, and basketball. For majors and minors only. Typically offered Fall Spring.

HK 11800 - Analysis Of Sport Performance

Credit Hours: 1.00. Introduces factors that affect sport training movements, options and methods of sports performance testing, strategies for performance training, and practical application of sport assessment/training drills specific to identified sports. Typically offered Fall.

HK 11900 - Instructional Techniques Of Group Exercise

Credit Hours: 1.00. Students will learn to create the lead effective group fitness classes. This course serves as a preparatory course for HK 31100 and HK 41100. Typically offered Fall Spring.

HK 12000 - Analysis Of Sport Performance Training II

Credit Hours: 1.00. This course is designed to introduce and practically apply/analyze testing measures related to sport performance training. Typically offered Spring.

HK 13000 - Strength And Conditioning Roundtable

Credit Hours: 1.00. This course is designed to analyze research relative to sport performance training. Typically offered Fall.

HK 13500 - Introduction To Health And Kinesiology

Credit Hours: 1.00. Overviews the disciplines of health and kinesiology. Students explore skills and academic interests in theses areas. Describes career opportunities and options for graduate study. Provides strategies for professional and portfolio development. Students complete five hours of community service per semester. Typically offered Fall Spring.

HK 20000 - Healthy Lifestyles

Credit Hours: 3.00. Students are provided an opportunity to assess personal behavior patterns related to preventive health services, health protection activities concerning environmental issues, and promotion of a healthful lifestyle. Personal strategies for adopting and maintaining potential health-enhancing behaviors are explored. Typically offered Fall Spring Summer.

HK 20100 - Clinical Practice In Athletic Training - Assist

Credit Hours: 2.00. Under supervision of the certified athletic trainer, students will be provided the opportunity to practice those skills required of the athletic trainer. The student will assist the staff and upperclass students. Typically offered Fall Spring.

HK 20300 - Adult Health And Development Program

Credit Hours: 3.00. Theory and practice in gerontological health by working with older adults to positively influence health and well-being. Typically offered Fall Spring.

HK 20500 - Foundations Of Athletic Training

Credit Hours: 3.00. Designed to provide the physical education teacher, coach, and athletic training student with an introduction to the prevention, recognition, and treatment of common athletic injuries. Experience will be gained in basic taping skills. Typically offered Fall Spring.

HK 20800 - Prevention And Treatment Of Athletic Injuries

Credit Hours: 3.00. Provides the physical educator, coach, and athletic training student with an introduction to the prevention, recognition, and treatment of common athletic injuries, and response to common emergency situations. American Red Cross Community First Aid and CPR certification is included. PE teaching majors and minors, athletic training majors, and coaching endorsement students only. Typically offered Fall Spring.

HK 20900 - Elementary School Physical Education Methods

Credit Hours: 3.00. Provides physical education majors with methods and field experiences for teaching physical education in elementary schools. Typically offered Fall Spring Summer.

HK 21000 - History And Philosophy Of Physical Education

Credit Hours: 2.00. Introduction to the history and philosophy of physical education to prospective teachers. Emphasis is placed on the impact of societal history on physical education and the role of philosophic thinking in curricular activities. For majors and minors only. Typically offered Fall.

HK 21100 - Clinical Applications Of Health/Fitness Concepts I

Credit Hours: 1.00. The course is designed to allow students to establish foundational skills that they will apply professionally within the field of Exercise and Health emphasizing communication skills, instruction, evaluation, and performance of various exercise modalities. Clinical experiences are developed in interest of helping students identify individual strengths and weaknesses in application and performance requiring students to take a professional role in assurance of completion of duties and responsibilities. Typically offered Fall Spring.

HK 21500 - Basic Public Health Studies

Credit Hours: 3.00. Examination of basic scientific concepts as applied to the problems and issues in selected areas of human health behavior with particular attention to their influence on population and individual health. Restricted to students enrolled in major degree programs for which this course is a requirement. Typically offered Fall Spring.

HK 21900 - Personal And Community Health

Credit Hours: 2.00. Application of health science to selected health problems and issues, with particular reference to health promotion and disease prevention among children, adolescents, and young adults. Typically offered Fall Spring Summer.

HK 22000 - Death, Dying, And Human Health

Credit Hours: 3.00. Introductory analysis of the death experience as related to human health. Emphasis on attitudes and practices of death in contemporary America; processes of dying; care of the dying person; grief and bereavement; legal, medical, and consumer aspects; and death education. Typically offered Fall Spring Summer.

HK 22500 - Sexuality And Health

Credit Hours: 3.00. Deals with various aspects of human sexuality and sexual behavior and their impact upon individual health. Health concerns related to sexual behavior. Typically offered Fall Spring Summer.

HK 22600 - Contemporary Women's Health

Credit Hours: 3.00. Examines behavioral, psychological, and sociocultural aspects of women's experience in healthcare systems. Includes the influence of factors such as age, social class, and ethnicity on women's roles as recipients and providers of health care. Typically offered Fall Spring.

HK 23100 - Substance Abuse And Health

Credit Hours: 3.00. The study of drug abuse and drug education, including stimulants, depressants, psychedelics, and other drugs and harmful substances; beverage alcohol usage and health effects of tobacco smoking. Education materials and techniques are examined. Typically offered Summer Fall Spring.

HK 23300 - Stress And Human Health

Credit Hours: 3.00. Course is designed to provide an understanding of stress and stress management, including the physiology of the stress response, the relationship between stress and disease, potential sources of stress, and methods of intervening to prevent and/or relieve stress. Typically offered Summer Fall Spring.

HK 23500 - Teacher Education Sophomore Seminar

Credit Hours: 1.00. This course provides sophomore students in health and physical education teaching with an ongoing review in seminar format of practical instructional and professional issues necessary for effective public school and community-based practice in health, physical education, and sport. Typically offered Fall Spring.

HK 25000 - Clinical Applications Of Sport I

Credit Hours: 1.00. Students will have a unique opportunity to experience strength and conditioning first hand. In this course, students will spend approximately 6 hours a week observing a certified strength and conditioning specialist identifying the essential foundations of sport performance training. Typically offered Fall Spring.

HK 25300 - Principles Of Motor Development

Credit Hours: 3.00. This course provides an introduction to motor development from a life-span perspective. Students will learn how infants develop from mainly reflexive beings into children and adults that are capable of interacting with the world in a goal-directed manner. This course specifically examines how changes in physical growth, aging, and maturation of the central nervous system influence motor performance. Finally, the decline of motor skills associated with advanced age is discussed. Typically offered Fall Spring.

HK 25400 - Principles Of Motor Learning And Development

Credit Hours: 3.00. This course surveys the fundamental processes and variables related to motor development and learning. Students will be exposed to research techniques and critical issues in motor development and learning. For majors and minors only. Typically offered Fall Spring.

HK 25800 - Foundations Of Motor Skill Learning

Credit Hours: 3.00. Concepts and principles of motor skill learning, with emphasis on the acquisition and retention of gross movement and sport skills. Typically offered Fall Spring.

HK 26100 - Applied Anatomy And Kinesiology

Credit Hours: 3.00. The study of how muscles, bones, and joint structure produce human motion. Kinesiological analysis of full body, upper and lower extremity skills. Typically offered Spring.

HK 26300 - Biomechanical Foundations Of Motor Skills

Credit Hours: 3.00. Fundamental anatomical and mechanical concepts and procedures for analyzing motor skills, with particular reference to sport, dance, and aquatic activities. Typically offered Fall Spring.

HK 26400 - Principles Of Motor Learning, Development, And Biomechanics

Credit Hours: 3.00. This course surveys the fundamental processes and variables related to motor development, motor learning, and biomechanics. Students will be exposed to concepts relevant to teaching motor skills and critical issues to increase knowledge of human movement. Typically offered Fall Spring Summer.

HK 26600 - Introduction To Health/Fitness Programming

Credit Hours: 3.00. Introduces rationale, application, and nature of health promotion as applied to various professional settings, providing students with a conceptual framework of the health/fitness and health promotion discipline. Students will be introduced to various professional opportunities in the field. Typically offered Fall Spring.

HK 26900 - Career Development And Preparation For The Health And Fitness Fields

Credit Hours: 1.00. Provides students with basic professional skills and materials for subsequent practicum experience and future employment search. Students will have secured a viable practicum site, complete with written job description/responsibilities, at the completion of the course. Typically offered Fall Spring.

HK 28000 - Basic First Aid And CPR

Credit Hours: 2.00. First aid principles, procedures, and skills, including first aid emergency care and cardiopulmonary resuscitation (CPR). Emphasis is placed on practical application by the average person in everyday living. Typically offered Fall Spring Summer. CTL:IHP 1401 First Aid

HK 29100 - Cooperative And Professional Work Experience I

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. For Cooperative Education Program students only. Prerequisite: approval of departmental professional experience coordinator required for enrollment. Permission of department required. Typically offered Fall Spring Summer.

HK 29200 - Cooperative And Professional Work Experience II

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Approval of departmental professional experience coordinator required for enrollment. Permission of department required. Typically offered Fall Spring Summer.

HK 30100 - Clinical Practice In Athletic Training - Associate

Credit Hours: 2.00. Under the supervision of a certified athletic trainer, students will be provided the opportunity to practice those skills required of an athletic trainer. Independent practice as an athletic trainer. Typically offered Fall Spring.

HK 30200 - Applied Clinical Anatomy

Credit Hours: 3.00. An introduction to the regional anatomical study of the human body for undergraduate allied health students. Lectures will be supplemented by observation and demonstration of prosected cadaver material, radiographs, osteology, and surface anatomy. Typically offered Fall.

HK 30300 - Athletic Training Modalities

Credit Hours: 3.00. Theory and practice in the use of physical agents used in the management and promotion of healing of athletic injuries. Typically offered Spring.

HK 30400 - Therapeutic Exercise

Credit Hours: 3.00. This course will introduce the athletic training student to the planning and implementation of a

comprehensive reconditioning program for injuries sustained by athletes. Techniques of therapeutic exercise as they apply to athletic training will be examined. Typically offered Spring.

HK 30500 - Injury Assessment I

Credit Hours: 3.00. A guided lecture and demonstration experience designed to expose the student to the techniques normally required of an athletic trainer. Topics include splinting and transportation, equipment fitting and fabrication, lower extremity injury evaluation, taping and bracing. Typically offered Fall.

HK 30600 - Injury Assessment II

Credit Hours: 3.00. A continuation of HK 30500. A guided lecture and demonstration experience designed to expose the student to the techniques of the upper extremity, head, neck, abdomen, and thorax, along with associated taping, padding, and bracing. Typically offered Spring.

HK 31100 - Clinical Applications Of Health/Fitness Concepts II

Credit Hours: 1.00. Under the supervision of the program coordinator, students will demonstrate the ability to apply skills, competencies, and applications of basic/advanced exercise principles in a professional setting. Required to be taken fall and spring. Permission of department required. Typically offered Fall Spring.

HK 31200 - Exercise Testing And Prescription For Sport

Credit Hours: 3.00. Students will learn how to assess, analyze, and develop exercise practices for athletes based on sport performance development while introduced to various training styles and theories of program design for sports performance training. Typically offered Fall Spring.

HK 31900 - Teaching Health And Safety In Middle/Junior High Schools

Credit Hours: 3.00. Introduction to school health practice, including the teacher's role and functions in the school health program. Focuses on planning, implementing, and evaluating health instruction. Special emphasis placed on methods for teaching middle and junior high school students. No undergraduate students may be enrolled in this course until they have been admitted to teacher education and a copy of this acceptance is on file. Typically offered Spring.

HK 32000 - Health Education In Elementary Schools

Credit Hours: 3.00. The problems of physical health, mental health, and safety of the school-aged child are considered, with emphasis on ways in which the elementary teacher meets his or her responsibilities and opportunities for promoting pupil health. Typically offered Fall Spring Summer.

HK 32200 - Physical Education In The Elementary School

Credit Hours: 2.00. Current conceptions of elementary school physical education, with a particular emphasis on curriculum implementation. Typically offered Summer Fall Spring.

HK 32600 - Foundations Of Adapted Physical Education

Credit Hours: 3.00. Lecture and physical education practicum in teaching children with disabilities. An introduction to the basic concepts and techniques of adapted physical education. Laboratory experience in carrying out adapted physical education programs for children is provided. Typically offered Summer Fall Spring.

HK 32900 - Curriculum In Physical Education

Credit Hours: 3.00. Introduction to curriculum theory, contemporary curriculum issues, dominant curriculum models, and related lesson planning and assessment techniques for school and community-based physical education programming. Typically offered Fall.

HK 33000 - Teaching Physical Education In Secondary Schools

Credit Hours: 3.00. This course is designed to provide prospective teachers of physical education with theoretical and practical foundations of curriculum design, instructional strategies, and assessment techniques. Admission to Gate A. Typically offered Spring.

HK 33500 - Teacher Education Junior Seminar

Credit Hours: 1.00. This course provides junior students in health and physical education teaching with an ongoing review in seminar format of practical instructional and professional issues necessary for effective public school and community-based practice in health, physical education, and sport. Typically offered Fall Spring Summer.

HK 34500 - The Coaching Of Interscholastic Sports

Credit Hours: 2.00. Discussion and practical experience in organizing, training, and coaching interscholastic athletes in a selected sport. A partial list of sports that may be selected: baseball, basketball, football, gymnastics, soccer, swimming, track/field/cross country, volleyball, and wrestling. Typically offered Fall Spring.

HK 34600 - Field Experience In Coaching

Credit Hours: 2.00. Students will be assigned to assist in coaching a team in a public-, parochial-, or selected university-sponsored program. A partial list of sports available: baseball, basketball, football, gymnastics, soccer, swimming, track/field/cross country, volleyball, and wrestling. Permission of instructor required. Typically offered Fall Spring Summer.

HK 35000 - Clinical Applications Of Sport II

Credit Hours: 2.00. Students will spend approximately 15 hours a week with a certified strength and conditioning specialist utilizing skills in previous clinical experiences and coursework to assist with athletes in lifting and conditioning workouts. Students will also have an opportunity to see variations in training practices between various sport teams and analyze workouts related to specific sports. Typically offered Fall Spring.

HK 36500 - Principles Of Community Health Promotion

Credit Hours: 3.00. Provides an overview of community health promotion. Includes such topics as organization, financing, and delivery of personal health requirements for comprehensive health promotion. These include health care, health education, and health policy. Typically offered Fall.

HK 36600 - Health Behavior And Health Promotion

Credit Hours: 3.00. Introduces health behavior theory and practice in the context of health promotion and education. Examines individual, interpersonal, and community approaches to explaining and predicting health behavior and emphasizes their application to interventions in health promotion and education. Typically offered Fall Spring Summer.

HK 36800 - Exercise Physiology I

Credit Hours: 3.00. Physiological concepts and principles underlying human responses and adaptations to exercise stress. Included are selected methods and techniques of assessing physiological function in the laboratory setting. Typically offered Fall Spring Summer.

HK 37200 - Sport And Exercise Psychology I

Credit Hours: 3.00. This course focuses on social and psychological factors related to participation in sport, exercise, and physical activity. The class explores both (a) how social and psychological factors influence participation and performance in physical activity, and (b) how sport, exercise, and physical activity participation affects psychological well-being. Topics include personality, socialization, learning and feedback, stress and coping, self-perceptions, motivation, and psychological methods for enhancing personal development and physical performance. Typically offered Fall Spring Summer.

HK 37600 - History Of Sport

Credit Hours: 3.00. A prior course in American or world history is recommended but not required. A survey of historical events that have shaped classical and modern sport, with a focus on recent history of American sport. Typically offered Fall Spring.

HK 38000 - The Psychology Of Teaching Physical Education

Credit Hours: 2.00. Course focused on social and psychological factors related to teaching physical education. Topics include reinforcement, modeling, moral development, achievement goals, self-perception, attributions, interest and value, and physical activity enhancement. Typically offered Fall Summer.

HK 38500 - Methods Of Health Promotion And Education

Credit Hours: 3.00. Methods and materials of health promotion and education; preparation and use of content and materials related to health concerns of target populations. A variety of strategies and media are covered with theoretical and practical applications. Typically offered Fall Spring.

HK 39100 - Cooperative Work Experience III

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Approval of departmental professional experience coordinator required for enrollment. Permission of department required. Typically offered Fall Spring Summer.

HK 39200 - Cooperative Work Experience IV

Credit Hours: 0.00. Practical experience in professional employment. Programs must be preplanned and conducted under the

direction of the departmental coordinator with the cooperation of an employer. Students must submit comprehensive written reports of the experience. Permission of instructor required. Typically offered Fall Spring Summer.

HK 40100 - Clinical Practice In Athletic Training - Lead

Credit Hours: 2.00. Under the supervision of the certified athletic trainer, the student will be provided the opportunity to practice those skills acquired. The student is expected to take a leadership role in the clinical setting. Typically offered Fall Spring.

HK 40200 - Pathophysiology For Allied Health Professions

Credit Hours: 3.00. Overview of the etiology, pathogenesis, and clinical features of common illnesses and diseases that affect the human body's various organ systems. Emphasis is placed on cellular adaptation to disease and tissue response to damage. Typically offered Spring.

HK 40400 - Administration Of Physical Education And Athletics

Credit Hours: 2.00. A course covering aspects of administration of physical education and intramurals. Curriculum development, budget, design of facilities, scheduling and class organization will be covered. Open to all students but designed for the physical education major. Typically offered Fall Spring Summer.

HK 40500 - Administration Of Athletic Training Programs

Credit Hours: 3.00. Advanced theory in the more complex injuries associated with athletics. Organization of athletic training programs, nontraumatic medical problems, pharmacology, and athletic nutrition also will be studied. Typically offered Spring.

HK 40800 - Orientation And Observation In Physical Therapy

Credit Hours: 2.00. Assigned observations of physical therapy in hospitals. Typically offered Fall Spring.

HK 40900 - Seminar In Sports Medicine

Credit Hours: 3.00. A review of selected medical aspects of sports. Liberal use of guest medical professionals. A broad look at the field of sports medicine. Typically offered Spring.

HK 41100 - Clinical Applications Of Health/Fitness Concepts III

Credit Hours: 1.00. Under the supervision of the program coordinator, students will demonstrate the ability to apply specific skills, competencies, and applications of basic/advanced exercise principles in a professional setting. Required to be taken fall and spring. Permission of department required. Typically offered Fall Spring.

HK 42100 - Health Screening And Fitness Evaluation And Design

Credit Hours: 3.00. Health screening, fitness assessment and evaluation, and exercise prescription will be the primary focus of this course. The course will also qualify students to take the American College of Sports Medicine Health/Fitness Instructor exam. Typically offered Fall Spring.

HK 42200 - Basic Concepts In Exercise Program Design

Credit Hours: 3.00. Introduces basic program design concepts and rationale to design fitness programs for healthy adults emphasizing cardiovascular training, strength training, flexibility training, and balance. Typically offered Fall Spring.

HK 42400 - Health And Fitness Program Management

Credit Hours: 3.00. Overviews major principles, competencies, and challenges involved in managing health, fitness, and sports organizations. Students will develop an understanding of the key considerations and skills needed to organize and manage human resources and facilities in health, fitness, and sport settings. Typically offered Fall Spring.

HK 43500 - Student Teaching Seminar

Credit Hours: 1.00. Development and implementation of selected teaching units and plans for a specified student teaching setting. Typically offered Fall Spring.

HK 44000 - Human Diseases And Disorders

Credit Hours: 3.00. The major communicable and noncommunicable diseases and disorders that afflict modern man, with particular emphasis upon the etiology, epidemiology, and ecology of these diseases and disorders. Typically offered Fall Spring.

HK 44300 - Neuroscience Of Movement

Credit Hours: 3.00. In this course students will learn about the neuroscience behind the control, sensation and perception of human movement. The course is divided into five sections. In the first section, students learn about the sensory systems with human movement. In the second section, students learn about the basic CNS building blocks underlying movement control and perception. In the third section, the control of balance and locomotion is the central topic. In the fourth section students learn about the higher brain functions involved in cognition. The final section of the class examines issues regarding learning, development, and brain plasticity. Typically offered Fall Spring.

HK 44400 - Motor Function In Older Adults

Credit Hours: 3.00. In this course, students learn about the decline in motor function that occurs in older adults and techniques to improve motor function in an older population. Topics include decreased balance control, loss of muscle strength, and declines in adaptive locomotion as a function of age. Students enrolled in this class also participate in an off-campus lab. In the lab, students are paired with an older adult and use the knowledge gained in lecture to improve the motor function of the older adult. This class provides students with a unique opportunity to gain hands-on experience working with an older population. Permission of instructor required. Typically offered Fall Spring.

HK 44500 - Principles Of Epidemiology

Credit Hours: 3.00. The study of the distribution of diseases in human populations and factors that influence these distributions. Typically offered Fall Spring.

HK 45000 - Clinical Applications Of Sport III

Credit Hours: 2.00. Students will spend approximately 15 hours a week with a certified strength and conditioning specialist utilizing skills in previous clinical experiences and coursework to help lead athletes in lifting, conditioning and drill sets. Students will be assigned to observe and assist with various sport teams exposing them to a variety of training practices in sport and performance. Typically offered Fall Spring.

HK 45300 - Motor Coordination And Development

Credit Hours: 3.00. An advanced undergraduate motor development course that examines the processes and coordination principles related to motor behavior development across the life span. Material and concepts are concentrated around specific skills areas and SPAN a broad range of ages and theoretical approaches. Typically offered Spring.

HK 45800 - Principles Of Motor Control And Learning

Credit Hours: 3.00. Discussion of the principles of motor learning and control. Relevant research literature will be surveyed with an historical perspective. Students will be expected to design and/or conduct a mini research project. Typically offered Fall Spring.

HK 46300 - Analysis Of Human Motion

Credit Hours: 3.00. An analytic approach to the mechanical analysis of human motion, including modeling procedures and computer-generated display techniques. Typically offered Fall Spring.

HK 46500 - Research Methods

Credit Hours: 3.00. This course will be conducted in a lecture/lab format. The lectures will introduce the basic knowledge necessary to understanding the entire research process as it is found in health and kinesiology. The laboratories will be designed to give students practice in discovering research questions, preparing research proposals, evaluating existing research, and applying research to practical problems. Typically offered Fall Spring.

HK 46800 - Advanced Exercise Physiology II

Credit Hours: 3.00. An advanced undergraduate course in the area of exercise and human performance. Further examination of the physiological mechanisms and theories involved in the exercise response. Typically offered Fall Spring.

HK 46900 - Exercise Testing And Prescription In Special Populations

Credit Hours: 3.00. Examines responses to exercise testing and prescription in healthy adults compared to exercise responses and special considerations for individuals with chronic diseases and conditions and issues of concern to pregnant women, children, and older adults, among others. Typically offered Fall Spring.

HK 47200 - Sport And Exercise Psychology II

Credit Hours: 3.00. Course presents topics not covered in PE 37200 and emphasizes application of psychological principles in sport and exercise settings. Topics include group dynamics, psychological benefits of exercise; exercise addiction; body image; leadership and communication; and performance enhancement principles and techniques. Typically offered Spring.

HK 47400 - Youth Physical Activity Behavior

Credit Hours: 3.00. This course addresses developmental, psychological, social, and contextual factors associated with physical activity behavior and sedentary behavior of young people. Students will consider fundamental questions and assumptions that frame the study of youth physical behavior, be exposed to a breadth of empirical literature on youth physical activity and sedentary behavior, and learn how the existing knowledge base has been translated into physical activity promotion efforts. Typically offered Fall Spring.

HK 47500 - Practicum In Kinesiology

Credit Hours: 6.00. Supervised field work in university, community, hospital, business, or clinical settings where structured exercise programs or rehabilitative services are conducted. Supervisory conferences and written reports are required. Typically offered Fall Spring Summer.

HK 47600 - Olympic Games: Ancient And Modern

Credit Hours: 3.00. A historical study of the nature and significance of the ancient and modern Olympic Games. Topics include genesis of the games; evolution of events; the amateur ideal; social, economic, and commercial influences; politics; modern controversies; and various reform movements. Typically offered Spring.

HK 49000 - Special Topics In Health And Kinesiology

Credit Hours: 1.00 to 3.00. Individualized readings, topics, or projects in health and kinesiology appropriate for undergraduate students. Permission of instructor required. Typically offered Summer Fall Spring.

HK 49200 - Professional Work Experience IV

Credit Hours: 1.00. Practical experience in professional employment. Programs must be preplanned and conducted under direction of the departmental coordinator and agency supervisor. Students will submit documentaton of practical experiences. Permission of instructor required. Typically offered Fall Spring Summer.

HK 49600 - Independent Inquiry in Movement and Sport Sciences

Credit Hours: 1.00 to 3.00. Students are engaged in a research project under the guidance of a faculty member in one of the areas of inquiry in the movement and sport sciences major. Permission of instructor required. Typically offered Spring Summer Fall.

HK 49800 - Directed Research For Undergraduates

Credit Hours: 3.00. Student designs, conducts, and writes an individual research project under the guidance of a member of the faculty. Permission of instructor required. Typically offered Fall Spring Summer.

HK 51000 - Introduction To The Quantitative Methods Of Public Health

Credit Hours: 3.00. Acquaints students with the basic concepts and methods of statistics, the applications, and their interpretation as used in public health. Students learn basic terminology and its meaning, how to calculate various statistical measures and indices, how to quantify health relationships, and how to compute and interpret inferential statistical techniques. Students will acquire the ability to utilize statistical software as a tool to facilitate the processing, editing, storing, displaying, analysis, and interpretation of health research-related data. Typically offered Fall.

HK 52400 - Managing Health, Fitness, And Sports Organizations

Credit Hours: 3.00. An overview of the major principles, considerations, and techniques involved in managing health, fitness, and sports (HFS) organizations. Emphasizes the skills and competencies involved in the planning, organization, and control of opportunities, resources, and facilities in HFS settings. Permission of instructor required. Typically offered Fall.

HK 52500 - Marketing And Promotion In Health, Fitness, And Sports Organizations

Credit Hours: 3.00. An overview of marketing and promotion in health, fitness, and sports organizations. Emphasizes the skills necessary to develop marketing and promotion plans and to develop materials and approaches for carrying out these plans in health, fitness, and sports settings. Permission of instructor required. Typically offered Spring.

HK 53700 - Analysis Of Teaching And Coaching In Physical Education

Credit Hours: 3.00. The study and practice of using data-based approaches for collecting information about and making changes in teacher's own teaching and coaching styles. Procedures for the establishment, assessment, and maintenance of techniques and skills in teaching will be covered and used. Typically offered Fall Spring.

HK 53900 - Pedagogical Studies In Physical Education

Credit Hours: 3.00. This course examines research on teacher education and research on teaching in physical education. The course will acquaint students with empirical and conceptual publications related to the professional training process as well as

studies examining the role of teacher and the influence of the teaching process in physical education settings. Typically offered Spring Summer.

HK 56600 - Biomedical Principles Of Public Health

Credit Hours: 3.00. Biological foundation underlying priority actions related to public health promotion and disease prevention. Review of current professional literature in preventive medicine/public health promotion. Development of critical thinking skills to distinguish health information based on scientific inquiry. Typically offered Summer Fall Spring.

HK 56700 - Epidemiology For Public Health Practice

Credit Hours: 3.00. This course presents the fundamental principles, methods, and applications of epidemiology, including the quantification of morbidity, mortality, and disease risk. Epidemiologic study designs and the use of public health vital statistics, disease transmission evidence, and risk assessment data are explored. Historically significant epidemiological cases provide a framework for the application of ethical principles to epidemiologic research. This course meets the epidemiology core competency requirement for the Master's in Public Health (MPH) degree. Typically offered Fall Spring Summer.

HK 56800 - Advanced Exercise Physiology

Credit Hours: 3.00. The study of selected concepts and principles of physiology as they relate to the exercising human. Typically offered Fall.

HK 57000 - Gender Roles And Physical Activity

Credit Hours: 3.00. Examines the influence of gender roles on the performance, participation, and persistence of males and females in physical activity. Emphasis will be placed on understanding the social, psychological, and biological factors that affect behavior in sport and exercise contexts throughout the lifespan. Typically offered Spring Summer.

HK 57200 - Sport In American Culture

Credit Hours: 3.00. Survey and critique of major sociological concepts, theoretical and methodological perspectives as they apply to dimensions of human play and sport. Class activity will include field experiments utilizing basic sociological methods. Typically offered Spring Fall.

HK 57400 - Advanced Sport And Exercise Psychology

Credit Hours: 3.00. A survey of current research and theoretical and methodological perspectives focused on the psychological aspects of sport and exercise behavior. Emphasis will be placed on the social psychological correlates (e. g., motivation, stress) of performance and adherence in physical activity settings. Typically offered Fall.

HK 57500 - Introduction To Environmental Health

Credit Hours: 3.00. (HSCI 57500) An introduction to chemical, physical, or biological factors in the environment that affect the health of the community. This course examines health issues, scientific understanding of causes, and approaches to the control of major environmental health problems in industrialized and developing countries. This is a core course for the Master's in Public Health (MPH). Typically offered Spring.

HK 57600 - Diversity And Health

Credit Hours: 3.00. This course is designed to examine the health status and the politics of representation of the U.S. ethnic minorities (e.g., African Americans, Latinos, Asian Americans, Native Americans, Alaskans, etc.). Emphasis is placed on factors that influence health and health-related behaviors. The course is intended to provide students with an overview of historical, political, social, and cultural factors related to the health behavior and status of minority groups in American society. Typically offered Spring.

HK 58000 - Philosophy Of Sport And The Body

Credit Hours: 3.00. A course designed to introduce the past and recent philosophical literature on the nature and significance of sport and embodiment. Topics include: theories of play; meaning, knowledge, and morality in sport; the lived body; and aesthetics of human movement. Typically offered Spring Fall Summer.

HK 58100 - International Health

Credit Hours: 3.00. An introduction to public health priorities from an international perspective, recognizing the interdependent nature of health promotion and disease prevention issues across diverse regions and populations. Students analyze historical, epidemiological, environmental, ecological, and behavioral influences on population health status. Technological advances in communication, travel, medicine, and industry have dramatically shaped global health priorities. Using contemporary public health theories and analytic models, students examine population health determinants, contrasting industrialized and developing countries and how these influence health goals established by public health institutions, such as the World Health Organization, philanthropic foundations, and governmental agencies. Typically offered Fall.

HK 59000 - Special Topics In Health And Kinesiology

Credit Hours: 1.00 to 3.00. Individualized readings, topics, or projects in health and kinesiology appropriate for graduate students. Permission of instructor required. Typically offered Summer Fall Spring.

HK 59200 - Public Health Practicum

Credit Hours: 3.00 to 9.00. This course integrates public health theory and practice in a professional setting. Students have the opportunity to apply concepts from core and concentration courses, conduct projects, and interact with a range of professionals in the designated setting. Permission of instructor required. Typically offered Fall Spring Summer.

HK 60000 - Individual Research And Study

Credit Hours: 1.00 to 3.00. Each student studies a problem of interest related to physical education, health, or recreation. Permission of instructor required. Typically offered Spring Fall Summer.

HK 60100 - HK PhD Seminar

Credit Hours: 2.00. This course is the first of a required two-course sequence for first-year health and kinesiology doctoral students. The course is designed to socialize students into the worlds of science, graduate education, and health and kinesiology research and practice. Particular emphasis is placed on the responsible conduct of research, shared and unique expectations of graduate students and mentors across various health and kinesiology subdisciplines, professional development, and the nurturing of academic community. Prerequisite: Incoming health and kinesiology doctoral students qualify for and are required to complete this course. Permission of department required. Typically offered Fall.

HK 60200 - HK PhD Seminar II

Credit Hours: 2.00. This course is the second of a required two-course sequence for first-year health and kinesiology doctoral students. The course is designed to expose students to classic works in health and kinesiology subdisciplines, address professional development issues, and help students formulate a curricular and research program to structure the doctoral experience. Particular emphasis is placed on the interdisciplinary nature of health and kinesiology and becoming an active member of the research community. Permission of department required. Typically offered Spring.

HK 61000 - Research Methods In Health, Physical Education, And Recreation

Credit Hours: 3.00. Application of research methodology to problems in health, physical education, and recreation. Prerequisite: 3 credit hours in Statistics. Permission of instructor required. Typically offered Fall.

HK 61100 - Data Analysis In Health And Kinesiology

Credit Hours: 3.00. This student-driven course addresses a variety of data analysis issues in health, kinesiology, and related fields (e.g., education, psychology). The course will overview the types of data prominent in health and kinesiology research, how these data are obtained and handled by researchers, measurement/evaluation issues, and ways to present and analyze data. Heavy emphasis is placed on matching research questions and conceptualization with data analysis techniques, obtaining familiarity with widely-used data analysis software, analyzing multivariate data sets, and constructing high-quality results sections in journal manuscript format. Prerequisites: STAT 50100, STAT 50200 and access to a data set pertaining to one's area of research are expected. Permission of instructor required. Typically offered Fall.

HK 62100 - Seminar In Public Health

Credit Hours: 1.00 to 3.00. Critical analysis of current issues in public health, with emphasis on reviewing current literature and research pertinent to community public health programs. Prerequisite: 6 credit hours in Health and Physical Education/Fitness. Typically offered Spring Fall Summer.

HK 62500 - Physical Activity And Public Health

Credit Hours: 3.00. In this course students will be exposed to epidemiological, behavioral, and public health issues relevant to effective promotion of physical activity. The course is appropriate for students training to be practitioners or researchers from a range of disciplines including exercise science, nutrition, psychology, and public health. Major topic areas will include physical activity epidemiology, determinants of physical activity in youth and adults, and current evidence for physical activity interventions ranging from individual, behavioral strategies, to environmental or policy approaches. Typically offered Spring.

HK 63400 - Seminar In Physical Education Curriculum Theory

Credit Hours: 3.00. A critical analysis of concepts underlying curriculum theories with a focus on theoretical perspectives and principles used for curriculum planning and design in physical education. Typically offered Spring Summer.

HK 66800 - Seminar In Exercise Physiology

Credit Hours: 3.00. Review of literature; design and conduct of research in an area of current interest in exercise physiology. Permission of instructor required. Typically offered Spring Fall Summer.

HK 66900 - Exercise Metabolism And Biochemistry

Credit Hours: 3.00. This course is designed to provide students with practice using basic laboratory skills which can then be applied to more sophisticated techniques in biochemical analysis. The course is a laboratory-based class and will provide considerable "hands on" experience. Lectures will focus on laboratory procedures, calculations, common lab problems and solutions, and laboratory safety procedures. Most of these measures will be made using an exercise context, i.e., standard exercise physiology tests (VO2 max, Wingate tests, etc.) will be performed to allow us to acquire blood samples for analysis. Prerequisites: HK 56800 or permission of the instructor. Typically offered Fall Spring.

HK 67000 - Advanced Topics In Motor Control

Credit Hours: 3.00. Selected topics in motor control. The subject matter will be data-based and drawn from research literature encompassing behavioral and physiological experimental paradigms. Students will critically evaluate and synthesize research to better understand the integration of individual systems in sensorimotor processing. Permission of instructor required. Typically offered Spring.

HK 67200 - Stress And Coping In Sport, Exercise And Physical Activity

Credit Hours: 3.00. This course examines stress, coping, and emotional processes as they relate to sport, exercise, physical activity, and the physical self. We will explore theoretical perspectives on stress and coping processes, examine the empirical evidence related to sport/exercise/physical activity/rehabilitation/physical self, and discuss applications of this knowledge. Course readings will cover topics including the history and conceptual issues of psychosocial stress, conceptual and methodological issues of coping, individual differences in stress and coping, the influence of sociocultural and contextual factors, and vulnerability and resilience. Prerequisite: HK 57400. Typically offered Spring.

HK 67400 - Special Topics In Sport And Exercise Psychology

Credit Hours: 3.00. An in-depth analysis of specific areas of theoretical and empirical work in sport or exercise psychology. Emphasis is placed on the critique, integration, and application of the literature reviewed. Rotating topics. Prerequisite: HK 57400. Typically offered Spring Fall.

HK 67500 - Design And Analysis Of Public Health Interventions

Credit Hours: 3.00. Professional competencies in design, implementation, evaluation and diffusion of health health interventions in community settings. Program planning paradigms, determinants of health behavior, and behavior change strategies serve as a basis for analyzing health interventions. Prerequisite: HS 56500. Typically offered Fall Spring.

HK 67600 - Theoretical Foundations Of Health Behavior

Credit Hours: 3.00. Examines the theoretical foundations of health behavior. Emphasizes the development of a conceptual framework for understanding and facilitating behavior enhancement, elimination, and/or maintenance in health promotion and education. Focuses on current theories regarding health-related behaviors. Permission of instructor required. Typically offered Spring Fall Summer.

HK 67800 - Motivational Processes In Sport And Exercise

Credit Hours: 3.00. Seminar focused on motivation in sport and exercise settings. Antecedents and consequences of motivated behavior are examined from theoretical, research, and application perspectives. Topics include participation motivation in sport, intrinsic/extrinsic orientations, achievement goals, causal attributions, group processes, and exercise motivation. Prerequisite: HK 57400. Typically offered Spring.

HK 68600 - Theories And Concepts Of Stress Management

Credit Hours: 3.00. Development of a conceptual understanding of stress and stress management. A seminar focused on the review of literature regarding psychophysiology of stress, relationship between stress and disease, and methods of preventing/relieving stress, models of stress research, and issues surrounding stress research methodology. Prerequisite: BIOL 20300, BIOL 20400. Permission of instructor required. Typically offered Spring.

HK 68700 - Public Health Administration

Credit Hours: 3.00. An introduction to the principals of management as applied to public health organizations, particularly local health departments. Topics include the organization of the U.S. public health system, legal and ethical obligations of public health administrators, the public health workforce and human resource issues, public health budgeting and finance, and leadership in the public health agency. The course is designed to introduce master's level students in public health to the management skills necessary to successfully implement a public health program. Typically offered Fall.

HK 68800 - Health Policy In The United States

Credit Hours: 3.00. Examines the formation, implementation, and evaluation of health policies, with emphasis on the legislative and regulatory processes that are involved. Discusses legislation in areas specific to public health promotion. Students are encouraged to consider their role in future policy initiatives. Permission of instructor required. Typically offered Fall.

HK 69000 - Advanced Studies

Credit Hours: 1.00 to 6.00. Topic and credit to be arranged. Individual study for the doctoral student. Permission of instructor required. Typically offered Spring Fall Summer.

HK 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

HK 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Health Sciences

HSCI 10100 - Introduction to the Health Sciences Professions

Credit Hours: 2.00. This course will present an overview of the fields in both the preventive, Public Health, as well as the clinical, Private Health, sides of the Allied Health Science Professions as it presents the holistic nature of health maintenance. Students will have the opportunity to hear from health professionals practicing in the allied health and preprofessional concentrations as well as from School of Health Sciences faculty in their areas of expertise in the fields of industrial hygiene, ergonomics, radiological sciences, toxicology and environmental health science. Typically offered Fall.

HSCI 13000 - Introduction To Medical Laboratory Science

Credit Hours: 1.00. An introduction to career opportunities in medical technology. Preprofessional and professional requirements. A survey of the major clinical laboratory departments and their applications to patient care and management. Discussion and interpretation of some of the major diagnostic tests, i.e., for cardiac enzymes, cholesterol, blood cells, diabetes, and drug monitoring. Typically offered Spring.

HSCI 13100 - Introduction To Medical Terminology

Credit Hours: 2.00. This self-paced learning course is designed to familiarize the student with terms used in medicine. Each body system will be studied individually. Word roots, prefixes, and suffixes will be used to build words relating to the system. Diagnostic and symptomatic terms will be introduced. Typically offered Fall Spring. CTL:IPO 1820 Medical Terminology

HSCI 19000 - Special Topics

Credit Hours: 1.00 to 8.00. Special topics, projects, or readings in selected areas of health sciences at a level appropriate for freshmen students. Permission of instructor required. Typically offered Summer Fall Spring.

HSCI 19500 - Freshman Scholars Project Seminar

Credit Hours: 2.00. Designed for Health Sciences Freshman Scholars. Class format is a one-hour weekly seminar that provides academic support and enrichment. Scholars complete semester-long projects with assigned professors or professionals in the area of their major. Typically offered Fall Spring.

HSCI 19501 - School Of Health Sciences Freshman Honors Seminar

Credit Hours: 1.00. This course is for Freshman students in the School of Health Sciences Honors Program. This course consists of a 50 minute weekly seminar meeting designed to orient and familiarize Freshman HSCI Honors students with the School of Health Sciences including research areas and current topics in public health and biomedical research. Students will interact with guest speakers and expand their knowledge base in health science research. In addition to the seminar, students will be matched to a faculty mentor in a research area of their interest during the fall semester. Students will develop and design a research project with their faculty mentor (to be conducted in HSCI 19601 during the spring semester). In the spring semester, students will enroll in the seminar series (HSCI 19501) and in the research project course (HSCI 19601) to complete their project. Each student will be responsible for presenting and reporting on their research project during the spring seminar series. Permission of departmental required. Typically offered Fall Spring.

HSCI 19601 - School Of Health Sciences Freshman Honors Project

Credit Hours: 1.00. This course is for Freshman students in the School of Health Sciences Honors Program. In this course students will earn credit for work completed on their Honors Project under supervision of their faculty mentor. Students enroll in this course during the spring semester concurrently with HSCI 19501. During the fall semester in HSCI 19501, students will be matched to a faculty mentor in the research area of their choice and complete a Project Description Form based upon the work to be completed during this course. Course meeting times and frequency are to be set by the student and faculty mentor with an estimated commitment of 3-4 hours per week. Hours are to be arranged between the student and the faculty mentor, with at least weekly or biweekly meetings set aside for a one-on-one session between the student and faculty mentor. Some students may also be matched to professional mentors off campus depending on their interests and future goals. The regular meeting times should be set during the first week of class. Working hours must not conflict with other course obligations or consume too much of students' study time. Permission of department required. Typically offered Spring.

HSCI 20100 - Principles of Public Health Science

Credit Hours: 3.00. This course begins with a definition of public health and a review of its history and its role in disease prevention. The basic tools of public health practice, vital statistics and epidemiology, are then presented. After gaining an understanding of how these tools are used in assessing the health status of a community, the etiology and control of infectious and non-infectious threats to our health will be examined. The course concludes with risk analysis as a basis for public health policy determination. Typically offered Spring.

HSCI 20200 - Essentials Of Environmental, Occupational, And Radiological Health Sciences

Credit Hours: 3.00. This course is designed to introduce the essential concepts of Environmental, Occupational, and Radiological Health Science. The principles of these three fields including the environmental impacts on human health and disease, environmental toxicology, occupational health concerns, contemporary occupational health issues, radioactivity, and the human health effects of exposure to ionizing radiation will be discussed. Typically offered Fall.

HSCI 22000 - Principles Of Central Services Technology

Credit Hours: 2.00. This is a correspondence course for central service personnel and operation room infection control and material management employees. Incorporates major issues related to central service such as infection control, instrumentation, packaging, chemical disinfection, ethylene oxide, steam and dry heat sterilization, and preparation of external solutions. Typically offered Fall Spring Summer.

HSCI 29000 - Special Topics

Credit Hours: 1.00 to 8.00. Special topics, projects, or readings in selected areas of health sciences at a level appropriate for sophomore students. Permission of instructor required. Typically offered Summer Fall Spring.

HSCI 29500 - Introduction to Forensic Sciences

Credit Hours: 3.00. Intended for those students wishing to combine the clinical laboratory science curriculum with forensic science. Introduction to pathology, evidence, DNA recognition, blood chemistry, and techniques. Entry level, general chemistry/biology preferred. Typically offered Fall Spring.

HSCI 29501 - School Of Health Sciences Sophomore Honors Seminar

Credit Hours: 1.00. This course is for sophomore students in the School of Health Sciences Honors Program. This course consists of a 50 minute weekly seminar meeting to discuss current topics in health science, public health, and biomedical research.

Students will interact with guest speakers and expand their knowledge base in health sciences research. In addition, each student will be responsible for presenting and reporting on their ongoing honors research project. Permission of department required. Typically offered Spring.

HSCI 29601 - School of Health Sciences Sophomore Honors Project

Credit Hours: 1.00. This course is for Sophomore students in the School of Health Sciences Honors Program. In this course students will earn credit for work completed on their Honors Project under supervision of their faculty mentor. Students enroll in this course in both fall and spring semesters (concurrently with HSCI 29501 in the spring semester). An updated Project Description Form will be due at the beginning of each semester based on the progress and any changes to the research plan. Course meeting times and frequency are to be set by the student and faculty mentor with an estimated commitment of 3-4 hours per week. Hours are to be arranged between the student and the faculty mentor, with at least weekly or biweekly meetings set aside for a one-on-one session between the student and faculty mentor. Some students may also be matched to professional mentors off campus depending on their interests and future goals. The regular meeting times should be set during the first week of class. Working hours must not conflict with other course obligations or consume too much of students' study time. Permission of department required. Typically offered Fall Spring.

HSCI 31200 - Radiation Science Fundamentals

Credit Hours: 3.00. This course introduces principles and concepts related to nuclear energetics, radioactive decay, the interactions of ionizing radiation with matter, and the human health effects of exposure to ionizing radiation. Fundamental concepts related to atomic and sub-atomic physical processes as well as relevant aspects of modern physics are briefly reviewed. Students gain practical experience and enhance their understanding of radiation protection by participating in a radiological emergency response exercise (RERE). Typically offered Fall.

HSCI 31300 - Principles Of Radiation Detection And Measurement

Credit Hours: 2.00. Course presents an introduction to the principles of radiation detection and measurement, including statistical models, counting statistics, error analysis, detection limits, ionization chambers, proportional counters, GM counters, scintillation counters, gamma-ray spectroscopy, solid-state detectors, TLDs, track-etch and bubble detectors. Typically offered Fall.

HSCI 32200 - Radiation Dosimetry

Credit Hours: 3.00. Principles of radiation protection, with emphasis on monitoring principles, personnel dosimetry, internal dose calculations, bioassay, waste management, and practical aspects of the use of radionuclides and radiation-producing devices. Typically offered Fall.

HSCI 32201 - Radiation Dosimetry Lab

Credit Hours: 1.00. Practical aspects of radiation monitoring; sample analysis, personnel dosimetry, instrument calibration, radioactive waste management, record keeping, and germanium spectrometry. Typically offered Fall.

HSCI 33000 - Aspects Of The Medical Technology Laboratory

Credit Hours: 1.00. The role of the medical technologist in the clinical laboratory. Overview of the clinical departments, with an emphasis on disease states and on the procedures and instruments used to perform clinical tests. Special topics and case studies are presented. Provides students with an idea of what to expect during their clinical experiences. Instructors: medical technologists from the affiliated hospital programs. Typically offered Fall.

HSCI 33200 - Introduction To Hematology

Credit Hours: 2.00. An introduction to hematology and coagulation. Clinical laboratory tests will be discussed. Lectures will cover maturation, morphology, and function of normal and abnormal blood cells. Information on coagulation diseases and disorders will be presented. Typically offered Fall.

HSCI 33300 - Introduction To Immunology

Credit Hours: 2.00. An introduction to the various aspects of the immune system. Students will become familiar with components of the immune system and their interactions. Emphasis on clinical applications. Various diseases will be discussed as they relate to the immune system. Typically offered Spring.

HSCI 34500 - Introduction To Occupational And Environmental Health Sciences

Credit Hours: 3.00. Principles of occupational health (industrial hygiene) and environmental health as related to anticipation, recognition, evaluation, and control of hazards in the workplace and the surrounding community. Emphasis is on hazards of chemicals and their role in occupationally and environmentally related diseases. Historical basis and current legislation are discussed. In addition, the principles of epidemiology, toxicology, exposure standards, and respiratory protection are addressed. Typically offered Fall.

HSCI 34600 - Industrial Hygiene Engineering Control

Credit Hours: 4.00. Study of the various techniques needed to control hazards in the workplace. Major emphasis is placed on developing a working understanding of industrial ventilation, including basic principles of fluid flow, hood and duct design, and system balancing. Effects and control of the physical hazards of noise, vibration, and heat stress are addressed. A field trip to a major industry summarizes the course material. Typically offered Spring.

HSCI 34700 - Industrial Hygiene Hazard Evaluation

Credit Hours: 3.00. Principles of hazard measurements; critical analysis of field measuring equipment, instrument evaluation, and calibration, planning and sample strategy. Typically offered Fall.

HSCI 34800 - Industrial Hygiene Instrumentation Techniques

Credit Hours: 3.00. Sophisticated field and laboratory instrumentation and techniques, sampling methodology for organic vapors, dust, fibers, noise, and heat; calibration and validation techniques; emphasis on critical analysis of data. Typically offered Spring.

HSCI 34900 - Health Sciences Practice

Credit Hours: 1.00 to 8.00. Applied work experience in industry, government laboratory, or educational and research institution, and oral/written reports of this practice. Permission of instructor required. Typically offered Fall Spring Summer.

HSCI 39000 - Special Topics

Credit Hours: 1.00 to 8.00. Special topics, projects, or readings in selected areas of health sciences at a level appropriate for junior students. Permission of instructor required. Typically offered Summer Fall Spring.

HSCI 39501 - School Of Health Sciences Junior Honors Seminar

Credit Hours: 1.00. This course is for Junior students in the School of Health Sciences Honors Program. This course consists of a 50 minute weekly seminar meeting to discuss current topics in health science, public health, and biomedical research. Students will interact with guest speakers and expand their knowledge base in health sciences research. In addition, each student will be responsible for presenting and reporting on their ongoing honors research project. Permission of department required. Typically offered Spring.

HSCI 39601 - School Of Health Sciences Junior Honors Project

Credit Hours: 1.00. This course is for Junior students in the School of Health Sciences Honors Program. In this course students will earn credit for work completed on their Honors Project under supervision of their faculty mentor. Students enroll in this course in both the fall and spring semesters (and concurrently with HSCI 39501 in the spring semester). An updated Project

Description Form will be due at the beginning of each semester based on the progress and any changes to the research plan. Course meeting times and frequency are to be set by the student and faculty mentor with an estimated commitment of 3-4 hours per week. Hours are to be arranged between the student and the faculty mentor, with at least biweekly meetings set aside for a one-on-one session between the student and faculty mentor. Some students may also be matched to professional mentors off campus depending on their interests and future goals. The regular meeting times should be set during the first week of class. Working hours must not conflict with other course obligations or consume too much of students' study time. Permission of departmental required. Typically offered Fall Spring.

HSCI 40000 - International Special Topics

Credit Hours: 1.00 to 8.00. Courses taken during an International experience that is recognized by the University. Permission of Department required. Typically offered Fall Spring Summer.

HSCI 43800 - Reactor Health Physics

Credit Hours: 3.00. Concepts of health physics as related to nuclear power and research reactors, sources and prevention of exposure, design and operational criteria for meeting ALARA exposure limits, criticality dosimetry, reactor monitoring limits, design and operation of environmental surveillance programs around nuclear power stations, reactor site criteria, licensing and regulations, downwind dose assessment, credible accidents and risk analysis, and emergency planning. Typically offered Fall.

HSCI 43801 - Reactor Health Physics Laboratory

Credit Hours: 1.00. Practical aspects of radiation dosimetry, monitoring, and surveying devices and procedures used by reactor health physicists. Typically offered Fall.

HSCI 44500 - Industrial Hygiene Internship

Credit Hours: 2.00. Discussion class based on applied work experience as an industrial hygiene assistant or technician at an industrial, consulting, hospital, government, or education and research institution. Topics covered also include professional and ethical aspects derived from students' work experiences. Written and oral reports as well as other classroom assignments. Restricted to industrial hygiene majors who have completed an acceptable industrial hygiene work experience. Typically offered Fall Spring Summer.

HSCI 44600 - Applied Industrial Hygiene

Credit Hours: 3.00. This course allows the student to synthesize his or her basic industrial hygiene fundamentals to understand

how they apply in the real world. Issues faced by industrial hygienists will be addressed by a variety of guest speakers. Class projects add to the diversity of this senior capstone course. Typically offered Fall.

HSCI 45100 - Clinical Biochemistry

Credit Hours: 1.00 to 10.00. This course is designed to provide principles of biochemistry for clinical application for medical technologists. The course encompasses an introduction to carbohydrate, amino acid, and lipid metabolism. Also included are lectures on basic endocrinology, enzymes, and biosynthesis of steroid hormones. Physiological principles are stressed with respect to liver, lung, and kidney function. Special emphasis is placed on correlation of the theoretical and clinical areas. Typically offered Fall Spring.

HSCI 45200 - Clinical Chemistry

Credit Hours: 1.00 to 10.00. This course is designed to provide the medical technologist with the principles and application of clinical chemistry. Methods of instrumental analysis include a variety of automated procedures, electrophoresis, immunoelectrophoresis, immunodiffusion, radioisotopes, steroids, hormone assay, and toxicology. Quality control for clinical chemistry is included. Supervised clinical laboratory experience is offered, with students rotating through the various areas of clinical chemistry on a sequential rotational basis. Typically offered Fall Spring.

HSCI 45201 - Clinical Chemistry Laboratory

Credit Hours: 1.00 to 8.00. Theory and practice of analytical biochemistry as applied to pathologic states, including related methodology and instrumentation. Typically offered Fall Spring.

HSCI 45300 - Clinical Hematology

Credit Hours: 1.00 to 10.00. Study of the functions, maturation, and morphology of blood cells. Blood cells, platelets, and reticulocyte counting procedure. Experiences in the study of cellular content of other body fluids are offered. Lectures and laboratory are designed to teach techniques of sedimentation rates, hematocrits, corpuscular indices, hemoglobin red cell fragility, and special staining procedures. Also, routine and special coagulation studies are taught. Supervised experience in clinical hematology offers opportunities for study in routine and special hematology and coagulation procedures. Typically offered Fall Spring.

HSCI 45301 - Clinical Hematology Laboratory

Credit Hours: 1.00 to 8.00. Study of the development, morphology and pathophysiology of the formed element of the blood and

bone marrow. Includes hematologic methods and instrumentation used in blood, bone marrow and body fluids for disease diagnosis. Typically offered Fall Spring.

HSCI 45400 - Clinical Immunohematology

Credit Hours: 1.00 to 10.00. A review of serologic principles and technical fundamentals of transfusion practice; a comprehensive consideration of all blood groups, with emphasis on ABO and Rh-Hr blood group systems. Extensive practice is gained in pre-transfusion techniques and antibody identification in the laboratory. Other blood types and antigen-antibody relationships are taught in laboratory and lectures. Also included are blood donor room procedures; preparation of blood components; correlation of blood component therapy with disease states; quality control of all reagents, procedures, and equipment used; and laboratory safety measures, all of which offer the best patient care and protection of laboratory personnel. Typically offered Fall Spring.

HSCI 45401 - Clinical Immunohematology Laboratory

Credit Hours: 1.00 to 8.00. Study of red cell antigen systems, antibody screening and identification, compatability testing and immunopathiologic conditions. Includes lab analysis, donor requirements, and current practices in component preparation and hematherapy. Typically offered Fall Spring.

HSCI 45500 - Clinical Microbiology

Credit Hours: 1.00 to 10.00. Lectures and clinical laboratory experience in diagnostic procedures as aids to the diagnosis of human disease. Proper selection of techniques for the isolation and identification of medically important bacteria. Special emphasis is placed on newer methods for anaerobic bacteria identification. Also includes lectures and laboratory identification in the fields of mycology and microbacteriology, with emphasis on isolation and identification. Practical applications of fluorescent antibody tests are performed. Typically offered Fall Spring.

HSCI 45501 - Clinical Microbiology Laboratory

Credit Hours: 1.00 to 8.00. Practice of the isolation and identification of pathogenic bacteria, rickettsia and mycobacteria in clinical specimen cultures using morphology, biochemical and serological reactions. Drug susceptibility and clinical significance are included. Typically offered Fall Spring.

HSCI 45600 - Clinical Nuclear Medicine And Radioisotopes

Credit Hours: 1.00 to 10.00. Lectures and clinical rotation designed to familiarize the medical technology student with the

terminology, instrumentation, dosages, and "in vitro" and "in vivo" rationale and procedures pertinent to a nuclear medicine department. Typically offered Fall Spring.

HSCI 45700 - Clinical Parasitology

Credit Hours: 1.00 to 10.00. Techniques of specimen examination, identification of cysts and ova, life cycles of parasites. Typically offered Fall Spring.

HSCI 45800 - Clinical Serology

Credit Hours: 1.00 to 10.00. Lectures and a laboratory experience in serology, including the preparation of antigen, flocculation tests for syphilis, heterophile antibody tests, creative proteins, RA test, FTA, rubella testing. Also included are lectures in immunology that include classifications of immunoglobulins; mechanism of antibody formation; immune response; types of antigen-antibody reactions; and theories of radioimmunoassay. Typically offered Fall Spring.

HSCI 45900 - Clinical Toxicology

Credit Hours: 1.00 to 10.00. A basic orientation in the use of instrumentation, such as mass spectrophotometry, and liquid and gas chromatography that is used in the specialized toxicology laboratory. Typically offered Fall Spring.

HSCI 46000 - Clinical Urinalysis

Credit Hours: 1.00 to 10.00. Routine analysis, chemical tests, sediment identification, renal function tests, pregnancy tests. Typically offered Fall Spring.

HSCI 46100 - Clinical Virology

Credit Hours: 1.00 to 10.00. Techniques involved in the performance of virologic studies for rubella, influenza, mumps, Newcastle disease, herpes, polio, and hepatitis. Tissue cultures are maintained for primary virus isolation. Typically offered Fall Spring.

HSCI 46200 - Clinical Cytology

Credit Hours: 1.00 to 10.00. Lectures and laboratory experience in examination of body fluids: e.g., spinal fluid, synovial fluid, and seminal fluid. Lectures on the use and application of various types of microscopy. Typically offered Fall Spring.

HSCI 46300 - Clinical Histology

Credit Hours: 1.00 to 10.00. Histologic technique (principles of dehydration, embedding, sectioning, routine staining, frozen sections, decalcification, exfoliative cytology). Typically offered Fall Spring.

HSCI 46400 - Clinical Anatomy And Physiology

Credit Hours: 1.00 to 10.00. Review of the structure and function of the systems most concerned with laboratory tests: heart, kidney, liver, hematopoietic system, etc. Typically offered Fall Spring.

HSCI 46500 - Introduction To Laboratory Education And Management

Credit Hours: 1.00 to 3.00. A study of the principles and techniques of clinical instruction, and inservice and continuing education as well as administration and supervision. Typically offered Fall Spring.

HSCI 46600 - Clinical Immunology

Credit Hours: 1.00 to 8.00. Review of the protective and adverse aspects of the cellular and humoral immune responses. Typically offered Fall Spring.

HSCI 46601 - Clinical Immunology Laboratory

Credit Hours: 1.00 to 8.00. Performance of immunological procedures and clinical significance of test results. Typically offered Fall Spring.

HSCI 46700 - Clinical Correlation

Credit Hours: 1.00 to 8.00. Written case studies are utilized and designed to correlate laboratory test with disease states. Designed as a review for all areas in the clinical laboratory. Typically offered Fall Spring.

HSCI 46800 - Coagulation

Credit Hours: 1.00 to 8.00. Students study the theory and practice of testing coagulation mechanisms during lecture and clinical application. Typically offered Fall Spring.

HSCI 46900 - Clinical Instrumentation And Laboratory Techniques

Credit Hours: 1.00 to 8.00. A study of the principles of instrumental analysis used in clinical laboratories. Typically offered Fall Spring.

HSCI 48500 - Health Physics Internship

Credit Hours: 1.00 to 8.00. Applied work experience as a health physics assistant or technician at a nuclear power generating station, government laboratory, hospital, or education and research institution. Permission of instructor required. Typically offered Summer Fall Spring.

HSCI 49000 - Special Topics

Credit Hours: 1.00 to 8.00. Special topics, projects, or readings in selected areas of health sciences at a level appropriate for senior students. Permission of instructor required. Typically offered Fall Spring.

HSCI 49501 - School Of Health Sciences Senior Honors Seminar

Credit Hours: 1.00. This course is for Senior students in the School of Health Sciences Program. This course consists of a 50 minute weekly seminar meeting to discuss current topics in health science, public health, and biomedical research. Students will interact with guest speakers and expand their knowledge base in health sciences research. In addition, each student will be responsible for presenting and reporting on their ongoing honors research project. Permission of department required. Typically offered Spring.

HSCI 49601 - School Of Health Sciences Senior Honors Project

Credit Hours: 1.00. This course is for Senior students in the School of Health Sciences Honors Program. In this course students will earn credit for work completed on their Honors Project under supervision of their faculty mentor. Students will enroll in this

course in both fall and spring semesters (and concurrently with HSCI 49501 in the spring semester). An updated Project Description Form will be at the beginning of each semester based on the progress and any changes to the research plan. Course meeting times and frequency are to be set by the student and faculty mentor with an estimated commitment of 3-4 hours per week. Hours are to be arranged between the student and the faculty mentor, with at least weekly or biweekly meetings set aside for a one-on-one session between the student and faculty mentor. Students may also be matched to professional mentors off campus depending on their interests and future goals. The regular meeting times should be set during the first week of class. Working hours must not conflict with other course obligations or consume too much of students' study time. Permission of department required. Typically offered Fall Spring.

HSCI 51400 - Radiation Instrumentation Laboratory

Credit Hours: 2.00. Laboratory techniques required for the application of radiation and radionuclides. Typically offered Spring.

HSCI 52600 - Principles Of Health Physics And Dosimetry

Credit Hours: 3.00. Principles of health physics, radiation dosimetry, and radiation shielding. Topics covered include natural and man-made radiation environments, operational radiation quantities and units, radiation protection philosophy, risk and dose limits, dose-response models, mortality estimates and risk calculations. Typically offered Fall.

HSCI 53400 - Applied Health Physics

Credit Hours: 3.00. Lecture and case studies related to the application of radiation dosimetry and shielding principles to the practice of health physics, including environmental and in-plant monitoring, emergency response, decommissioning and decontamination, operational criteria for meeting ALARA exposure limits, and the transport, disposal and treatment of radioactive waste. Epidemiological studies related to radiological accidents and nuclear power are also examined. Typically offered Spring.

HSCI 54000 - Radiation Biology

Credit Hours: 3.00. Effects of ionizing radiation on living systems at the molecular, cellular and tissue levels. Biological basis for radiation therapy treatment planning and radiation protection. Typically offered Spring.

HSCI 54500 - Advanced Topics In Exposure Assessment

Credit Hours: 1.00. Current research and practice in human environmental exposure assessment including homogeneous exposure groups, job-task modeling, physiologically-based pharmacokinetic and modeling of exposure and dose, biological markers of

exposure, statistical issues, exposure assessment in epidemiology, and risk assessment. Students and faculty present readings and lead discussions. Permission of instructor required. Typically offered Fall.

HSCI 54600 - Advanced Industrial Hygiene Control Technology

Credit Hours: 1.00. Students and faculty present readings and lead discussions on current research and practice in industrial hygiene control technology, including general control strategy, personal protective equipment, and ventilation. Students conduct self-paced, step-wise solutions to practical case studies. Ventilation design software is used to solve design problems. Permission of instructor required. Typically offered Spring.

HSCI 54700 - Environmental Epidemiology

Credit Hours: 2.00. The use of epidemiological methods to study the adverse effects of environmental agents on human health. Study designs, association and causation, statistical analysis, bias and confounding, modeling of exposure-response relationships, molecular epidemiology, and investigation of disease outbreaks. The emphasis of the course is on analytical studies, quantitative measures of association, and critical readings of current literature. Typically offered Fall Spring.

HSCI 55100 - Physical Agents In Environmental Health

Credit Hours: 3.00. Physical characterization and biological interactions of nonionizing radiation with emphasis on the adverse effects of human exposure. Topics include source characterization, environmental exposure assessment, measurement instrumentation, toxicological and epidemiological findings, control strategies. Typically offered Spring.

HSCI 55200 - Introduction To Aerosol Science

Credit Hours: 3.00. The principles of aerosol behavior and sampling, with particular emphasis on applications in the health sciences. Topics include aerosol aerodynamics, aerosol filtration, pulmonary deposition of aerosols, methods of environmental sampling, and generation of laboratory aerosols. Typically offered Fall Spring.

HSCI 56000 - Toxicology

Credit Hours: 3.00. (MCMP 56000) Introduction to general principles of toxicology, target organ toxicity, and safety evaluation. Covers toxicity of metals, solvents, pesticides, gases, dusts, and food additives. Typically offered Fall.

HSCI 56200 - Analytical Toxicology And Pathology

Credit Hours: 3.00. Historically, toxicology has been defined as the study of the adverse effects of xenobiotics. Today, toxicology encompasses much broader areas, including the study of endogenous compounds, physical agents, and even using toxicants as research tools. Basic and introductory toxicology courses cover the principles of toxicant metabolism and target organ toxicity. This course, Analytical Toxicology and Toxicologic Pathology is focused on the research and clinical applications of these principles. Two major areas will be covered: (1) principles of toxicant detection in biological matrices and (2) the assessment of pathological effects caused by toxicant exposure in biological systems. Laboratory sessions associated with each major topic allow students to have hands-on experience in these advanced analytical and pathological technologies. This course provides a unique opportunity for students to learn techniques that research and clinical toxicologists use daily in scientific or clinical laboratories. The course is suitable to both graduate and upper-class undergraduate students who are interested in toxicology, forensic science, veterinary medicine, environmental and occupational health, food toxicity, pharmaceutical drug testing, medical laboratory science, and general human and children's health. Typically offered Spring.

HSCI 57000 - Introduction To Medical Diagnostic Imaging

Credit Hours: 3.00. This course teaches the fundamentals of medical imaging, including the basic physics and engineering associated with each imaging modality (CT, MRI, PET, and ultrasound), as well as mathematics and computational tools associated with image reconstruction and image processing. The course is intended for students in health sciences, biomedical engineering, physics, and life sciences. Typically offered Spring.

HSCI 57200 - Radiation Oncology Physics

Credit Hours: 3.00. An introductory course to the physical principles, equipment, processes, imaging guidance, and clinical techniques involved in the treatment of cancer patients with external radiation beams and radioactive sources. Various external radiation beam types and their energy deposition characteristics are described. Treatment planning dose calculation algorithms and point dose calculations are discussed. The use of international dosimetry protocols for radiation beam calibration are covered in detail. Typically offered Spring.

HSCI 57400 - Medical Health Physics

Credit Hours: 2.00. This course introduces the legislation and international and national recommendations relevant to the practice of radiation protection in medicine. Principles for the design of radiation use monitoring programs and shielding for radiation facilities is covered. Radiation risk avoidance and management for staff, patients and their families, and members of the public are discussed. Typically offered Fall.

HSCI 57500 - Introduction To Environmental Health

Credit Hours: 3.00. (HK 57500) An introduction to chemical, physical and biological factors in the environment that affect the health of the community. This course examines health issues, scientific understanding of causes and approaches to the control of

major environmental health problems in industrialized and developed countries. This is a core course for the Masters in Public Health (MPH) degree at Purdue. Typically offered Spring.

HSCI 58000 - Occupational Safety And Ergonomics

Credit Hours: 3.00. Occupational safety is a cross-disciplinary area concerned with protecting the safety, health and welfare of people engaged in work. Occupational ergonomics is a branch of science that focuses on optimizing the relationships between workers and their work environment. This course focuses on the principles and applications of safety and ergonomics as it applies to workers. The first part of the course will consist of lectures on the fundamentals of safety standards and liability and the development of work-related musculoskeletal disorders, ergonomic risk factors including work practices, tools and workstation design. The last part will consist of identification and use of safety and ergonomic controls to reduce and prevent work-related fatalities, injuries, and musculoskeletal disorders. Typically offered Fall.

HSCI 59000 - Special Topics

Credit Hours: 1.00 to 8.00. Special topics, projects, or readings in selected areas of health sciences at a level appropriate for seniors and graduate students. Permission of instructor required. Typically offered Spring Fall Summer.

HSCI 67100 - Biochemical Toxicology

Credit Hours: 1.00. (MCMP 671) Analysis of experimental methods for evaluating toxic mechanisms of selected chemicals such as halogenated solvents, arsenic, alcohols, and nitriles. Offered in alternate years. Prerequisite: HSCI 56000. Typically offered Spring.

HSCI 69000 - Special Topics

Credit Hours: 1.00 to 8.00. Special topics, projects, or readings in selected areas of health sciences at a level appropriate for graduate students. Permission of instructor required. Typically offered Spring Fall Summer.

HSCI 69600 - Seminar

Credit Hours: 0.00 or 1.00. Selected topics in health sciences presented by staff, students, and invited speakers. Typically offered Fall Spring.

HSCI 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

HSCI 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Hebrew

HEBR 10100 - Modern Hebrew Level I

Credit Hours: 3.00. Introduction to Modern Hebrew: the writing and sound systems, and systematic presentation of basic structures. All language skills - reading, writing, speaking, and comprehension - are emphasized. No previous knowledge of Hebrew required. Typically offered Fall Spring.

HEBR 10200 - Modern Hebrew II

Credit Hours: 3.00. Continuation and extension of the first semester. The course aims to develop fluency in reading, comprehension, and spoken language. Knowledge of grammar and vocabulary is expanded. Typically offered Spring.

HEBR 12100 - Biblical Hebrew Level I

Credit Hours: 3.00. The first semester of biblical Hebrew will present the basic elements of the language, including alphabet, vocabulary, and grammar. No previous knowledge of Hebrew required. Typically offered Fall.

HEBR 12200 - Biblical Hebrew Level II

Credit Hours: 3.00. The second semester of biblical Hebrew will continue the study of reading, vocabulary and grammar, based on selections form the Hebrew Bible. Typically offered Spring.

HEBR 20100 - Modern Hebrew Level III

Credit Hours: 3.00. Extensive practice in reading, speaking, and writing Hebrew, based on a variety of subjects from daily life and literature. Continued study of grammar and reading both in the modern language. Typically offered Fall Spring.

HEBR 20200 - Modern Hebrew Level IV

Credit Hours: 3.00. Extensive practice in reading, speaking, and writing Hebrew, based on a variety of subjects from daily life and literature. Continued study of grammar and reading in the modern language. Typically offered Spring.

HEBR 22100 - Biblical Hebrew Level III

Credit Hours: 3.00. The third semester of biblical Hebrew focuses on reading and translation of extended passages form the Pentateuch and the use of textual criticism. Typically offered Fall.

HEBR 22200 - Biblical Hebrew Level IV

Credit Hours: 3.00. The fourth semester of biblical Hebrew exposes the student to both narrative and poetic sections of the Bbile. Typically offered Spring.

HEBR 28000 - Modern Israel: Cinema, Literature, Politics And History

Credit Hours: 3.00. Critical survey/exploration of major traits of Israeli culture through a variety of media: literature, film and music, in the larger context of Judaism, Zionism, as well as the creation of a new state and culture. Conducted in English; no knowledge of Hebrew is necessary. Typically offered Fall Spring Summer.

HEBR 28400 - Ancient Near Eastern History And Culture

Credit Hours: 3.00. This course is a survey of the development of the ancient Near East, from its pre-history to Alexander the Great. It emphasizes the evolutions of various Near Eastern cultures in their many manifestations; art, government, agriculture, economics, philosophy, religion, ethics, and science. Taught in English. Typically offered Fall Spring.

HEBR 38500 - The Holocaust In Modern Hebrew Literature

Credit Hours: 3.00. This course critically examines the Holocaust and the ways in which it has influenced modern Hebrew

literature, the role it plays, and how it is represented in modern Hebrew literature. Conducted in English; no knowledge of Hebrew is necessary. Typically offered Fall Spring Summer.

College Health and Human Sciences

HHS 19700 - Health&Human Science First Year Honors Seminar-Global Challenges In Human Health And Quality Of Life

Credit Hours: 1.00. Every day, members of the public are flooded with stories and statistics about human problems - medical problems, social problems, psychological problems, financial problems, and others. Developing good awareness of major human challenges around the world, and a good instinct for how to figure out what to believe are good survival skills for anyone. They are especially important for scientists who are obligated to seek accuracy and for individuals who are going to become leaders. In this course, we will deepen our understanding of global human challenges; develop our own personal detection systems for 'dubious data;' and learn about how scientists try to address common distortions in data related to their areas of study. Typically offered Fall Spring.

History

HIST 10200 - Introduction To The Ancient World

Credit Hours: 3.00. A history of the ancient world (Near East, Greece, and Rome) from its prehistoric origins to its dismemberment in the early Christian era. It is designed to meet the needs of the beginning student of European and world history.

HIST 10300 - Introduction To The Medieval World

Credit Hours: 3.00. Barbarians, kings, queens, peasants, witches, saints, teachers, students, heretics, Moslems, Jews, Christians, love, death, monks, farm life, city life, ordinary men, women, and children as Europe develops from A.D. 500 to 1500. Typically offered Fall Spring Summer.

HIST 10400 - Introduction To The Modern World

Credit Hours: 3.00. Traces the expansion of Europe into the Americas, Africa, and Asia. The French Revolution, nationalism, and the development of western European states from the era of the Reformation to the present are studied. Typically offered Fall Spring Summer.

HIST 10500 - Survey Of Global History

Credit Hours: 3.00. A survey of the interaction between the civilizations of Asia, Africa, Europe, and the Americas since 1500, with attention to cultural comparisons over time, and to the implications of global interdependence for the environment, health, economy, and geopolitics. Typically offered Fall Spring Summer.

HIST 15100 - American History To 1877

Credit Hours: 3.00. A study of the development of American political, economic, and social institutions from the early explorations and colonial settlements through Reconstruction. Typically offered Fall Spring Summer. CTL:ISH 1010 American History I

HIST 15200 - United States Since 1877

Credit Hours: 3.00. A study of the growth of the United States from 1877 to the present. The new industrialism, agrarian problems, depression, the New Deal, the two world wars, the cold war, and similar topics are analyzed. Typically offered Fall Spring Summer. CTL:ISH 1011 American History II

HIST 19500 - The Historian's Craft: Historical Research And Film

Credit Hours: 3.00. Examines various interpretative approaches and genres of history; students also critique a historical film based on their own research, learning to decipher fact from fiction and how bias and subjectivity enter into the history on screen. Typically offered Fall Spring.

HIST 20100 - Special Topics In History

Credit Hours: 3.00. This variable title course deals with broad historical topics that transcend and telescope traditional analytical, chronological, and geographical boundaries. Content will vary with the instructors teaching the class. Typically offered Summer Fall Spring.

HIST 21000 - The Making Of Modern Africa

Credit Hours: 3.00. This course provides students with a comprehensive introduction to modern African history from 1800 to the present. Using a variety of films, novels and scholarly resources, we will examine the major historical forces that have shaped African lives over the last two centuries. Emphasis will be placed on African experiences of slavery, colonialism, liberation

struggles, and post-independence national building. Students will also learn to analyze contemporary African issues within a larger historical context. Typically offered Fall Spring.

HIST 22800 - English History To 1688

Credit Hours: 3.00. This course is designed to survey the growth and development of English society from its beginning through the seventeenth century. Emphasis is put upon those institutions and events that influenced the establishments of the English legal system. Typically offered Fall.

HIST 22900 - English History Since 1688

Credit Hours: 3.00. A continuation of HIST 22800. Emphasis is placed upon Great Britain as a world and imperial power. Attention is given particularly to the industrial revolution, the growth and achievements of democratic institutions, and the role Britain has played in Western civilization in recent times. Typically offered Spring.

HIST 23800 - History Of Russia From Medieval Times To 1861

Credit Hours: 3.00. This course explores the main characteristics of early Russian society, culture and politics. Topics include: the Kievan principalities, Orthodox Christianity, the Mongols, the rise of Moscow, the Petrine reforms, peasant and national rebellions, revolutionary movements, and the Tsarist empire to the Crimean War. Typically offered Fall Spring Summer.

HIST 23900 - History Of Russia From 1861 To The Present

Credit Hours: 3.00. This course surveys the paths of the Russian empire through economic modernization, social transformation, and World War I; the revolutionary regimes of Bolshevism, Leninism, and Stalinism; World War II and the Cold War; the collapse of the USSR; and the new Eurasian states. Typically offered Fall Spring Summer.

HIST 24000 - East Asia And Its Historic Tradition

Credit Hours: 3.00. Survey of the great historic traditions of China, Japan, and Korea from earliest times to approximately 1600, with special attention to state formation, society, intellectual, philosophical, and religious developments, and the visual, musical, and literary arts. Typically offered Fall.

HIST 24100 - East Asia In The Modern World

Credit Hours: 3.00. The response of China, Japan, and Korea to the coming of the West in modern times, with special stress on the effect of Western ideas and machines. Approximately 1600 to the present. Typically offered Spring.

HIST 24300 - South Asian History And Civilizations

Credit Hours: 3.00. Survey history of India, Pakistan, and Bangladesh, from the origins of South Asian civilization to the present. Topics include ancient India, the Mughal Empire, the colonial experience, the independence movement, and conflict and popular culture. Typically offered Fall Spring.

HIST 24500 - Introduction To The Middle East History And Culture

Credit Hours: 3.00. A survey of the civilization of the Middle East from the rise of Islam to the present. The political, social, and cultural institutions are examined along with the problem of adjusting these to the pressure of Western civilization in the last two centuries. Typically offered Fall Spring.

HIST 24600 - Modern Middle East And North Africa

Credit Hours: 3.00. This course explores the political, social, and cultural factors that have contributed to the formation of the modern Middle East. Course includes short stories and a selection of documentary films from the region. Typically offered Summer Fall Spring.

HIST 25000 - United States Relations With The Middle East And North Africa

Credit Hours: 3.00. This course examines US relations with the Middle East and North Africa since World War II. Typically offered Fall Spring.

HIST 27100 - Introduction To Colonial Latin American History (1492-1810)

Credit Hours: 3.00. The purpose of this general survey course is to introduce students to the principle historical themes of Latin America during the colonial period (roughly, from 1492 to 1810). No prior knowledge of Latin American history is required. Typically offered Fall Spring Summer.

HIST 27200 - Introduction To Modern Latin American History (1810 To The Present)

Credit Hours: 3.00. The purpose of this general survey course is to introduce students to the study of the major economic, political, social, and cultural processes that shaped modern Latin American nations since independence. No prior knowledge of Latin American history is required. Typically offered Fall Spring Summer.

HIST 30000 - Eve Of Destruction: Global Crises And World Organization In The 20th Century

Credit Hours: 3.00. Using a variety of case studies, this course considers 20th-century turning points -- often violent and disastrous ones -- in an emerging global conversation about urgent world problems and their possible solutions. Typically offered Summer Fall Spring.

HIST 30200 - Historical Topics

Credit Hours: 3.00. This variable-title course deals with broad historical topics that transcend and collapse traditional analytical, chronological, and geographic boundaries. Content will vary with faculty member teaching the class. Typically offered Fall Spring.

HIST 30400 - America In The 1960s

Credit Hours: 3.00. Surveys the turbulent history of the 1960s America. Topics include: the Kennedy, Johnson, and Nixon presidencies; postwar liberalism and conservatism; insurgent political and social movements; the counterculture; the sexual revolution; rock 'n roll; and the Vietnam War. Typically offered Fall Spring.

HIST 30505 - The United States In The World 1898-Present

Credit Hours: 3.00. This course explores the central issues and themes of American foreign relations during the twentieth century with a primary focus on the expansion of American political military, economic, and cultural power. Typically offered Fall Spring.

HIST 31200 - The Crusades

Credit Hours: 3.00. A study of the origins and transformation of the medieval crusading ideal as well as the development of western European civilization. Topics examined include warfare, heresy, religion, Islamic and Byzantine worlds, holy war theories, and economic and political history. Typically offered Fall Spring.

HIST 31202 - The Crusades: Writing Intensive

Credit Hours: 3.00. A study of the origins and transformation of the medieval crusading ideal as well as the development of western European civilization. Topics examined include warfare, heresy, religion, Islamic and Byzantine worlds, holy war theories, and economic and political history. This is the writing intensive version of HIST 31200. Typically offered Fall Spring.

HIST 31700 - A History Of The Christian Church And The Expansion Of Christianity I

Credit Hours: 3.00. A history of the emergence of Christianity, the development of the Christian church, and the impact of Christian thought and institutions upon western Europe prior to the Reformation. Typically offered Fall.

HIST 31702 - History Of Christian Church I: Writing Intensive

Credit Hours: 3.00. A history of the emergence of Christianity, the development of the Christian church, and the impact of Christian thought and institutions upon western Europe prior to the Reformation. This is the writing intensive version of HIST 31700. Typically offered Fall Spring.

HIST 31800 - A History Of The Christian Church And The Expansion Of Christianity II

Credit Hours: 3.00. Continuation of HIST 31700. The Reformation, the major developments in Christianity, and the churches in the modern world. Typically offered Spring.

HIST 31802 - History Of Christian Church II: Writing Intensive

Credit Hours: 3.00. Continuation of HIST 31700. The Reformation, the major developments in Christianity, and the churches in the modern world. This is the writing intensive version of HIST 31800. Typically offered Fall Spring.

HIST 32000 - The World Of Charlemagne

Credit Hours: 3.00. This course examines Charlemagne's efforts to create a new European civilization (A.D. 768-814). The course incorporates the perspectives of Saxons, Vikings, Muslims, Byzantines, peasants, aristocrats, popes, bishops, abbots, and emphasizes the interplay between politics and art, culture, religion, and society. Typically offered Fall Spring.

HIST 32200 - Monarchy: Its Rise And Fall

Credit Hours: 3.00. Traces the rise and fall of Europe's great monarchs and monarchies from the Renaissance to the present and examines both the craft of kingship and the relevancy of the institution itself to society's changing needs and values. Typically offered Fall Spring.

HIST 32300 - German History

Credit Hours: 3.00. A survey of German history from the earliest times until the present. After a brief description of the medieval empire, we will turn to the Germany of Bismarck and Hitler and its successor states. A recurring theme will be the struggle between forces of liberalism and democracy and those of authoritarianism and militarism. Typically offered Fall Spring.

HIST 32400 - Modern France

Credit Hours: 3.00. A survey of modern France since 1789, including political, social, industrial, and institutional development. Emphasis is also placed upon the colonial and international aspects of French history. Typically offered Fall Spring.

HIST 32402 - Modern France: Writing Intensive

Credit Hours: 3.00. A survey of modern France since 1789, including political, social, industrial, and institutional development. Emphasis is also placed upon the colonial and international aspects of French history. This is the writing intensive version of HIST 32400. Typically offered Fall Spring.

HIST 32501 - Twentieth Century Europe Through Autobiography

Credit Hours: 3.00. Merits and limitations of autobiographies as sources for 20th century European history. Typically offered Fall Spring Summer.

HIST 32502 - 20th Century Europe Through Autobiography: Writing Intensive

Credit Hours: 3.00. Merits and limitations of autobiographies as sources for 20th century European history. This is the writing intensive version of HIST 32501. Typically offered Fall Spring.

HIST 32600 - Popular Culture In Preindustrial Europe (1400-1800)

Credit Hours: 3.00. A survey of European history from the perspective of common people. How did they, when confronted with unprecedented economic expansion, population growth, urbanization, and Christianization, change the way they worked, played, worshipped, persecuted witches, and raised children?. Typically offered Fall Spring.

HIST 32700 - The Habsburg Legacy: Central Europe, 1500-2000

Credit Hours: 3.00. Examines the emergence of modern east central Europe. Special focus will be given to the region's unique geopolitical, demographic, economic, and ethnic circumstances that explain its current problems. Typically offered Fall.

HIST 32800 - History Of Women In Renaissance Europe

Credit Hours: 3.00. This course studies the history of women in early modern Europe (1500-1800), examining their roles, images, and experiences as wives, mothers, nuns, artisans, peasants, prostitutes, scholars, and sovereigns in the eras of Renaissance, Reformation, and Revolution. Typically offered Fall Spring.

HIST 32900 - History Of Women In Modern Europe

Credit Hours: 3.00. This course examines women's experiences and constructions of femininity in Europe from 1789 to the present, including women in revolutions, state intervention in the family, changing ideas of sexuality, women's movements, women in socialism and fascism, and women in war. Typically offered Fall Spring.

HIST 32902 - History Of Women In Modern Europe: Writing Intensive

Credit Hours: 3.00. This course examines women's experiences and constructions of femininity in Europe from 1789 to the present, including women in revolutions, state intervention in the family, changing ideas of sexuality, women's movements, women in socialism and fascism, and women in war. This is the writing intensive version of HIST 32900. Typically offered Fall Spring.

HIST 33000 - History Of The British Empire And Commonwealth, 1783 To 1960

Credit Hours: 3.00. A survey of the expansion and decline of British power overseas from the American war of independence to the mid-twentieth century. Emphasizing economic and military power, it focuses on British rule in Canada, Africa, India, Australia, and the West Indies. Typically offered Fall Spring.

HIST 33100 - Great Figures In History

Credit Hours: 3.00. A series of autobiographical and biographical sketches of figures distinguished as well as lesser-known in all fields of activity. Typically offered Fall Spring.

HIST 33300 - Science And Technology In Western Civilization I

Credit Hours: 3.00. A survey of some of the main features of the historical development of science and technology, primarily in the Western world, from the dawn of civilization up to Isaac Newton. Emphasis is placed upon the interaction between science, technology, and the societies that encourage or abridge them. Typically offered Fall Spring.

HIST 33400 - Science And Technology In Western Civilization II

Credit Hours: 3.00. A survey of some of the main features of the historical development of science and technology in the Western world from Newton to the present. Emphasis is placed upon the relation between the achievements of individual investigators and the major aspects of the society and culture in which they lived. Typically offered Fall Spring.

HIST 33505 - Nationalism And Socialism In East Central Europe

Credit Hours: 3.0. This course examines how the peoples of East Central Europe engaged and coped with the most influential ideologies of the 20th century; with special attention to the weaknesses of the interwar and postwar regimes, strategies of modernization, survival, and dissent. Typically offered Fall Spring.

HIST 33700 - Europe In The Age Of The Cold War

Credit Hours: 3.00. Examines the power vacuum created in western and central Europe by the defeat of Nazi Germany and explores the influence of the superpowers' policy on the political, cultural, and economic development of European countries within their respective spheres of influence. Typically offered Fall Spring.

HIST 33900 - Traditional China

Credit Hours: 3.00. Chinese civilization from its origins to the end of the Ming Dynasty. Attention is divided equally between

political and cultural history, giving emphasis to the development of traditional institutions in Chinese society as well as to art, literature, religion, and philosophy. Typically offered Fall.

HIST 34000 - Modern China

Credit Hours: 3.00. Chinese history from the Qing Dynasty (1644) to the present, with emphasis on the period since 1800. Attention given to internal developments and China's response to Western thought and material accomplishments. Nationalism and communism in the twentieth century are examined. Typically offered Spring.

HIST 34100 - History Of Africa South Of The Sahara

Credit Hours: 3.00. An introductory survey of major movements and problems in the development of the people of sub-Saharan Africa from the dawn of history to the mid-twentieth century. Attention is directed to the response of Africans to their environment and to various external challenges - Islam, European colonization, and the industrial revolution. Typically offered Fall Spring.

HIST 34200 - Africa And The West

Credit Hours: 3.00. The study of Africa's relations with Europe and the Americas, emphasizing economic and cultural crosscurrents from the period of the Atlantic slave trade to the rise of modern nationalism. Typically offered Fall Spring.

HIST 34300 - Traditional Japan

Credit Hours: 3.00. The course considers Japanese civilization from its origins to the establishment of the Tokugawa Shogun (1603). Divided between political and cultural history, it will emphasize the development of traditional institutions in Japanese society, religion, philosophy, art, and literature. Typically offered Fall.

HIST 34302 - Traditional Japan: Writing Intensive

Credit Hours: 3.00. The course considers Japanese civilization from its origins to the establishment of the Tokugawa Shogun (1603). Divided between political and cultural history, it will emphasize the development of traditional institutions in Japanese society, religion, philosophy, art, and literature. This is the writing intensive version of HIST 34300. Typically offered Fall Spring.

HIST 34400 - History Of Modern Japan

Credit Hours: 3.00. A survey of Japanese history from the nineteenth century to the present, including Japan's response to Western expansionism, the formation of the modern state, political parties, industrialization, the Pacific War, the American Occupation, the postwar "economic miracle," and Japan today. Typically offered Spring.

HIST 34402 - History Of Modern Japan: Writing Intensive

Credit Hours: 3.00. A survey of Japanese history from the nineteenth century to the present, including Japan's response to Western expansionism, the formation of the modern state, political parties, industrialization, the Pacific War, the American Occupation, the postwar "economic miracle," and Japan today. This is the writing intensive version of HIST 34400. Typically offered Fall Spring.

HIST 34901 - The First World War

Credit Hours: 3.00. This course is designed to explore the origins, course, meaning, and lasting legacy of World War I. Typically offered Fall Spring.

HIST 35000 - Science And Technology In The Twentieth Century World

Credit Hours: 3.00. An introductory survey, emphasizing cultural contexts, relationships with other institutions, and occasional forays into the biographies of major figures. Covering selected major achievements as well as the problems these generate. Neither science nor engineering background is required. Typically offered Fall Spring.

HIST 35100 - The Second World War

Credit Hours: 3.00. A study of the diplomacy, economic mobilization, and military operations of World War II, 1939-1945. Typically offered Fall Spring.

HIST 35400 - Women In America To 1870

Credit Hours: 3.00. A survey of the history of women in America from the colonial period to 1870. Typically offered Summer Fall Spring.

HIST 35500 - History Of American Military Affairs

Credit Hours: 3.00. Surveys American military policy from the colonial militia to the atomic age. Covers major wars and limited wars. The course also investigates the peacetime military functions, i.e., the Navy's role in diplomacy and the Army's involvement in Indian affairs. Typically offered Fall Spring.

HIST 35600 - America In Vietnam

Credit Hours: 3.00. Course examines the economic, political, ideological, and military aspects of America's involvement in Vietnam, between 1945 and 1975. Course will include lectures, film, and discussions. Each student will be assigned to a discussion section after the first day of class. . Typically offered Spring.

HIST 35700 - History Of Southern Africa Since 1400

Credit Hours: 3.00. Course explores the diversity and resilience of the peoples of southern Africa in the face of internal and external challenges, including migrations, state-building, European colonization, industrialization, and apartheid. African liberation movements and the independence revolution are focal points of attention. Typically offered Fall Spring.

HIST 35900 - Gender In East Asian History

Credit Hours: 3.00. Examination of the construction of tradition and modernity in East Asia through the lens of gender. Topics include the influence of "Confucian" ethics; gender and imperialism, nationalism and revolution; and social change in the aftermath of war and decolonization. Typically offered Fall Summer Spring.

HIST 35902 - Gender In East Asian History: Writing Intensive

Credit Hours: 3.00. Examination of the construction of tradition and modernity in East Asia through the lens of gender. Topics include the influence of "Confucian" ethics; gender and imperialism, nationalism and revolution; and social change in the aftermath of war and decolonization. This is the writing intensive version of HIST 35900. Typically offered Fall Spring.

HIST 36000 - Gender In Middle East History

Credit Hours: 3.00. Examines the gendered history, politics, and culture of the Middle East and North Africa, the relationship between Islam and patriarchy, representations of women in medieval texts, and late nineteenth- and early twentieth-century struggles for women's rights in the region. Typically offered Fall Spring.

HIST 36101 - Violence, War, And Militarism In Modern Africa

Credit Hours: 3.00. Why do African countries always seem to be at war? Is this because Africans are inherently more violent than the rest of the world? Or might there be another set of explanations? This course seeks answers to these troubling questions by examining some of the myths and realities about violence, war, and militarism in Africa. Although these issues are not in any way ¿new¿ or ¿modern¿, our historical gaze will be focused primarily on the last 125 years. Studies can expect to engage with a variety of primary sources including films, novels, memoirs, music, and speeches as well as an array of scholarly literature from various academic disciplines. Typically offered Fall Spring.

HIST 36500 - Women In America

Credit Hours: 3.00. A survey of the history of women in America from Colonial times to the present. Emphasis is on the changing status of women, social and cultural influences, movements for women's rights, and women's contributions to American society. Typically offered Summer Fall Spring.

HIST 36600 - Hispanic Heritage Of The United States

Credit Hours: 3.00. Despite their numerical prominence, Hispanics have received relatively little attention in traditional U.S. history. Focusing primarily on Mexican-Americans, Cuban-Americans, and Puerto Ricans, this course offers a historical perspective on the Hispanic experience from colonial times to the present. Typically offered Fall Spring Summer.

HIST 37100 - Society, Culture, And Rock And Roll

Credit Hours: 3.00. Surveys American society and culture through the prism of rock and roll music. Looks at politics, gender, race, and class in the postwar era to examine and explain the social, economic, and technological forces that shaped rock and roll. Typically offered Fall Spring.

HIST 37200 - History Of The American West

Credit Hours: 3.00. A study of the American frontier. Characteristics and problems of pioneer life; causes and effects of the westward movement of our people. Typically offered Fall Spring.

HIST 37500 - Women In America Since 1870

Credit Hours: 3.00. A survey of the history of women in the United States from 1870 to the present. Typically offered Summer Fall Spring.

HIST 37600 - History Of Indiana

Credit Hours: 3.00. Economic, political, and social history of Indiana from the state's earliest beginnings as a part of the old Northwest Territory to the present. Typically offered Fall Spring.

HIST 37700 - History And Culture Of Native America

Credit Hours: 3.00. This course explores the societies of Native North America in a historical context, from pre-historic times to the present, examining Native world views and belief systems to understand their historical relations with each other, and with Europeans and their descendents. Typically offered Fall Spring.

HIST 37900 - Gandhi: Myth Reality And Perspective

Credit Hours: 3.00. The course charts Gandhi's career against the back-ground of events in London, South Africa and India. It examines the evolution and practical application of his ideas and techniques of non-violent resistance, and his attitudes toward the economy, society and state. . Typically offered Summer Fall Spring.

HIST 38001 - History Of United States Agriculture

Credit Hours: 3.0. This course surveys the main development in North American agricultural history, emphasizing the continental United States. Topics include early American agriculture, the plantation system, land policy, scientific and technological change, agrarian politics, water rights, migrant labor, and agricultural policy. Typically offered Fall Spring.

HIST 38200 - American Constitutional History

Credit Hours: 3.00. Survey of the fundamental principles of American constitutionalism and dominant trends in judicial interpretation, from the creation of the Constitution to the period of the New Deal. Typically offered Summer Fall Spring.

HIST 38300 - Recent American Constitutional History

Credit Hours: 3.00. Intensive study of constitutional questions and Supreme Court answers from the period of the Warren Court to present. Particularly emphasized are the areas of segregation, civil rights, and civil liberties and guarantees for personal rights. Typically offered Summer Fall Spring.

HIST 38400 - History Of Aviation

Credit Hours: 3.00. A comparative history of human flight and air power (in Europe, the Americas, and Asia) from its origin in the early inventors and pilots, through its reflection in the popular media, to the global development of civil and military aviation. Typically offered Fall Spring.

HIST 38600 - History Of American Foreign Relations

Credit Hours: 3.00. The history of American foreign relations from the late colonial period to the present. The development of traditional policies, territorial expansion, and reaction to great-power status and the Cold War are some of the topics discussed. Typically offered Fall Spring.

HIST 38700 - History Of The Space Age

Credit Hours: 3.00. The historical interaction between human values and space exploration in the contemporary age, focusing on issues of global interdependence. Topics include the international competition in rocketry, the Cold War in space, the moon missions, space disasters, and satellite technology. Typically offered Fall Spring.

HIST 39001 - Jews In The Modern World: A Survey Of Modern Jewish Society, Culture, And Politics

Credit Hours: 3.00. This survey of modern Jewish society, culture, and politics from the expulsion from Spain in 1492 until the collapse of the Interwar state system in 1938 examines Jewish responses to modernity with special attention to the Jewish relationship to the state and with the surrounding non-Jewish cultures, and the diversity of the modern Jewish experience. Typically offered Fall Spring.

HIST 39100 - History Of Russian Popular Entertainment

Credit Hours: 3.00. The history of modern mass entertainment and revolutionary experimentation in popular film, the public arts, and daily life in Russia and the Soviet Union (including Central Asia and Siberia) from 1900 to the present. Typically offered Fall Spring.

HIST 39200 - Caribbean History And Culture

Credit Hours: 3.00. (AAS 39200) This survey of Caribbean history highlights the British, Danish, Dutch, French, and Spanish islands. It addresses slavery, colonialism, independence, nationalism and gender relations. It will attract students interested in Latin America, African Diaspora studies, immigration, and cultural studies. Typically offered Summer Fall Spring.

HIST 39400 - Environmental History Of The United States

Credit Hours: 3.00. This is a mid-level survey designed to provide students of environmental science with historical background and students of history with the unique perspective of environmental history. Typically offered Summer Fall Spring.

HIST 39500 - Junior Research Seminar

Credit Hours: 3.00. Variable title seminar for history majors in their junior year intended to teach historical skills, including research in primary sources, analytical skills, and forming historical arguments. It is a writing intensive course and counts as one of the major requirements. Typically offered Fall Spring.

HIST 39600 - The Afro-American To 1865

Credit Hours: 3.00. The history of Afro-Americans in America from their African origins to 1865. Emphasis is focused upon early African society, American slavery, and the development of black institutions and culture in the United States. Typically offered Fall Spring.

HIST 39800 - The Afro-American Since 1865

Credit Hours: 3.00. The history of Afro-Americans from 1865 to the present. Their struggles to overcome social, economic, and political oppression and to win basic civil and human rights while making valuable contributions to American society are emphasized. Typically offered Fall Spring.

HIST 40202 - Europe In The Renaissance: Writing Intensive

Credit Hours: 3.00. Primarily a survey of Renaissance Italy, 1300 to 1530. Attention is focused on Italian humanism as an intellectual and social movement, on the struggle of republicanism against despotism in Italian city life, and finally on the impact of humanism north of the Alps in the late fifteenth and early sixteenth centuries. This is the writing intensive version of HIST 40200. Typically offered Fall Spring.

HIST 40300 - Europe In The Reformation

Credit Hours: 3.00. A study of decay and renewal in European society, 1300 to 1650. Concentrates on the Protestant and Catholic Reformation and religious wars, but also covers the Northern Renaissance, the New Monarchies, and the discovery and exploration of the New World. Typically offered Fall Spring.

HIST 40302 - Europe In The Reformation: Writing Intensive

Credit Hours: 3.00. A study of decay and renewal in European society, 1300 to 1650. Concentrates on the Protestant and Catholic Reformation and religious wars, but also covers the Northern Renaissance, the New Monarchies, and the discovery and exploration of the New World. This is the writing intensive version of HIST 40300. Typically offered Fall Spring.

HIST 40400 - Kings And Philosophers: Europe 1618-1789

Credit Hours: 3.00. Study of great European monarchies and transformation of modern thought by the scientific revolution and Enlightenment. Emphasis on key rulers (Louis XIV, Peter and Catherine the Great, Frederick the Great) and great thinkers (Voltaire, Montesquieu, Rousseau). Typically offered Fall Spring.

HIST 40402 - Kings And Philosophers: Writing Intensive

Credit Hours: 3.00. Study of great European monarchies and transformation of modern thought by the scientific revolution and Enlightenment. Emphasis on key rulers (Louis XIV, Peter and Catherine the Great, Frederick the Great) and great thinkers (Voltaire, Montesquieu, Rousseau). This is the writing intensive version of HIST 40400. Typically offered Fall Spring.

HIST 40500 - The French Revolution And Napoleon

Credit Hours: 3.00. A study of revolutionary France from the fall of the ancien regime to the Congress of Vienna. Divided in emphasis between the period of the revolution and the era of Napoleon, the course stresses social, political, ideological, and institutional developments. Typically offered Fall Spring.

HIST 40502 - French Revolution And Napoleon: Writing Intensive

Credit Hours: 3.00. A study of revolutionary France from the fall of the ancien regime to the Congress of Vienna. Divided in emphasis between the period of the revolution and the era of Napoleon, the course stresses social, political, ideological, and institutional developments. This is the writing intensive version of HIST 40500. Typically offered Fall Spring.

HIST 40600 - Rebels And Romantics: Europe 1815-1870

Credit Hours: 3.00. Examines the dramatic social, cultural, and political developments in Europe following the defeat of Napolean through various rebellious and romantic personalities, as well as figures who supported conservative or reformist solutions to the upheavals of industrialization, revolution, and nationalism. Typically offered Fall Spring.

HIST 40602 - Rebels And Romantics: Writing Intensive

Credit Hours: 3.00. Examines the dramatic social, cultural, and political developments in Europe following the defeat of Napolean through various rebellious and romantic personalities, as well as figures who supported conservative or reformist solutions to the upheavals of industrialization, revolution, and nationalism. This is the writing intensive version of HIST 40600. Typically offered Fall Spring.

HIST 40700 - Road To World War I: Europe 1870-1919

Credit Hours: 3.00. Studies the increase in Europe's wealth and power through conquest, industrialization, and nation-state rivalries, along with the social stress and cultural anxiety that culminated in World War I; examines the war from the perspectives of both combatants and civilians. Typically offered Fall Spring.

HIST 40702 - Road To World War I: Writing Intensive

Credit Hours: 3.00. Studies the increase in Europe's wealth and power through conquest, industrialization, and nation-state rivalries, along with the social stress and cultural anxiety that culminated in World War I; examines the war from the perspectives of both combatants and civilians. This is the writing intensive version of HIST 40700. Typically offered Fall Spring.

HIST 40800 - Dictatorship And Democracy: Europe 1919-1945

Credit Hours: 3.00. This course examines the fleeting triumph of democracy across Europe. Followed by the rise of fascism, communism, and Nazism. Emphasis will be placed on broad economic, social, and cultural transformations as well as individual choices to resist or conform. Typically offered Fall Spring.

HIST 40802 - Dictatorship And Democracy: Writing Intensive

Credit Hours: 3.00. This course examines the fleeting triumph of democracy across Europe. Followed by the rise of fascism, communism, and Nazism. Emphasis will be placed on broad economic, social, and cultural transformations as well as individual choices to resist or conform. This is the writing intensive version of HIST 40800. Typically offered Fall Spring.

HIST 41100 - The Four Horsemen Ride: Crisis And Change In Europe 1300-1648

Credit Hours: 3.00. Upper-division history course on the history of various crises in late medieval and early modern Europe and the changes those crises wrought upon society. Topics include: famine, The Black Death and demographic upheavals, the Hundred Years' War, religious schism, prophecy and divination, apocalyptic expectations, the fracturing of Christendom, new technologies and social change, conflict between Catholics and Protestants, The Thirty Year's War. Typically offered Summer Fall Spring.

HIST 41102 - The Four Horsemen Ride: Crisis And Change In Europe: 1300-1648: Writing Intensive

Credit Hours: 3.00. Upper-division history course on the history of various crises in late medieval and early modern Europe and the changes those crises wrought upon society. Topics include: famine, The Black Death and demographic upheavals, the Hundred Years' War, religious schism, prophecy and divination, apocalyptic expectations, the fracturing of Christendom, new technologies and social change, conflict between Catholics and Protestants, The Thirty Year's War. This is the writing intensive version of HIST 41100. Typically offered Fall Spring.

HIST 41200 - The Cultural History Of The Middle Ages

Credit Hours: 3.00. The development of new patterns of thought and their manifestation in literature (religious and secular), education, and art from the decline of the ancient world to the fourteenth century inclusive. Typically offered Fall Spring.

HIST 41202 - Cultural History Of Middle Ages: Writing Intensive

Credit Hours: 3.00. The development of new patterns of thought and their manifestation in literature (religious and secular), education, and art from the decline of the ancient world to the fourteenth century inclusive. This is the writing intensive version of HIST 41200. Typically offered Fall Spring.

HIST 41300 - Europe In The Age Of Empires

Credit Hours: 3.00. This upper-level course will examine the history of modern European imperialism, beginning with the

transformation and expansion of empires in the 19th century and ending with the collapse of these systems in more recent years. Typically offered Fall Spring.

HIST 41302 - Europe In The Age Of Empires: Writing Intensive

Credit Hours: 3.00. This upper-level course will examine the history of modern European imperialism, beginning with the transformation and expansion of empires in the 19th century and ending with the collapse of these systems in more recent years. Students in this writing-intensive course will be expected to write a series of short response papers, including a book review and a primary source analysis. Typically offered Fall Spring.

HIST 41800 - European Society And Culture 1450-1800

Credit Hours: 3.00. This course will examine European society and culture from 1450-1800. We will explore marriage and the family, sexuality, social status and civility, gender relations, witchcraft, poverty, violence, work and the everyday economy, and resistance and accommodation to political authority. Typically offered Fall Spring.

HIST 42100 - Honors Historical Methods

Credit Hours: 3.00. Designed as a prequel to Honors Thesis; this course introduces the Honors students to various advanced interpretative approaches to history and methods of historical research. Students also choose their topic for their Honors Thesis and begin research. Typically offered Summer Fall Spring.

HIST 42200 - Honors Thesis In Historical Research

Credit Hours: 3.00. Designed as a sequel to HIST 42100 (Honors Historical Methods); this course is intended as the culminating academic experience for students in the Department of History Honors Program. It will require the completion of an undergraduate thesis in history. Permission of instructor required. Typically offered Summer Fall Spring.

HIST 42300 - Advanced Topics In Modern Germany

Credit Hours: 3.00. This course offers a reading-intensive study of a specific period or theme in modern German history. Semester-long topics might include Imperial Germany; Weimar Germany; Divided Germany (1945-1990); or thematic studies on culture, religion, or military affairs. Typically offered Fall Spring.

HIST 42700 - History Of Spain And Portugal

Credit Hours: 3.00. A study of the evolving social and institutional history of the Iberian peoples, from the Roman colony to the twentieth century. Some emphasis is placed upon the transfer of institutions to the lands of the Spanish and Portuguese empires. Typically offered Fall Spring.

HIST 42702 - History Of Spain And Portugal: Writing Intensive

Credit Hours: 3.00. A study of the evolving social and institutional history of the Iberian peoples, from the Roman colony to the twentieth century. Some emphasis is placed upon the transfer of institutions to the lands of the Spanish and Portuguese empires. This is the writing intensive version of HIST 42700. Typically offered Fall Spring.

HIST 43000 - Women In African History

Credit Hours: 3.00. (WGSS 43000) African women's history is rich and deeply layered. In this course, we will examine the social, political, economic, religious, and cultural experiences of women living in Africa. Although we look at women in the pre-colonial and slave trade eras, the focus will be on women during the nineteenth and twentieth centuries. Much of our reading and discussion will consider not only women, but also gender as we think about women's interactions with men and children. This course is concerned with the historical forces shaping African women's lives, as well as with ways in which women have been active agents in the making of their own histories. Students can expect to engage with a number of different types of texts (e.g. firms, novels, scholarly analyses, and primary sources.) Typically offered Fall, Spring.

HIST 43002 - Women In Africa History: Writing Intensive

Credit Hours: 3.00. This writing-intensive seminar examines the social, political, economic, religious, and cultural experiences of women living in Africa. Although we will look at women in the pre-colonial and slave trade eras, the focus will be on women during the nineteenth and twentieth centuries. Much of our reading and discussion will consider not only women, but also gender as we think about women's interactions with men and children. Topics include sexuality, power, politics, violence, and resistance, among others. Students can expect to engage with a number of different types of texts (e.g. films, novels, scholarly analyses, and primary sources). Typically offered Fall Spring.

HIST 43800 - History Of Russia From Medieval Times To 1861

Credit Hours: 3.00. This course explores the main characteristics of early Russian society, culture and politics. Topics include: the Kievan principalities, Orthodox Christianity, the Mongols, the rise of Moscow, the Petrine reforms, peasant and national rebellions, revolutionary movements, and the Tsarist empire to the Crimean War. Typically offered Fall Spring Summer.

HIST 43802 - History Of Russia From Medieval Times to 1861: Writing Intensive

Credit Hours: 3.00. This course explores the main characteristics of early Russian society, culture and politics. Topics include: the Kievan principalities, Orthodox Christianity, the Mongols, the rise of Moscow, the Petrine reforms, peasant and national rebellions, revolutionary movements, and the Tsarist empire to the Crimean War. This is the writing intensive version of HIST 43800. Typically offered Fall Spring.

HIST 43900 - Communist China

Credit Hours: 3.00. The evolution of the Communist movement (1921-1949) and the development of the Communist government (since 1949) in China. Attention is given to political, economic, social, and cultural changes. Typically offered Spring.

HIST 43902 - Communist China: Writing Intensive

Credit Hours: 3.00. The evolution of the Communist movement (1921-1949) and the development of the Communist government (since 1949) in China. Attention is given to political, economic, social, and cultural changes. This is the writing intensive version of HIST 43900. Typically offered Fall Spring.

HIST 44000 - History Of Russia From 1861 To The Present

Credit Hours: 3.00. This course surveys the paths of the Russian empire through economic modernization, social transformation, and World War I; the revolutionary regimes of Bolshevism, Leninism, and Stalinism; World War II and the Cold War; the collapse of the USSR; and the new Eurasian states. Typically offered Fall Spring Summer.

HIST 44002 - History Of Russia From 1861-Present: Writing Intensive

Credit Hours: 3.00. This course surveys the paths of the Russian empire through economic modernization, social transformation, and World War I; the revolutionary regimes of Bolshevism, Leninism, and Stalinism; World War II and the Cold War; the collapse of the USSR; and the new Eurasian states. This is the writing intensive version of HIST 44000. Typically offered Fall Spring.

HIST 44100 - Africa In The Twentieth Century

Credit Hours: 3.00. A problem-oriented course in the modern history of Africa from 1880 to 1975. It analyzes origins of African nationalism, European colonialism, racial conflict, and war leading to the independence revolution of the 1960s and 1970s. Typically offered Fall Spring.

HIST 44102 - Africa In The Twentieth Century: Writing Intensive

Credit Hours: 3.00. A problem-oriented course in the modern history of Africa from 1880 to 1975. It analyzes origins of African nationalism, European colonialism, racial conflict, and war leading to the independence revolution of the 1960s and 1970s. This is the writing intensive version of HIST 44100. Typically offered Fall Spring.

HIST 45000 - The English Landscape:Integrating History, Horticulture & Landscape Architect

Credit Hours: 3.00. Intensive four-weeks in residence in Corsham,UK with visits to significant sites to examine the intersections between human culture and the natural environment that results in the developed landscape. Permission of instructor required. Typically offered Summer.

HIST 45500 - Modern Iraq

Credit Hours: 3.00. This course focuses on Iraq's formation as a modern state, and it addresses the following periods: Ottoman Mesopotomia (1908-1920), Colonial Iraq (1915-1932), the Monarchy (1932-1958), Revolutionary Iraq (1958-1968), and Baathist Iraq (1968-2003), the Iraq War (2003-2008). Typically offered Fall Spring.

HIST 45502 - Modern Iraq: Writing Intensive

Credit Hours: 3.00. This course focuses on Iraq's formation as a state from Ottoman times until the present day. In doing so, it historicizes the Iraq War, encouraging students to draw their own conclusions about it. This class requires that students engage primary sources and write a research paper of twenty-five pages. Typically offered Fall Spring.

HIST 46000 - American Colonial History

Credit Hours: 3.00. An investigation of the foundation of the American colonies, their place in the British imperial structure, and the eventual conflict of imperial exigencies with colonial self-interest and national feeling. Typically offered Fall.

HIST 46002 - American Colonial History: Writing Intensive

Credit Hours: 3.00. An investigation of the foundation of the American colonies, their place in the British imperial structure, and the eventual conflict of imperial exigencies with colonial self-interest and national feeling. This is the writing intensive version of HIST 46000. Typically offered Fall Spring.

HIST 46100 - The Revolutionary Era, 1763 To 1800

Credit Hours: 3.00. An analysis of the origins, nature, and consequences of the American Revolution; of the achievements and difficulties of the new nation under the Articles of Confederation; of the drafting and adoption of the Constitution; and of the initial political, economic, and social progress of the United States under the Federalists. Typically offered Fall Spring.

HIST 46102 - Revolutionary Era 1763-1800: Writing Intensive

Credit Hours: 3.00. An analysis of the origins, nature, and consequences of the American Revolution; of the achievements and difficulties of the new nation under the Articles of Confederation; of the drafting and adoption of the Constitution; and of the initial political, economic, and social progress of the United States under the Federalists. This is the writing intensive version of HIST 46100. Typically offered Fall Spring.

HIST 46300 - Creation Of American Legal Culture

Credit Hours: 3.00. The "Founding Fathers" wrote a Constitution riddled with compromise language, maddeningly brief, and often imprecise. How did early Americans erect a working civil society, with courts and policemen, laws and procedures, on the foundation of that constitutional framework?. Typically offered Fall Spring.

HIST 46302 - Creation Of American Legal Culture: Writing Intensive

Credit Hours: 3.00. The "Founding Fathers" wrote a Constitution riddled with compromise language, maddeningly brief, and often imprecise. How did early Americans erect a working civil society, with courts and policemen, laws and procedures, on the foundation of that constitutional framework?. This is the writing intensive version of HIST 46300. Typically offered Fall Spring.

HIST 46500 - The Civil War And Reconstruction, 1850 To 1877

Credit Hours: 3.00. A survey of the American Civil War and Reconstruction, covering the intense sectional conflict of the 1850s; the military, social, economic, and political aspects of the war; and the political and economic reconstruction that followed. Typically offered Fall Spring.

HIST 46502 - Civil War And Reconstruction 1850-1877: Writing Intensive

Credit Hours: 3.00. A survey of the American Civil War and Reconstruction, covering the intense sectional conflict of the 1850s; the military, social, economic, and political aspects of the war; and the political and economic reconstruction that followed. This is the writing intensive version of HIST 46500. Typically offered Fall Spring.

HIST 46700 - The Emergence Of Modern America

Credit Hours: 3.00. Examines the changes in American society between 1877 and 1932. The course covers such issues as the rise of industry, the growth of consumerism, the shift to a multi-ethnic society, imperialism, Populism, Progressivism, World War I, and the 1920s. Typically offered Fall Spring.

HIST 46702 - Emergence Of Modern America: Writing Intensive

Credit Hours: 3.00. Examines the changes in American society between 1877 and 1932. The course covers such issues as the rise of industry, the growth of consumerism, the shift to a multi-ethnic society, imperialism, Populism, Progressivism, World War I, and the 1920s. This is the writing intensive version of HIST 46700. Typically offered Fall Spring.

HIST 46800 - Recent American History

Credit Hours: 3.00. Examines the issues that shaped American society, politics, foreign policy, and culture from 1932 to the present. Covers the Great Depression, World War II, the Cold War, and the Vietnam War as well as the social, cultural, and economic impact of those events. Typically offered Fall Spring.

HIST 46802 - Recent American History: Writing Intensive

Credit Hours: 3.00. Examines the issues that shaped American society, politics, foreign policy, and culture from 1932 to the present. Covers the Great Depression, World War II, the Cold War, and the Vietnam War as well as the social, cultural, and economic impact of those events. This is the writing intensive version of HIST 46800. Typically offered Fall Spring.

HIST 46900 - Black Civil Rights Movement

Credit Hours: 3.00. This course will examine the origins, dynamics, and consequences of the modern black civil rights movement by exploring how struggles for racial equality and full citizenship worked to dismantle entrenched systems of segregation, repression, and discrimination within American society and culture. Typically offered Fall Spring.

HIST 46902 - Black Civil Rights Movement: Writing Intensive

Credit Hours: 3.00. This course will examine the origins, dynamics, and consequences of the modern black civil rights movement by exploring how struggles for racial equality and full citizenship worked to dismantle entrenched systems of segregation, repression, and discrimination within American society and culture. This is the writing intensive version of HIST 46900. Typically offered Fall Spring.

HIST 47100 - History Of The Great Plains Indians

Credit Hours: 3.00. A study of the tribal history, culture, and social institutions of the Plains Indians. Relations with Euro-Americans, warfare, trade, major ceremonials, and lifestyles before, during, and after the reservation period will be studied. Typically offered Fall Spring.

HIST 47102 - History Of Great Plains Indians: Writing Intensive

Credit Hours: 3.00. A study of the tribal history, culture, and social institutions of the Plains Indians. Relations with Euro-Americans, warfare, trade, major ceremonials, and lifestyles before, during, and after the reservation period will be studied. This is the writing intensive version of HIST 47100. Typically offered Fall Spring.

HIST 47200 - History Of Mexico

Credit Hours: 3.00. A history of the Mexican people from the pre-Columbian period to present. Special emphasis is placed on the successful social revolutions that led to the development of today's dynamic nation. Typically offered Fall Spring.

HIST 47202 - History Of Mexico: Writing Intensive

Credit Hours: 3.00. A history of the Mexican people from the pre-Columbian period to present. Special emphasis is placed on the successful social revolutions that led to the development of today's dynamic nation. This is the writing intensive version of HIST 47200. Typically offered Fall Spring.

HIST 47300 - History Of The South

Credit Hours: 3.00. Geographic, economic, cultural, social, and political aspects of the South. The significance of such figures as Jefferson, Jackson, Calhoun, Jefferson Davis, and Woodrow Wilson. The emphasis is on the evolution of the intellectual climate. Typically offered Fall Spring.

HIST 47302 - History Of The South: Writing Intensive

Credit Hours: 3.00. Geographic, economic, cultural, social, and political aspects of the South. The significance of such figures as Jefferson, Jackson, Calhoun, Jefferson Davis, and Woodrow Wilson. The emphasis is on the evolution of the intellectual climate. This is the writing intensive version of HIST 47300. Typically offered Fall Spring.

HIST 47500 - Spanish Frontier In North America

Credit Hours: 3.00. Examines both the chronological history and institutions of the expansion of Spain in the colonial period in northern Mexico, the southwestern United States, and Florida and the Southeast. Typically offered Fall Spring.

HIST 47502 - Spanish Frontier In North America: Writing Intensive

Credit Hours: 3.00. Examines both the chronological history and institutions of the expansion of Spain in the colonial period in northern Mexico, the southwestern United States, and Florida and the Southeast. This is the writing intensive version of HIST 47500. Typically offered Fall Spring.

HIST 47600 - The Civil War In Myth And Memory

Credit Hours: 3.00. This seminar will explore how the Civil War has been celebrated and/or remembered from 1865-present. Typically offered Fall Spring.

HIST 47700 - Native American Women's History

Credit Hours: 3.00. This course studies the history of indigenous women in North America from pre-contact to the present era, examining their roles through the experience of colonization and decolonization underscoring issues of sovereignty, identity, activism, kinship, public images, and stereotypes. Typically offered Summer Fall Spring.

HIST 47702 - Native American Women's History: Writing Intensive

Credit Hours: 3.00. This course thematically explores the history of Native American women in North America. The course is grounded in the particular theoretical and methodological concerns of indigenous history and is a reading and writing intensive course. During the semester, students are required to write two book reviews, two cultural event essays, and a research paper that

includes the following components: research proposal, preliminary annotated bibliography, detailed outline and complete annotated bibliography, first draft, final submitted essay (10-15 pages in length). Typically offered Fall Spring.

HIST 47900 - American Representations Of The Middle East And North Africa

Credit Hours: 3.00. This course explores Arab-American relations over the past 300 years, using American writings on the Middle East and North Africa as a prism for viewing evolving conceptions of national identity and global power in the United States. Typically offered Fall Spring.

HIST 47902 - American Representations Of Mid East Writing Intensive

Credit Hours: 3.00. This course explores Arab-American relations, using American writings on the Middle East and North Africa as a prism for viewing evolving conceptions of national identity and global power in the United States. Students produce three polished pieces of writing that address specific themes in the readings for this course. Typically offered Fall Spring.

HIST 48500 - Topics In American Political History

Credit Hours: 3.00. This course deals with broad thematic and chronologically defined topics in American political history from the Revolutionary Era to the late twentieth century. Content will vary with the faculty member teaching the class. Typically offered Fall Spring Summer.

HIST 48502 - Topics In American Political History: Writing Intensive

Credit Hours: 3.00. This course deals with broad thematic and chronologically defined topics in American political history from the Revolutionary Era to the late twentieth century. Content will vary with the faculty member teaching the class. This is the writing intensive version of HIST 48500. Typically offered Fall Spring.

HIST 48800 - History Of Sexual Regulation In The United States

Credit Hours: 3.00. This course will illuminate broad themes in the historical regulation of sexual violence, consensual sex, and homosexuality. Student will understand and analyze how cultural, social, religious, and moral ideologies have influenced conceptions of deviant and normative sexuality in the United States. Typically offered Fall Spring.

HIST 49200 - Seminar In Historical Topics

Credit Hours: 3.00. Course description will vary according to specific topic proposed to study. Typically offered Fall Spring Summer.

HIST 49202 - Seminar In Historical Topics: Writing Intensive

Credit Hours: 3.00. Course description will vary according to specific topic proposed to study. This is the writing intensive version of HIST 49200. Typically offered Fall Spring.

HIST 49300 - Interdisciplinary Undergraduate Seminar

Credit Hours: 1.00 to 3.00. An undergraduate seminar devoted to an interdisciplinary examination of social, economic, political, and intellectual movements, using the faculty resources of the participating departments. Subject matter will vary. Each offering of the seminar will be approved by a committee of department heads from the sponsoring departments. Typically offered Fall Spring Summer.

HIST 49400 - Science And Technology In American Civilization

Credit Hours: 3.00. A survey chiefly of technological developments, with particular attention paid to the reasons underlying the American tradition of using natural resources lavishly. The technological theme features mass production, while pure science themes include such items as the natural history tradition. Typically offered Spring.

HIST 49402 - Science And Technology In America: Writing Intensive

Credit Hours: 3.00. A survey chiefly of technological developments, with particular attention paid to the reasons underlying the American tradition of using natural resources lavishly. The technological theme features mass production, while pure science themes include such items as the natural history tradition. This is the writing intensive version of HIST 49400. Typically offered Fall Spring.

HIST 49500 - Research Seminar In Historical Topics

Credit Hours: 3.00. This course is designed to train history majors in the fundamentals of historical research and writing. Course descriptions vary according to specific topics proposed for study by instructors. Typically offered Fall Spring.

HIST 49900 - History Internship

Credit Hours: 1.00 to 3.00. This course allows students to earn credit for internships. Examples of qualified internships would include work with museums, historical societies, and various units of government. Credit and course requirements arranged with the instructor. Permission of instructor required. Typically offered Summer Fall Spring.

HIST 50000 - Studies In Medieval History

Credit Hours: 3.00. The first semester concentrates on selected major developments in the early Middle Ages (A.D. 400-1050). The second semester does the same for the High and Late Middle Ages (A.D. 1050-1500). Topics of interest and broad significance. Typically offered Fall Spring.

HIST 50500 - Haunted Pasts: Ghosts, Ghouls And Monsters In Global Culture

Credit Hours: 3.00. This reading and writing intensive course will be a survey of ghost-lore across cultures. It will study ghost-stories and theologies about the after-life, along with practices such as funerals, in order to understand the changing nature of fear in society. Typically offered Fall Spring.

HIST 51100 - England Under The Tudors

Credit Hours: 3.00. Examines English society from 1485 to 1603, examing the evolution of English kingship; changing religious climate; growth of parliament; and England's entry into the era of European expansionism. It is also concerned with family life, marriage, children, Renaissance and folk culture. Permission of Instructor required. Typically offered Fall Spring.

HIST 51200 - England Under The Stuarts

Credit Hours: 3.00. This intensive study of seventeenth-century England focuses on the political, religious, and economic tensions under the early Stuarts; the Civil War; Cromwell's Protectorate; and The Glorious Revolution. Topics discussed include parliament, puritanism, radicalism, the Restoration, and the Whig Oligarchy. Typically offered Spring.

HIST 51400 - A History Of Western Thought I

Credit Hours: 3.00. Intellectual and cultural development of the western world to the end of the Middle Ages. Typically offered Fall.

HIST 51500 - A History Of Western Thought II

Credit Hours: 3.00. Intellectual and cultural development of the western world from the Renaissance to the present. Typically offered Spring.

HIST 52500 - Hitler And Twentieth-Century Germany

Credit Hours: 3.00. A reading and discussion course concentrating on four major periods of German history: pre-1914, the Weimar Republic, the Third Reich, and the post-1945 period. Emphasis is placed on the transformations occurring in German society as a result of these upheavals. Typically offered Spring.

HIST 54800 - Conflict In East Asia: Twentieth Century

Credit Hours: 3.00. An examination of the participation of China, Japan, and Korea in the shifting alliances and the diplomatic and military crises of the twentieth century. The policies of these countries are considered in the light of the major international problems that confronted them. Particular attention is given to the Communist challenge in East Asia. Typically offered Fall.

HIST 57600 - Problems In Latin American History

Credit Hours: 3.00. A detailed examination of specific topics in Latin American history. Topics offered vary between colonial and national periods. Typically offered Spring Fall.

HIST 57700 - Contemporary Latin America

Credit Hours: 3.00. A topical and regional approach to recent political, social, and economic movements in Latin America. Typically offered Spring Fall.

HIST 58500 - American Labor History

Credit Hours: 3.00. A chronological survey of American working class society, the growth of worker organizations and the movement toward massive labor organization as a distinctive national development. Changing philosophies are examined, and the resulting pattern of relationships between management, the federal government, and the labor movement is emphasized. Typically offered Spring Fall.

HIST 58600 - United States Foreign Affairs To World War I

Credit Hours: 3.00. An examination of the economic, political, and ideological factors which shaped American foreign policy from the colonial era until WWI. Course emphasizes the drive for territorial and commercial expansion which propelled the United States to a position of world power. Typically offered Fall.

HIST 58700 - United States Foreign Affairs: World War I To Present

Credit Hours: 3.00. An examination of the economic, political, and ideological factors which shaped American foreign policy from WWI until present. Course emphasizes the intimate relation between domestic conditions and the growing involvement of the United States in world affairs. Typically offered Spring.

HIST 58900 - History Of Religion In America

Credit Hours: 3.00. A historical examination, from colonial beginnings to the present, of American religions and their role in the social, political, and economic life of the nation, including a survey of the speculative theories, the institutional forms, and the artistic and emotional expressions of religion which have developed in the United States. Typically offered Spring Fall.

HIST 59000 - Directed Reading In History

Credit Hours: 1.00 to 3.00. A reading course directed by the instructor in whose field of specialization the content of the reading falls. Approval of each reading project must be secured from the department. Permission of instructor required. Typically offered Spring Fall.

HIST 59200 - Early American Intellectual History

Credit Hours: 3.00. A survey of American political, economic, philosophical, and religious thought beginning with the European backgrounds of American puritanism and concluding with the rise of Darwinian naturalism. Typically offered Fall.

HIST 59300 - Twentieth-Century American Intellectual History

Credit Hours: 3.00. Origins and developments of modern American thought. Early American religious and philosophical traditions; Darwinian evolution and evolutionary naturalism; pragmatism, and the main currents of the 1920s and 1930s. Typically offered Spring.

HIST 59400 - Afro-American Thought And Ideology

Credit Hours: 3.00. Survey of ideas, programs, strategies of nineteenth and twentieth century black leaders and activists. Course concentrates on Pan-Africanism, as-similationism, black nationalism (territorial and cultural), racial awareness as developed against background of slavery, urban migration, economic oppression, and black political powerlessness. Typically offered Spring.

HIST 59500 - The Holocaust And Genocide

Credit Hours: 3.00. (POL 59500) History and analysis of the Nazi attempt to destroy the European Jews, with comparisons to other instances of genocide. Typically offered Spring Fall.

HIST 59600 - The American City

Credit Hours: 3.00. A survey of urban development in the United States from the early colonial towns to the twentieth-century megalopolis. Emphasis is placed on the city as a particular geographic, economic, political, social, and cultural entity, and on its expanding role in American life. Typically offered Fall.

HIST 60100 - Reading Seminar In European History

Credit Hours: 1.00 to 3.00. Bibliography and historiography of selected fields of topics in European history; may vary in subject matter from semester to semester. Prerequisite: Master's student standing. Typically offered Fall Spring.

HIST 60200 - Seminar In European History

Credit Hours: 3.00. Individual and group study of topics in European history from the medieval period to the modern era. Topics reflect the research, teaching, or historiographical specialties of the faculty offering the course. Subtitles indicate the focus of the research seminar. Prerequisite: Master's student standing. Typically offered Spring Fall.

HIST 61000 - History: Theory And Methods

Credit Hours: 3.00. This is the first part of an introductory two-course sequence for new graduate students intended to acquaint them with some important issues regarding the modern professional practice of history. This semester concentrates on historiography, theoretical questions, and methodological debates that today's working historians inevitably encounter. Students read about the practice of historical scholarship and read several important example texts representing different approaches to the discipline over the past 200 years. Students write several short book reviews, position papers, and a mock grant proposal during this semester. The course is required of incoming graduate students in history. It usually will be followed by HIST 61100, Research Practicum. Typically offered Fall Spring.

HIST 61100 - History: Research Practicum

Credit Hours: 3.00. The second half of a two-semester sequence for new graduate students intended to acquaint them with important issues regarding the modern practice of historical scholarship. This course is a research seminar in which students shape and execute their own research projects resulting in original article-length historical essays. In addition, matters relating to ethical conduct of research and problems of historical writing and argumentation are discussed. Prerequisites: HIST 61000 or 59800. Permission of instructor required. Typically offered Fall Spring.

HIST 64100 - Reading Seminar In Global History

Credit Hours: 3.00. Individual and group study of topics in global history. Topics reflect the research, teaching, or historiographic specialties of the faculty offering the course. Subtitles indicate the focus of the research seminar. Prerequisite: Master's student standing. Typically offered Spring Fall.

HIST 64200 - Seminar In Global History

Credit Hours: 3.00. Individual and group study of topics in global history. Topics reflect the research, teaching, or historiographic specialties of the faculty offering the course. Subtitles indicate the focus of the research seminar. Prerequisite: Master's student standing. Typically offered Spring Fall.

HIST 65000 - Teaching The History Survey Course

Credit Hours: 3.00. This course provides an introduction to the literature on teaching history at the college level, especially the literature on pedagogy, theory, and conceptualization needed for the undergraduate survey course. Students will become familiar with the professional literature, develop their own syllabus for the survey course, and produce an extensive historiographical essay supporting and justifying the contents of the syllabus. Class discussions will expose students to a number of teaching strategies, concepts, and exercises. Prerequisite: Master's student standing. Permission of instructor required. Typically offered Summer Fall Spring.

HIST 65100 - Reading Seminar In American History

Credit Hours: 1.00 to 3.00. Bibliography and historiography of selected fields or topics in American history; may vary in subject matter from semester to semester. Prerequisite: Master's student standing. Typically offered Fall Spring.

HIST 65200 - Seminar In American History

Credit Hours: 3.00. Individual and group study of topics in American history from the colonial period to the present. Topics reflect the research, teaching, or historiographical specialties of the faculty offering the course. Subtitles indicate the focus of the research seminar. Prerequisite: Master's student standing. Typically offered Spring Fall.

HIST 66500 - Seminar On American Indian History

Credit Hours: 3.00. Individual research and group study of selected topics dealing with American Indian history from the pre-Columbian period to the present. Typically offered Spring Fall.

HIST 67000 - Seminar In Latin American History

Credit Hours: 3.00. Research or reading seminar in Latin American History on a selected topic in colonial or national period of Latin American History. Topics vary. It may be repeated once with change of topic. Students must have been admitted into M.A. or Ph.D. history programs or any other graduate program at Purdue. Also adequate knowledge of languages pertinent to research topic is expected. No prior knowledge of Latin American History is required. Typically offered Fall Spring.

HIST 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

HIST 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Honors

HONR 19500 - University Honors Program Freshman Independent Research

Credit Hours: 1.00 to 3.00. Honors research. Individual research projects undertaken with faculty supervision. Admission to University Honors Program. Permission of instructor required. Typically offered Summer Fall Spring.

HONR 19900 - Interdisciplinary Honors - Special Topics Seminar

Credit Hours: 1.00 to 6.00. For first and second-year honors eligible students only, with priority given to University Honors Program (UHP) students. These interdisciplinary topic seminars are designed to open intellectual horizons and allow opportunities for learning by inquiry in a collaborative environment. Courses are limited to 20 participants or less, may be team taught, and emphasize close interaction between the professor(s) and the students. Students will participate in active learning exercises that may include field trips, creative research experiences, community collaboration, and/or service learning. Seminar topics will vary from semester to semester depending upon demand and/or instructor's availability. Previous seminar titles include: The Vampire in Folklore, Fiction, & Film; Should the History of Science be X-Rated; The City; and The Modern Corporation in Society. Requires SAT >= 1200 or ACT >= 26. Permission of instructor required. Typically offered Summer Fall Spring.

HONR 19901 - The Evolution Of Ideas

Credit Hours: 1.00. This course is the first half of the required introductory series taken by all students entering the Honors College. It has no prerequisites and is restricted to students accepted into the Honors College. Typically offered Fall.

HONR 19902 - The Evolution Of Ideas II

Credit Hours: 1.00. This course is the second half of the required course sequence taken by all students entering the Honors College. It has no prerequisites and is restricted to students accepted by the Honors College. Typically offered Spring.

HONR 19903 - Interdisciplinary Approaches In Writing

Credit Hours: 3.00. This course is a writing-intensive course in which students learn how to find, evaluate, and use credible information, how to express themselves well in a variety of different written genres, and how to write for different audiences. Typically offered Fall Spring.

HONR 29500 - University Honors Program Sophomore Independent Research

Credit Hours: 1.00 to 3.00. Honors research. Individual research projects undertaken with faculty supervision. Admission to University Honors Program. Permission of instructor required. Typically offered Fall Spring Summer.

HONR 29900 - Interdisciplinary Honors - Special Topics Seminar

Credit Hours: 1.00 to 6.00. For second-year honors eligible students and above; with priority given to University Honors Program (UHP) students. These interdisciplinary topics seminars are designed to open intellectual horizons and allow opportunities for learning by inquiry in a collaborative environment. Courses are limited to 20 participates or less, may be team taught, and

emphasize close interaction between the professor(s) and the students. Students will participate in active learning exercises that may include field trips, creative research experiences, community collaboration, and/or service learning. Seminar topics will vary from semester to semester depending upon demand and/or instructor's availability. . Permission of instructor required. Typically offered Summer Fall Spring.

HONR 39500 - University Honors Program Junior Independent Research

Credit Hours: 1.00 to 3.00. Honors research. Individual research projects undertaken with faculty supervision. Admission to University Honors Program. Permission of instructor required. Typically offered Summer Fall Spring.

HONR 39900 - Interdisciplinary Honors - Special Topics Seminar

Credit Hours: 1.00 to 6.00. HONR 39900 is designated for a wide range of honors courses offered by various schools/departments as part of their respective curricula and by the University Honors Program. Permission of department required. Typically offered Summer Fall Spring.

HONR 49900 - Interdisciplinary Honors - Special Topics Seminar

Credit Hours: 1.00 to 6.00. HONR 49900 is designated for a wide range of honors courses offered by various schools/departments as part of their respective curricula and by the University Honors Program. Permission of department required. Typically offered Summer Fall Spring.

Horticulture

HORT 10100 - Fundamentals Of Horticulture

Credit Hours: 3.00. Biology and technology involved in the production, storage, processing, and marketing of horticultural plants and products. Laboratories include experiments demonstrating both the theoretical and practical aspects of horticultural plant growth and development. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall Spring.

HORT 11000 - Survey Of Horticulture

Credit Hours: 1.00. A survey of the field of horticulture, with emphasis on horticultural information and career opportunities.

This course will utilize a lecture format with a combination of presentations by the instructor and guest speakers with expertise and experience in specialized areas of horticulture. Typically offered Spring.

HORT 20100 - Plant Propagation

Credit Hours: 3.00. Theoretical and applied aspects of controlled plant reproduction by sexual and asexual techniques, including seeds, grafting and budding, layering, cuttings, micropropagation (in vitro culture), and specialized structures. Lectures emphasize morphological changes and physiological processes involved in plant propagation. Laboratory exercises illustrate the practical applications of propagation techniques. Typically offered Spring.

HORT 21700 - Woody Landscape Plants

Credit Hours: 4.00. Recognition and identification of woody landscape plants; plant characteristics in terms of landscape function. Typically offered Fall.

HORT 21800 - Herbaceous Landscape Plants

Credit Hours: 3.00. Covers important herbaceous ornamentals, with emphasis on annuals, perennials, bulbs, and ground covers; recognition; cultural requirements; and use in landscape plantings. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

HORT 22200 - DynaSCAPE Applications In Horticulture

Credit Hours: 1.00. This course will teach students how to use DynaSCAPE software for horticultural landscape design applications. Offered during weeks 6-10. Typically offered Spring.

HORT 22300 - AutoCAD Applications In Horticulture

Credit Hours: 1.00. This course will teach students how to use AutoCada software for horticultural landscape design and construction applications. Offered during weeks 11-15. Typically offered Spring.

HORT 22400 - Photoshop Applications In Horticulture

Credit Hours: 1.00. This course will teach students how to use Adobe Photoshop software for horticultural applications. Offered during weeks 1-5. Typically offered Spring.

HORT 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first- and second-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

HORT 30100 - Plant Physiology

Credit Hours: 4.00. Basic physiological processes of higher plants, particularly as related to the influence of environmental factors on growth, metabolism, and reproduction. Laboratory experiments involve hands-on experience with numerous aspects of plant physiology, including water relations, photosynthesis, growth, dormancy, hormones, and flowering. Typically offered Fall.

HORT 30600 - History Of Horticulture

Credit Hours: 3.00. The origins and development of agriculture, with specific emphasis on horticulture from prehistory to the present in relation to civilization and modern culture. Typically offered Fall Spring Summer.

HORT 31000 - Planting Design Basics

Credit Hours: 1.00. An introduction to the principles and methods of design and graphic communication as applied to the arrangement of plants in the landscape. The focus will be on small scale, ornamental and educational display plantings. Both herbaceous and woody planting design examples for public gardens, golf courses and other public sites will be presented. Offered during weeks 6-10. Typically offered Fall.

HORT 31500 - Landscape Design

Credit Hours: 3.00. An introduction to the landscape design process. The focus will be on smaller sites, constructed site systems and planting design. Graphic skills will emphasize techniques for drawing site plans and other illustrations. Typically offered Fall.

HORT 31600 - Landscape Construction

Credit Hours: 3.00. An introduction to the primary elements and systems of the constructed landscape, including landform, edging, paving, retaining wall, decking, low-voltage lighting, irrigation, drainage and ornamental water systems. Typically offered Spring.

HORT 31700 - Landscape Contracting And Management

Credit Hours: 3.00. Principles and practices applicable to the installation and management of landscape plants. Topics include site and project assessment, site modification and plant installation, the business practices of estimating and bidding, and plant management. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

HORT 36000 - Flower Arrangement And Indoor Plant Management

Credit Hours: 3.00. Principles of flower arrangements and displays. Identification, culture, propagation, and use of plants for indoor plantings. Laboratory materials fee required. Typically offered Fall Spring.

HORT 37000 - Professional Floral Design

Credit Hours: 3.00. Principles and techniques of commercial-scale floral design for weddings, funerals, hospitals, personal, and parties. Design construction for fresh, dried, and silk materials. Survey of retail florist management. Permission of department required. Typically offered Fall.

HORT 39000 - Cooperative Program In Horticulture

Credit Hours: 0.00. Supervised work experience in horticultural industry. Programs must be preplanned and conducted under the direction of the departmental coordinator with the cooperation of an employer. Students must submit a summary report. Permission of department required. Typically offered Fall Spring Summer.

HORT 40000 - Horticulture Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

HORT 40300 - Tropical Horticulture

Credit Hours: 3.00. An introduction to the agriculture of the tropics and subtropics, emphasizing horticultural crops. Offered in even-numbered years. Typically offered Fall.

HORT 42000 - Ornamental Plant Production

Credit Hours: 3.00. An intensive study of specific production technologies used to commercially grow landscape and floriculture crops, including greenhouse and nursery management. The course will have an emphasis on the growth and development of major floral and nursery crops as influenced by the environment and cultural techniques. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

HORT 42100 - Fruit Production

Credit Hours: 3.00. This course will teach the science and practice of temperate fruit production with emphasis on pome fruit (apples, pears), stone fruit (peaches, plums, cherries), berry crops (strawberries, brambles, blueberries) and grapes. Principles and concepts will be an important part of the class integrating knowledge of plant physiology, biochemistry and post-harvest physiology. The course will emphasize sustainable production practices and prepare students to think critically to solve fruit production problems. Typically offered Fall.

HORT 42200 - Vegetable And Herb Production

Credit Hours: 3.00. Sustainable principles, practices, establishment, projection, maintenance and harvesting of vegetable crops. Typically offered Spring.

HORT 42500 - Landscape Horticulture Capstone Project

Credit Hours: 3.00. Individuals or teams of students will work with local governments, community service agencies or not-for-profit organizations on projects in which students address problems of landscape planting design, landscape installation, and/or landscape management. The supervising faculty advisory committee will identify projects. Under the mentorship of the advisory committee, students will work closely with the sponsoring client entity to define the problem and participate in creating and/or implementing solutions. At project completion, oral presentations will be made to clients to supplement a written project report. Open only to graduation candidates majoring in Landscape Hortculture and Design. Typically offered Fall Spring.

HORT 43500 - Principles Of Marketing And Management For Horticultural Businesses

Credit Hours: 4.00. Principles of marketing and business management in the horticultural industries; market organization, performance, and planning; financial planning, pricing, promotion, cost control, and legal aspects of retailing. Case studies in direct farm, floral, and garden center management. Typically offered Fall.

HORT 44000 - Public Garden Management

Credit Hours: 1.00. Based on an approved internship at a public garden, arboretum, or other public horticulture-related institution, students will explore management strategies used by the host institution and then submit a comprehensive report. A computer-aided oral presentation based on specific aspects of the internship program will also be required. An approved internship is required. Typically offered Fall Spring.

HORT 44200 - Sustainability In The Managed Landscape

Credit Hours: 1.00. Presents recent advances in the science and technology of sustainable practices for managed landscapes. This course will utilize a lecture format with the combination of presentations by the instructor, expert guest speakers, and students. Offered in even-numbered years. Course enrollment is capped at 14. Typically offered Spring.

HORT 44500 - Strategic Analysis Of Horticultural Production And Marketing

Credit Hours: 1.00. Based on an approved work experience at a commercial horticultural enterprise, students will explore the management, operational and horticultural setting and strategies used by that enterprise and then submit a comprehensive Enterprise Analysis. A computer-aided oral presentation based on specific aspects of the enterprise and the student's work experience is also required. Typically offered Spring.

HORT 45000 - In The English Landscape:Integrating History, Horticulture, and Landscape Architecture

Credit Hours: 3.00. Intensive four-weeks in residence in Corsham, UK with visits to significant sites to examine the intersections between human culture and the natural environment that results in the developed landscape. Offered in even-numbered years. Permission of instructor required. Typically offered Summer.

HORT 47500 - Honors Course - Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third- and fourth-year

students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

HORT 49100 - Special Assignments In Horticulture

Credit Hours: 1.00 to 3.00. Training in research techniques, statistical methods, and record procedures. Assigned research problems. A written report of work accomplished is required. Permission of instructor required. Typically offered Fall Spring Summer.

HORT 49200 - Horticultural Science Capstone Seminar

Credit Hours: 1.00. A seminar class combining career development activities with analysis and presentations centered around relevant problems in horticultural science. Students will draw on a variety of their experience such as undergraduate research (HORT 49100), internships, study abroad programs, and other pre-professional activities. Typically offered Fall.

HORT 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. For students doing individualized research on horticultural problems; report required. Arrange with academic advisor and honors research advisor before registering. Admission to the honors program. Permission of instructor required. Typically offered Fall Spring Summer.

HORT 50100 - Scanning Electron Microscopy: Principles

Credit Hours: 1.00. This 10-week course covers basic theory of Scanning Electron Microscopy and its use as a technique for scientific research. The intent of the course is to provide students with a basic foundation of SEM for evaluating literature and utilizing the technique for their research. Research justification (determined by the instructor and major professor /academic adviser) is required for admission into this course. Permission of instructor required. Typically offered Fall.

HORT 50200 - Scanning Electron Microscopy: Application

Credit Hours: 2.00. This is a 10-week course covering application of Scanning Electron Microscopy (SEM) and its use as a tool for scientific research. The intent of the course is to train students to conduct independent research using this technology and the facilities of the Life Science Microscopy Facility (LSMF). Research justification (determined by the instructor and major professor/academic adviser) is required for admission into this course. Permission of instructor required. Typically offered Fall.

HORT 50300 - Transmission Electron Microscopy: Principles

Credit Hours: 1.00. This 10-week course covers basic theory and application of Transmission Electron Microscopy (TEM) and its use as a tool for scientific research. The intent of the course is to provide students with a basic foundation of TEM for evaluating literature and utilizing the technique for their research. Research justification (determined by the instructor and major professor /academic adviser) is required for admission into this course. Permission of instructor required. Typically offered Spring.

HORT 50400 - Transmission Electron Microscopy: Application

Credit Hours: 2.00. This 10-week course covers basic theory and application of Transmission Electron Microscopy (TEM) and its use as a tool for scientific research. The intent of the course is to provide students with a basic foundation of TEM for evaluating literature and utilizing the technique for their research. Research justification (determined by the instructor and major professor /academic adviser) is required for admission into this course. Permission of instructor required. Typically offered Spring.

HORT 50600 - Commerical Grape And Wine Production

Credit Hours: 3.00. (FS 50600) A study of professional grape growing and wine production with an emphasis on Midwestern climates, adapted varieties, and recommended wine styles. This course is especially intended for upper level undergraduate, or graduate students in the College of Agriculture that have completed basic course work in plant sciences, biology and chemistry. Students will learn the principles of viticulture and enology and the practices of commercial grape growing and wine making. Must be 21 years old. Permission of instructor required. Typically offered Fall.

HORT 51300 - Nutrition Of Horticulture Crops

Credit Hours: 1.00. An integrated course about plant nutrition focused on horticultural crops. The unique features of nutrient availability in a soil-less horticultural media will be highlighted. An emphasis will be placed on understanding the physiological basis of plant responses to nutrient application. Weeks 1-5. Typically offered Spring.

HORT 54100 - Postharvest Technology Of Fruits And Vegetables

Credit Hours: 1.00. (FS 54100) Theoretical and applied aspects of methods being used for enhancing the quality and shelf life of harvested fruits and vegetables. Factors that affect the longevity of produce and technology used to control these factors and reduce deterioration of produce between harvest and consumption/processing will be emphasized. Weeks 11-15. Typically offered Spring.

HORT 54200 - Introduction To Agricultural Biotechnology For Educators

Credit Hours: 3.00. (YDAE 54200) This course is offered, via distance education, to help formal and informal educators understand how transgenic organisms are produced, as well as to enable them to teach science and issues surrounding agricultural biotechnology. Typically offered Summer.

HORT 55100 - Cellular And Molecular Plant Physiology

Credit Hours: 3.00. THORT 55100 is a course in plant physiology that integrates physiological concepts with plant cell and molecular biology. The course places biophysical concepts of plant physiology such as water relations, energetics, source-sink relationships, chemiosmotic gradients, light responses, and stress physiology in the context of gene expression, cellular topology, protein structure, protein trafficking and membrane characteristics. The course material emphasizes both plant and comparative systems biology approaches, and places a particular emphasis on post transcriptional regulatory mechanisms. Another objective of the course is to acquaint students with primary scientific literature and help them learn to read, evaluate, and discuss scientific research papers. A combined lecture and seminar format is used to cover general topics and bring students into contact with primary literature. The format acquaints students with regular reading and analysis of primary research literature and improves their ability to produce written summaries and reviews. A subset of class sessions are devoted to onsite exposure to cutting edge technologies presented by experts. Typically offered Fall.

HORT 55300 - Plant Growth And Development

Credit Hours: 3.00. (BTNY 55300) Topics include seed dormancy, cell expansion and plant growth, pattern formation, phase transition, flowering, pollination and fertilization, seed development, fruit development, and senescence. This course is the second in a series of team-taught courses in the core curriculum of the Purdue Plant Biology Program. Typically offered Spring.

HORT 59000 - Special Studies In Horticulture

Credit Hours: 1.00 to 3.00. Special studies in horticulture not covered in regular coursework. The field in which work is offered will be indicated in the student's record. Permission of instructor required. Typically offered Spring Fall Summer.

HORT 60100 - Planning And Presenting Plant Science Research

Credit Hours: 1.00. The purpose of this course is to acquaint students with the culture of scientific research and the processes of scientific discovery and review. This course will: (1) acquaint students with techniques used in presenting short scientific talks, as e.g., at national meetings, (2) expose students to procedures used in preparing scientific papers, proposals, etc., (3) introduce students to the outcomes expected to be achieved by graduate education and the processes by which students are mentored and evaluated, (4) help students begin formulating their research project proposal, (5) acquaint students with guidelines for biosafety and responsible conduct of research and provide a forum for discussion of ethical issues confronting researchers, particularly those inherent in participating in extramurally-funded research, (6) acquaint students with intellectual property issues involved in scientific research, (7) acquaint students with core research facilities across campus, and (8) expose students to discussions

regarding the importance of diversity and an atmosphere of mutual respect to research excellence. This course is taken for a letter grade and carries on hour of credit. Typically offered Fall Spring .

HORT 60200 - Horticulture Research Seminar

Credit Hours: 1.00. Weekly attendance at the Horticulture and Landscape Architecture Departmental seminars to help graduate students develop an appreciation for attending seminars and learning appropriate and effective presentation skills. HORT 602 compliments HORT 60100 and HORT 60300 by extending the presentation and project development approaches learned, so that students are better ready to prepare and defend their project proposals in HORT 60300. Prerequisite: BCHM 56100. Typically offered Fall Spring.

HORT 60300 - Grants And Grantsmanship

Credit Hours: 1.00. Focuses on funding opportunities in agricultural research and techniques of writing successful scientific grant proposals. Students will write a proposal on a research topic of their choice during the course, and they will gain experience in the peer review process by preparing written reviews of proposals and participating in a panel meeting in which proposals are discussed and ranked. Typically offered Spring.

HORT 64000 - Metabolic Plant Physiology

Credit Hours: 3.00. (AGRY 64000, BCHM 64000, BIOL 64000, BTNY 64000) Topics include photosynthesis, respiration, carbohydrate and lipid metabolism, and nitrogen, sulfur, and secondary metabolism. This course is the third in a series of core courses in the Purdue Plant Biology Program graduate curriculum. Prerequisite: BCHM 56100, BCHM 56200; BTNY 55300 or HORT 55300, Prerequisite: BIOL 55100 or HORT 55100. Typically offered Fall.

HORT 69500 - Horticulture Seminar

Credit Hours: 0.00. Topics of current interest to staff and students. Typically offered Fall Spring Summer.

HORT 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

HORT 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Hospitality and Tourism Management

HTM 10000 - Introduction To The Hospitality And Tourism Industry

Credit Hours: 2.00 (West Lafayette) 1.00 to 3.00 (Calumet, Fort Wayne) An overview of the supervisory careers, opportunities, and responsibilities in the foodservice, lodging, and tourism industry; including historical developments, pioneers, and industry leaders; representatives of companies from the three areas. Typically offered Fall.

HTM 10010 - Introduction To The Hospitality And Tourism Industry

Credit Hours: 1.00. An overview of the basic dimensions of professionalism, customer service, sustainability, civic engagement, ethics, and the historical perspective that is integral to the hospitality and tourism industry. Students will also keep pace with current industry trends through guest lectures from executives of companies from foodservice, lodging, and tourism. Typically offered Fall.

HTM 10100 - Hospitality And Tourism Student Seminar

Credit Hours: 1.00. Course assists the student new to Purdue to become acquainted with the Purdue system and with the HTM department and program. Information presented to assist students with developing strategies for academic and career-related success at Purdue. Typically offered Fall.

HTM 14100 - Financial Accounting For The Service Industries

Credit Hours: 3.00. Fundamental accounting principles and procedures applied to the hospitality and service industries. Includes study of the uniform system of accounts, financial statements, special purpose journals, and subsidiary ledgers unique to the hospitality and service industries. Typically offered Summer Fall Spring.

HTM 17300 - Introduction To Tourism Management

Credit Hours: 3.00. This is an introduction to tourism management using a system approach that integrates a variety of hospitality and travel organizations and businesses. It focuses on the understanding of tourism from the perspectives of travelers and

destinations, while identifying tourism's economic, socio-cultural, and environmental impacts on communities. Typically offered Fall Spring.

HTM 18100 - Lodging Management

Credit Hours: 3.00. Organization, management and operating procedures of lodging facilities. Guest-employee interactions will be analyzed along with current trends and cutting edge topics in the lodging industry. A history of the lodging industry will be discussed. Typically offered Fall Spring.

HTM 19000 - First Year Seminar

Credit Hours: 1.00. A one-credit (each semester) first-year honors seminar consists of guest speakers and discussions of broad intellectual issues. Admitted high school students who have either a 1200 combined SAT score (equivalent ACT score) or graduate in top 10 percent of class. Letter of invitation from the CFS dean. Typically offered Fall Spring.

HTM 19100 - Sanitation And Health In Foodservice, Lodging, And Tourism

Credit Hours: 3.00. This course introduces students to the foodservice component of the Hospitality and Tourism industry and explores food safety and other health related issues. Application of sanitation principles in restaurants, hospitals, schools, hotels, cruise ships, airlines, and international travel are covered. Students must pass a National Sanitation Certification Examination to receive credit. Typically offered Fall Spring.

HTM 19700 - First Year Honors Seminar

Credit Hours: 1.00. A one-credit (each semester) first-year honors seminar consisting of guest speakers and discussions of broad issues within Consumer and Family Sciences. Permission of department required. Typically offered Fall Spring.

HTM 20200 - Hospitality And Tourism Management Internship

Credit Hours: 1.00. This course will consist of an approved hospitality industry experience. Students are required to obtain a letter from their employer verifying their paid employment. A minimum of 300 hours are needed for each credit hour given for a summer experience and the maximum number of credits in a semester is two. Students will be required to prepare weekly reflection reports which will each have a different topic that they will have to address. Students must present proof of their 300 hours of paid employment upon completion of their experience. Typically offered Summer.

HTM 21100 - Healthcare Material Management Concepts

Credit Hours: 3.00. No credit for HTM students, since course is geared toward specific audience. The purpose of this course is to develop managers who can provide the right product at the right time to the right place. Students will learn about strategic planning, budgeting, capital funding, purchasing, supplier waste control, warehousing and storage.

HTM 21200 - Organization And Management In The Hospitality And Tourism Industry

Credit Hours: 3.00. Basic principles of planning, organizing, directing, and controlling human and physical resources will be addressed. Students will also learn how these principles can be applied to maximize the organizational effectiveness of hospitality and tourism businesses. Typically offered Fall Spring.

HTM 21300 - Supervision Principles: Leadership Strategies For Healthcare Facilities

Credit Hours: 3.00. No credit for HTM students, since course is geared toward specific audience. The purpose of this course is to focus on proven management principles and unique skills that healthcare supervisors can use to manage people. Students will learn techniques of supervision that can last them a lifetime and will better prepare them to cope with the many professional and personal challenges facing them.

HTM 23100 - Hospitality And Tourism Marketing

Credit Hours: 3.00. This course teaches students a customer-oriented approach to marketing in hospitality and tourism. The role of marketing in an organization's overall strategic plan is emphasized. Techniques available to hotels, restaurants, and other tourism businesses are described and evaluated, including packaging, the travel trade, advertising, sales promotion, positioning and branding. Typically offered Fall Spring.

HTM 24100 - Managerial Accounting And Financial Management In Hospitality Operations

Credit Hours: 3.00. Managerial and financial analyses of numerical data used for decision-making. Consideration of systems, techniques, information types, and presentational forms used by hospitality management. Emphasis on situations oriented to the hospitality industry. Typically offered Summer Fall Spring.

HTM 29000 - Seminar

Credit Hours: 1.00. Current issues facing the hospitality and tourism industry are presented and discussed. An emphasis is placed

on exploring the various means used to study and understand these issues. Admittance into the HTM Honors Program. Typically offered Fall Spring.

HTM 29100 - Quantity Food Production And Service

Credit Hours: 3.00 (West Lafayette, Fort Wayne) 4.00 (Calumet) An introduction to food preparation methods and service techniques in quantity food settings. Students become familiar with ingredients and culinary terminology, and learn to read and evaluate menus. Recipe conversion and costing skills are developed. Different production schemes and product flow are examined, and the relationship between back-of-the-house and front-of-the-house activities is discussed. Typically offered Fall Spring.

HTM 29101 - Quantity Food Production And Service Laboratory

Credit Hours: 2.00. Basic knowledge of foodservice operations. Students learn and develop food production and service skills in the HTM Cafe and the John Purdue Room. Students are exposed to quantity cooking methods, the use and care of equipment, and service techniques as they rotate through various positions commonly found in foodservice operations. All aspects of the dining experience are experienced by students. National Sanitation Certification needed. Typically offered Fall Spring.

HTM 29700 - Introduction To Honors Research

Credit Hours: 1.00. Introduces students to the design and implementation of an honors research project. Typically offered Fall Spring.

HTM 30000 - Semester Internship Experience In Hospitality And Tourism

Credit Hours: 0.00. Mechanism to recognize students in the Purdue system the semester they are off campus participating in an approved semester internship program with a hospitality company. Permission of department required. Typically offered Fall Spring.

HTM 30200 - Hospitality And Tourism Industry Internship

Credit Hours: 1.00. This course consists of an approved hospitality industry experience. Students are required to obtain a letter from their employer verifying their paid employment. A minimum of 320 hours are needed for each credit hour given for a summer experience and the maximum number of credits in a semester is two. Students will be required to prepare weekly reflection reports which will each have a different topic that they will have to address. Students must present proof of their 320 hours of paid employment upon completion of their experience. Typically offered Summer.

HTM 31100 - Procurement Management For Foodservice

Credit Hours: 3.00. Identifies and describes food, supplies, and related merchandise used in the foodservice industry. Provides methods and criteria for recognizing quality, evaluating, specifying, purchasing, and inspecting these products. Discusses the use of technology in the purchasing component of the foodservice industry. Typically offered Fall Spring.

HTM 31200 - Human Resources Management For The Service Industries

Credit Hours: 3.00. The principles and practices of managing human resources for effective operations of hospitality and tourism businesses will be covered including: analysis and design of work, recruiting, selection, training and development, performance management, compensation, employee relations, and strategies for supporting organizational strategies. Typically offered Fall Spring.

HTM 31400 - Franchising

Credit Hours: 3.00. The study of franchise administration, operations, and marketing, with a special emphasis on hospitality-related franchises. Includes a study of the legal regulation of franchises, the franchisee-franchisor relationship, and unique problems in operating a franchise. Typically offered Summer.

HTM 31500 - Club Management And Operations

Credit Hours: 3.00. A study of the organization, administration, operation, and opportunities within the private club industry, with emphasis on the manager's duties. Typically offered Spring.

HTM 31700 - Business Etiquette For Managers

Credit Hours: 1.00. A review of contemporary standards of human interaction in the workplace. How manners, etiquette and style affect and enhance everyday dealings with others. Typically offered Fall Spring.

HTM 32200 - Hospitality Facilities Management

Credit Hours: 3.00. Technical and managerial issues relating to the operation and maintenance of the physical plant and equipment in hospitality industry facilities. Typically offered Fall Spring.

HTM 33100 - Hospitality And Tourism Sales And Service

Credit Hours: 3.00. Application of sales and customer service methods used to generate revenues for hospitality and tourism businesses. Emphasis is placed on a hands-on assignment which requires students to identify a product that they will market and sell, as well as participate in a sales blitz. Typically offered Fall Spring.

HTM 34100 - Cost Controls In Foodservice And Lodging

Credit Hours: 3.00. Application of cost controls; development of cost-reduction methods through management policy and decisions; examination of cost-control techniques for food, labor, and supplies in addition to the emphasis on beverage management control. Typically offered Fall Spring.

HTM 35100 - E-Business For The Hospitality Sector

Credit Hours: 3.00. This course introduces the students to the technological foundation of the internet, e-business strategies and models, as well as the social and ethical issues concerning the internet. The students will gain a better understanding of how hospitality and tourism organizations conduct internet-based activities, and have integrated their online and overall business strategies. Typically offered Fall.

HTM 37200 - Global Tourism Geography

Credit Hours: 3.00. Introduction and analysis of specific world travel destinations, including the exploration of geographic features, customs and tradition, population centers, visitor attractions, political, religious, language and other cultural differences as these relate to the hospitality and travel industry. The course is designed to teach students specific geographic knowledge, and develop a deeper understanding and empathy for cultural values and traditions that exist outside their own culture. Typically offered Fall.

HTM 37300 - Travel Industry Operations And Technology

Credit Hours: 3.00. This class is designed to provide a comprehensive understanding of the roles, sizes, structure, operations, and relationships of travel industry organizations with a particular emphasis on travel agencies, tour operators and wholesalers, corporate travel management, incentive travel, and meeting-convention planners. The latest technologies of travel information and reservations technology are also reviewed in the class, including airline reservation and World Wide Web-based systems such as Travelocity, Expedia, and Preview Travel. The class is divided into two parts: lecture and laboratory (hands-on instruction on airline reservation systems using the SABRE program developed by American Airlines). Typically offered Spring.

HTM 38110 - Revenue Management In The Lodging Industry

Credit Hours: 3.00. This course will add to and build upon the knowledge acquired in HTM 18100 - Lodging Management. The class will provide a theoretical perspective on service management and how service management concepts can be applied to the hospitality business. The course will also provide an understanding of revenue management's key concepts and applicability of revenue maximization strategies and their operational aspects, components of effective revenue management will be analyzed and its effects on overall profitability. The course will also review the latest issues and trends affecting all aspects and segments of the lodging industry. Typically offered Fall Spring.

HTM 38200 - Lodging Service Management

Credit Hours: 3.00. Covers aspects of the relationship between guest service departments in a hotel and the housekeeping department in maintaining positive guest relations. Principles and practices along with the functions and responsibilities of departments will be examined as they relate to guest services. Typically offered Fall Spring.

HTM 38300 - Resort, Cruise, And Entertainment Operations

Credit Hours: 3.00. This class provides a comprehensive analysis of the operations of different styles of resorts, as well as cruise lines, gaming, and other entertainment attractions. Operating structures, systems, and management practices are compared with traditional hotels. The resort development process is explained and alternative resort concepts are discussed, including resort condominium and vacation/interval ownership. Typically offered Fall Spring Summer.

HTM 39000 - Undergraduate Special Problems

Credit Hours: 0.00 to 6.00. Individual or group participation in supervised reading, laboratory experiences, field experiences, or research in special areas of the field. Permission of instructor required. Typically offered Fall Spring Summer.

HTM 39200 - Classical Cuisine

Credit Hours: 1.00. Supervised hands-on cooking experience to enhance competencies needed in professional cooking. Typically offered Spring.

HTM 39300 - Advanced Foodservice Techniques

Credit Hours: 1.00. The purpose of this course is to develop students' understanding of dining room management, give exposure to various service styles, and to extend their knowledge of gastronomy. Students will become familiar with the lines of authority

found in various food service settings, and required to master the specifics of different service styles and service etiquette. Course is available as an elective for all students enrolled in Hospitality and Tourism Management. Typically offered Fall.

HTM 39400 - Advanced Service Practicum

Credit Hours: 1.00. The purpose of this course is to provide students the opportunity to obtain greater service experience. Students are exposed to various service styles and event management. The functions range in size from 6 to over 1000 guests, and the level of service differs greatly. Students must be selected to enroll in course. Permission of department required. Typically offered Spring.

HTM 39700 - Directed Honors Research

Credit Hours: 1.00 to 3.00. Directed independent honors research for CFS Honors Program students. Students must select a faculty advisor for the course. Permission of instructor required. Typically offered Fall Spring Summer.

HTM 39800 - International Special Topics

Credit Hours: 1.00 to 6.00. Course taken during an international experience that is recognized by the University. Typically offered Summer Fall Spring.

HTM 39900 - Special Topics In HTM

Credit Hours: 1.00 to 6.00. Various topics that may change from semester to semester are presented by HTM faculty. Typically offered Summer Fall Spring.

HTM 41100 - Hospitality And Tourism Law

Credit Hours: 3.00. Overview of the fundamental legal framework that governs the conduct of hospitality and tourism managers. Topics include civil rights, contracts, court procedures, ethics, and risk management. Typically offered Fall Spring.

HTM 44100 - Financial Management For The Hospitality Industry

Credit Hours: 3.00. This course deals with subjects and issues facing a hospitality financial manager. The primary purposes of this course are to understand the role of financial management, to learn analytic concepts and managerial tools to make capital

investment decisions and to become familiar with major financial instruments and concepts such as time value of money, risk-return, bond and stock valuation, capital budgeting, cost of capital, capital structure and dividend policy. This course also handles hospitality-specific cases and readings for investments, capital structure, and dividends. Typically offered Fall.

HTM 49000 - Independent Study

Credit Hours: 1.00 to 4.00. Independent study. Permission of instructor required. Typically offered Fall Spring Summer.

HTM 49100 - Beverage Management

Credit Hours: 2.00. Principles and practices regarding the production, selection, purchasing, storage, and service of beverage alcohol in the hospitality industry. State of Indiana responsible alcohol service certification is required to earn course credit. Must be 21 years or older. Permission of department required. Typically offered Fall Spring.

HTM 49110 - Wine Sommelier Certification

Credit Hours: 1.00. This course involves the application of previously learned information about the principles of wine including vine growing, wine production, sensory evaluation of wine and practices involved in selection and sales of wine in a foodservice establishment. Students are immersed in the analysis and application of the principles and practices of the Guild of the Master Sommelier Program including Level one Certification. Student must be at least 21 years of age. Typically offered Fall.

HTM 49111 - Beverage Operation Management

Credit Hours: 1.00. This course teaches students the historical background and modern day principles and management practices regarding the production, selection, purchasing, storage and service of beverage alcohol in all aspects of the hospitality industry. Certification in State of Indiana Responsible Service of Alcohol program is required to earn course credit. Students must be at least 21 years of age. Permission of department required. Typically offered Fall Spring.

HTM 49112 - Management And Service Of Beverage Alcohol

Credit Hours: 1.00. This course introduces the principles and practices regarding the production, and service of beverage alcohol in the hospitality industry. Structured tastings will be utilized to identify and describe specific factors necessary to serve specific spirits, wines and beers in the hospitality industry. Typically offered Fall Spring.

HTM 49200 - Advanced Foodservice Management

Credit Hours: 4.00. Utilize managerial skills and techniques with planning, organizing, directing and controlling a full service restaurant operation. Management teams of two to three students develop, market, and operate a restaurant that is open to the public. Emphasis is placed on utilizing effective management skills to create a high quality, profitable operation with well planned systems and highly motivated, organized employees. Typically offered Fall Spring.

HTM 49700 - Honors Research Project

Credit Hours: 1.00 to 4.00. The completion of the independent honors research project for CFS Honors Program students. Must have an approved Honors Project Proposal. Permission of instructor required. Typically offered Fall Spring Summer.

HTM 49900 - Feasibility Studies And Business Development In Hospitality And Tourism

Credit Hours: 3.00. The study of business development. The course will cover all stages in the feasibility and development process. Emphasis will be on strategic planning, design of systems, models and problem analysis, leading to the opening of a successful hospitality or tourism business. Typically offered Fall Spring.

HTM 50100 - Research Methods In Hospitality And Tourism

Credit Hours: 3.00. Introduction to behavioral and economic research design, and the development of research proposals. Typically offered Spring Fall.

HTM 50101 - Statistical Laboratory

Credit Hours: 1.00. Introduction to the use of software used in behavioral research projects. Typically offered Spring.

HTM 50200 - Management Information Systems For The Hospitality Industry

Credit Hours: 3.00. Analysis and design of management information systems for hotels, restaurants, and the travel industry. Topics include cost and value information, data management, local area and wide area networks, implementation of system and impact of information systems on hospitality organizations. Typically offered Fall.

HTM 52200 - Foodservice Equipment And Facility Design

Credit Hours: 4.00. Development of efficient work spaces for hospitality operations. Topics include the principles of selection, operation, and maintenance of foodservice equipment; the application of human factors, ergonomics, environmental concerns in the development of work-flow patterns; and the use of computer-aided design (CAD) to prepare facility drawings. Typically offered Fall.

HTM 53100 - Hospitality And Tourism Marketing II

Credit Hours: 3.00. Examination of the multidimensional marketing functions common to complex hospitality organizations. Typically offered Spring Fall.

HTM 54100 - Advanced Hospitality Accounting And Finance Systems

Credit Hours: 3.00. Specialized accounting and finance systems as related to the hospitality industries. Applications of budgeting and pricing models, performance evaluations and incentives systems, and short-term asset management are discussed, as well as other current subjects. Typically offered Spring Fall.

HTM 57100 - Economics Of Travel And Tourism

Credit Hours: 3.00. This course includes the asset theory of tourism, cost-benefit analysis, tax policy impacts, and other economic and statistical aspects of tourism. The course will examine research designed to determine economic impacts of the hospitality and tourism industries. Typically offered Spring Fall.

HTM 58100 - Advanced Hotel Management

Credit Hours: 3.00. A study of current service management theories as they apply to hotel management. Theory topics include strategic planning, hotel organization and communication, organizational leadership, and control systems. Topics will be discussed from the viewpoint of the hotel's general manager. Typically offered Fall.

HTM 59000 - Problems In Hospitality And Tourism

Credit Hours: 1.00 to 4.00. Individual study in advanced subject areas. A course plan must be submitted to the supervising professor. Permission of instructor required. Typically offered Spring Fall Summer.

HTM 59100 - Research Issues In Food Service Management

Credit Hours: 3.00. The course will focus on research issues related to the food service industry and their short- and long-term implications. Topics will include essential issues in food safety, product development, food service consumer interests, food production, and waste management. Exposure to quantity food production and purchasing. Typically offered Spring Fall.

HTM 60200 - Research Topics And Methods Seminar

Credit Hours: 1.00. Examination of current research in hospitality and tourism. Focuses on industry research needs and appropriate methodologies. Open to graduate students and honors undergraduates. Required for doctoral students. Prerequisite: HTM 50100, STAT 50100, STAT 50200. Typically offered Spring Fall.

HTM 61200 - HTM Management Challenge Analysis

Credit Hours: 3.00. A course designed to discuss specific management problems in the hospitality and tourism industries. Through the use of case studies, students study current challenges, management analysis, the process of decision making, and the impacts of corporate decisions. Prerequisite: basic management organization class. Typically offered Fall.

HTM 63100 - Strategic Marketing in Hospitality And Tourism

Credit Hours: 3.00. Evaluates the role of marketing strategy within overall corporate strategic planning. Segmentation theory, brand segmentation, niche marketing, program life cycles, and positioning approaches are discussed. Emerging concepts, such as visioning, relationship marketing, strategic alliances, and database marketing are studied. Prerequisite: HTM 53100. Typically offered Spring.

HTM 64200 - Advanced Personnel Systems In Restaurants, Hotels, And Institutions

Credit Hours: 3.00. Examination of the philosophical and operational alternatives related to establishing and directing human resource systems in complex restaurant, hotel, and institutional organizations. Prerequisite: HTM 34100, HTM 41100; 6 credit hours at the upper division undergraduate level in Business, Management, Marketing. Typically offered Fall.

HTM 68100 - Seminar In Hotel Management Research

Credit Hours: 3.00. Analysis of hotel industry research based on current policy issues. Prerequisite: HTM 58100. Typically offered Spring.

HTM 69000 - Hospitality And Tourism Research Problems

Credit Hours: 1.00 to 4.00. Development of an individual research project for doctoral students. Projects are designed to broaden understanding of specific research techniques or to add to subject matter knowledge necessary for completion of the doctoral thesis. A paper worthy of submission to a refereed journal is expected upon project completion. Prerequisite: Doctoral student standing. Permission of instructor required. Typically offered Spring Fall Summer.

HTM 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

HTM 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Human Development and Family Studies

HDFS 10000 - Orientation To Current Issues In Human Development And Family Studies

Credit Hours: 1.00. Introduction to fields related to Human Development and Family studies, including majors and career paths. You will meet faculty, alumni, and professionals working in related areas. You will be matched with an advanced student mentor who will help you learn how to become successful as a HDFS student any beyond. Required of all students majoring in the department. Non-majors interested in learning more about HDFS majors are also welcome. Typically offered Fall.

HDFS 19000 - First Year Seminar

Credit Hours: 1.00. A one-credit (each semester) first-year honors seminar consists of guest speakers and discussions of broad intellectual issues. Admitted high school students who have either a 1200 combined SAT score (equivalent ACT score) or graduate in top 10 percent of class and letter from invitation of the HHS Dean. Typically offered Fall Spring.

HDFS 19700 - First Year Honors Seminar

Credit Hours: 1.00. A one-credit (each semester) first-year honors seminar consisting of guest speakers and discussions of broad issues within Consumer and Family Sciences. Permission of department required. Typically offered Fall Spring.

HDFS 20100 - Introduction To Family Processes

Credit Hours: 3.00. An examination of the interpersonal processes that take place within family contexts. Emphasis is on family dynamics. Also considered are linkages between family processes and the broader social environment. Basic components of the research process will be introduced. Typically offered Fall, Spring.

HDFS 21000 - Introduction To Human Development

Credit Hours: 3.00. An introduction to the development of individuals from conception through adulthood and aging. Physical growth, social and emotional behavior, cognitive and language development are covered. Typically offered Fall Spring. CTL: Developmental Psychology.

HDFS 21200 - Child Development Practicum For Youth Adult And Family Services Majors

Credit Hours: 2.00. This is a supervised practicum in a setting with young children. This course focuses on the development of observation skills and the understanding of children's behavior in group settings. Typically offered Fall Spring.

HDFS 21300 - Practicum For Early Intervention And Early Childhood Education And Exceptional Needs

Credit Hours: 3.00. This is a supervised practicum in a setting with young children. This course focuses on the development of observation skills and the understanding of children's behavior in group settings. In addition, students learn strategies for documenting individual children's development and learning, and writing observable and measurable learning objectives. Typically offered Fall Spring.

HDFS 25500 - Introduction To Couple And Family Relationships

Credit Hours: 3.00. Provides further understanding of family relations for those unmarried, those contemplating marriage, or for those married, and for prospective marriage counselors. A functional approach to the interpersonal relationships of courtship, marriage, and family. Typically offered Fall Spring.

HDFS 26000 - Young Children With Exceptional Needs

Credit Hours: 3.00. A broad overview of learner characteristics and service delivery models for young children (birth-8 years) who are at-risk or have identified disabilities. Students gain understanding of disabilities in young children, of laws relating to persons with disabilities, and roles of special and general educators in providing services to students with identified disabilities. Typically offered Spring.

HDFS 28000 - Diversity In Individual And Family Life

Credit Hours: 3.00. Students are introduced to aspects of individual and family life in diverse cultures, particularly racially and/or ethnically diverse families in the United States. The nature of relationships between dominant and minority cultures is considered. Implications of diversity for practice with diverse populations are emphasized throughout the course. Typically offered Fall Spring Summer.

HDFS 29000 - Scholarly Process In HDFS

Credit Hours: 1.00. This course introduces students to the process of designing and implementing scholarly projects in HDFS. Emphasis is on both a conceptual understanding of and applied experience with this process. Admittance into the HDFS Honors program. Typically offered Fall Spring.

HDFS 29700 - Introduction To Honors Research

Credit Hours: 1.00. Introduces students to the design and implementation of an honors research project. Typically offered Fall Spring.

HDFS 30500 - Biosocial Foundations Of The Family

Credit Hours: 3.00. Family ties and family processes in the promotion of individual health and management of disease across the life course are covered. Course reviews research on families and health from multiple disciplinary perspectives. Typically offered Fall Spring.

HDFS 31000 - Guidance In Early Childhood

Credit Hours: 3.00. This course presents a developmental, child-centered approach to the guidance and discipline of young children, including children with disabilities. Influential theories, relevant research, and effective guidance methods for the early childhood teachers and other professionals working with young children and families, including families from different cultural and economic backgrounds, are discussed. Admitted to Gate B. Typically offered Spring.

HDFS 31100 - Child Development

Credit Hours: 3.00. An in-depth study of developmental processes from infancy through adolescence. Includes processes of physical, cognitive, language, social, and emotional development. Processes are discussed within the framework of historical and contemporary theories and current research. Typically offered Fall Spring.

HDFS 31200 - Adult Development

Credit Hours: 3.00. An in-depth study of developmental processes from the transition to adulthood through old age. Particular emphasis is placed on understanding the influence of contexts on adult development. Typically offered Fall Spring.

HDFS 31300 - Adolescent Development

Credit Hours: 3.00. An overview of the normative developmental issues and concerns of the adolescent, with some attention given to problem behavior. Typically offered Fall Spring.

HDFS 31600 - Introduction To Research In Human Development And Family Studies

Credit Hours: 3.00. This course is designed to develop basic skills for conducting research, the ability to understand and critically analyze research studies in human development and family studies, and to apply research findings to other situations. Typically offered Fall Spring.

HDFS 31800 - Developmental Assessment

Credit Hours: 4.00. This course provides an introduction to the variety and characteristics of developmental assessments for young children, birth to 8 years of age. Students learn strategies for documenting individual development and learning, observing and measuring children's learning, and linking assessment and instruction. Understanding outcomes from developmental assessments, communicating with families, and cultural and ethical issues in assessment are included. A supervised practicum with young children is part of this course. Typically offered Fall Spring.

HDFS 32500 - Health And Health Care For Children And Families

Credit Hours: 3.00. This course examines child and family reactions and adjustment to illness and disability. A developmental

perspective on coping with health problems from early childhood through adolescence is presented. Psychosocial issues related to children's and family members' encounters with a variety of health care settings are addressed. Typically offered Summer Fall Spring.

HDFS 33000 - Sexuality And Family Life

Credit Hours: 3.00. Provides the student with a basic knowledge of human sexuality as it pertains to family relations. The course is designed to be helpful to students who will become family life educators as well as to be helpful to students as individuals, spouses, and parents. Typically offered Fall Spring.

HDFS 33100 - Skills For Helping Professionals In Individual, Family And Group Settings

Credit Hours: 3.00. This course is an introduction to skills commonly used in helping professions, including relationship-building skills, beginning interviewing skills, and group process skills. Attention is paid to cultural competence and professional ethics. This course includes a weekly "lab" experience involving practice of the helping skills, as well as a service-learning project in which helping skills are used in a community setting. Typically offered Fall Spring.

HDFS 33200 - Stress And Coping In Contemporary Families

Credit Hours: 3.00. Examines theoretical perspectives related to family stress and resilience and connects these perspectives to empirical work on family dynamics and dysfunction across the lifespan. Problems associated with family formation, parent-child relations, family care giving, and families in remarriage as well as contemporary family relations thought to be challenges themselves such as divorce, incest, and family violence are explored. Typically offered Fall Spring

HDFS 33400 - Aging And The Family

Credit Hours: 3.00. Aging in the family context: roles, relationships, and conditions of life in the family during later stages; intergenerational relations; policy and practice issues. Typically offered Fall.

HDFS 34100 - Working With Parents

Credit Hours: 3.00. This course focuses on developing and maintaining effective relationships between parents and professionals working with children, within the context of family-centered practices. Issues related to cultural, linguistic, economic, and developmental differences that affect relations between families and professionals are examined. Typically offered Spring Fall.

HDFS 34300 - Assessment And Case Management

Credit Hours: 3.00. This course is an introduction to case management as a service delivery approach for helping individuals and families in need. This course provides opportunities to practice basic helping and case management skills such as building rapport, assessing client needs, developing intervention plans, professional ethics, and professional writing. Typically offered Fall Spring.

HDFS 34600 - Research Design And Program Evaluation

Credit Hours: 3.00. This course is an introduction to research methods as used in community programs for children and families including review and application of existing research literature, generating research questions, conducting program needs assessments, evaluating processes and outcomes of existing programs, designing and interpreting applied research studies, and understanding ethical responsibilities in the use and application of research. Instruction has been designed to provide the skills necessary to use existing research and generate new data to benefit programs. Typically offered Fall Spring.

HDFS 34800 - Administration Of Social Service Not-For-Profit Organizations

Credit Hours: 3.00. This course introduces students to aspects of not-for-profit management identified as keys by leaders in existing agencies. Students will prepare themselves for specifically establishing, building, working in and leading not-for-profit organizations. Typically offered Fall.

HDFS 39000 - Special Topics In HDFS

Credit Hours: 1.00 to 6.00. Supervised readings, discussion, lectures and/or research on special topics in family and individual development. Permission of instructor required. Typically offered Summer Fall Spring.

HDFS 39700 - Directed Honors Research

Credit Hours: 1.00 to 3.00. Directed independent honors research for HHS Honors Program students. Students must select a faculty advisor for the course. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 39800 - International Special Topics

Credit Hours: 1.00 to 6.00. Course taken during an international experience that is recognized by the University. Typically offered Fall Spring Summer.

HDFS 40500 - Language, Literacy, And Social Studies In Preschool And Primary Grades

Credit Hours: 4.00. This course focuses on teaching language, literacy and social studies in preschool and primary grade classrooms. It covers the developmental foundations and curriculum applications of language, literacy and social studies teaching in pre-kindergarten and of social studies in primary grades and includes ways to plan, implement and evaluate developmentally appropriate instruction for children with and without disabilities and children who are learning English. A field experience in preschool or primary grade classrooms is included. Typically offered Fall.

HDFS 40600 - Mathematics In Preschool And Primary Grades

Credit Hours: 4.00. This course focuses on teaching mathematics in preschool and primary grade classrooms. It covers the developmental foundations and curriculum applications of mathematics teaching and includes ways to plan, implement and evaluate developmentally appropriate mathematics instructions for children with and without disabilities and children who are learning English. Field-based experiences in preschool or primary grade classrooms are included. Typically offered Spring.

HDFS 40800 - Curriculum Applications Of Atypical Development

Credit Hours: 3.00. An introduction to early childhood special education and early intervention including its rationale, service delivery options and program models. Student will learn specialized teaching strategies including the use of structured prompting (e.g., mand-model), functional behavior assessment and positive behavior support. Development of Individualized Education Programs and Individualized Family Service Plans will be addressed. Strategies for and practice in meeting children's needs in inclusive and natural settings are addressed. For Early Childhood Education and Exceptional Needs majors only, Gate B retained. Typically offered Fall.

HDFS 40900 - Science In Preschool And Primary Grades

Credit Hours: 3.00. This course focuses on teaching science in preschool and primary grade classrooms. It covers the developmental foundations and curriculum applications of science teaching and includes ways to plan, implement and evaluate developmentally appropriate science instruction for children with and without disabilities and children who are learning English. Typically offered Spring.

HDFS 41200 - Music And Movement In Preschool And Primary Grades

Credit Hours: 3.00. This course focuses on art, music and movement in preschool and primary grade classrooms. It covers the developmental foundation and curriculum applications of art, music and movement activities and includes ways to plan, implement and evaluate developmentally appropriate art, music, and movement instruction for children with and without disabilities and children who are learning English. Typically offered Spring.

HDFS 41500 - Approaches To Early Childhood Education

Credit Hours: 3.00. The historical and theoretical basis for early childhood education and early intervention is emphasized. Relations between theory and practice are examined and illustrated with model early childhood education and early childhood special education/early intervention programs. Addresses cultural/developmental diversity and issues in early childhood education and intervention. Gate B retained. Typically offered Spring.

HDFS 42000 - Developmental Foundations Of Infant And Toddler Curriculum

Credit Hours: 3.00. Study of typical and atypical development in infants and toddlers as well as the implications of development for practice. Focuses on designing and implementing learning activities in all developmental areas and enhancing parent/professional relationships in programs for infants and toddlers. Includes a practicum experience with infants and toddlers. Typically offered Fall Spring.

HDFS 42400 - Children And Stress

Credit Hours: 3.00. This course examines a variety of stressors that children may experience. Factors that influence children's coping with stress are emphasized. Focus is placed on techniques used in working with children who have encountered stressful experience (e.g., play). Typically offered Fall.

HDFS 43600 - Administration Of Programs For Young Children

Credit Hours: 3.00. Administration of inclusive programs for young children, including federal and state requirements and accreditation guidelines. Focuses on working with interdisciplinary staff, children, and parents; budgeting, planning for space and equipment needs; staff development; and program evaluation. Typically offered Spring.

HDFS 44200 - Family Life Education

Credit Hours: 3.00. Designed especially for students preparing to be youth and family specialists and family life educators. Discussion of courtship, marriage, and family relationships. Special attention to methods and materials used in family education programs in classrooms and agencies. Typically offered Spring.

HDFS 44400 - Working With Families In Early Childhood Programs

Credit Hours: 2.00. This course focuses on relationships between teachers and families in early childhood settings. Included in this course are issues related to cultural, linguistic, economic, and developmental differences that may affect relations between families and teachers, and practices aimed at strengthening the role of parents and families in relations with early childhood programs. Students have the opportunity to design practices aimed at developing and maintaining effective partnerships with families. Typically offered Fall.

HDFS 44500 - Strategies For Individual And Group Interventions

Credit Hours: 3.00. This course has been developed especially for students interested in designing prevention and intervention strategies for children, adults, and/or families. It focuses on understanding how to plan developmentally appropriate activities for individuals, families, and small groups. Emphases include the leader's role in facilitating healthy development through the design, coordination, and implementation of activities; and understanding and application of principles of group dynamics and processes. Typically offered Fall.

HDFS 45000 - Supervised Teaching In Inclusive Programs For Young Children

Credit Hours: 16.00. Observation of and teaching in inclusive programs for young children, under the supervision of the Department of Child Development and Family Studies faculty, the classroom teacher, and the special education teacher. Monthly seminars focus on issues pertinent to professional development. Sixteen weeks of full time teaching or the equivalent are required for 16 credits. Admittance to Gate C at least two semesters prior to enrollment. Admittance to Gate D. Permission of department required. Typically offered Fall Spring.

HDFS 45400 - Career Assessment And Professional Development

Credit Hours: 2.00. Emphasis on professional development, self-evaluation, exploration of field experience and/or career opportunities, career search skills, and an overview of the human service profession. Students willl complete arrangements for their field placement. Typically offered Fall Spring.

HDFS 45500 - Human Services Capstone Internship

Credit Hours: 6.00 or 12.00. Supervised full-time or half- time internship in human services, doing work typical of an entry-level bachelor-degreed professional. Students will integrate and build upon knowledge developed during their studies in human services. Students will use and enhance their skills in direct service to client or indirect service. Students will work in the placement setting secured during HDFS 45400. Example field placement sites include: government or community agencies; social service agencies; hospitals; and recreational settings. Permission of Department required. Must be a student in good academic standing during the internship semester. Typically offered Fall Spring Summer.

HDFS 45600 - Child Health Internship

Credit Hours: 6.00 to 12.00. A supervised internship during which the student works full time for one semester in the child life department of a hospital. Includes exposure to methods of administering child life programs. Must be completed away from the Lafayette area. Application acceptance for Child Health field placements. Typically offered Fall Spring.

HDFS 46000 - Practicum In Kindergarten Education

Credit Hours: 10.00. Observation of, and teaching in, the kindergarten under the supervision of the Department of Human Development and Family Studies faculty and the classroom teacher. Admission to teacher education two semesters prior to taking this course. Typically offered Fall Spring.

HDFS 49000 - Independent Study

Credit Hours: 1.00 to 4.00. Independent study. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 49100 - Mentored Research In Human Development And Family Studies

Credit Hours: 3.00. Independent study in which student engages in research under the supervision of a faculty member. Involves developing a research project plan, relating objectives of the project to the research literature, executing the project plan, and communicating the results of the project clearly. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 49700 - Honors Research Project

Credit Hours: 1.00 to 4.00. The completion of the independent honors research project for HHS Honors Program students. Must have an approved Honors Project Proposal. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 59000 - Special Problems

Credit Hours: 0.00 to 5.00. Special subjects for investigation and experiment according to the individual student's interest and need. Permission of instructor required. Typically offered Fall Spring

HDFS 59500 - Professional Seminar In Family Therapy

Credit Hours: 1.00. An examination of ethical, legal, and professional issues in marriage and family therapy. Typically offered Fall Spring Summer.

HDFS 60000 - Family Processes

Credit Hours: 3.00. Advanced study of selected aspects of family and interpersonal dynamics associated with intimate relationships. Theory and research representative of the study of intimate relationships are reviewed and critically analyzed. Special emphasis is given to intergenerational as well as intragenerational relationship dynamics in the context of family life. Prerequisite: HDFS 60200. Typically offered Fall Spring Summer.

HDFS 60100 - Advanced Child Development

Credit Hours: 3.00. This course provides an overview of foundational and current developmental research on changes that occur within the individual throughout infancy, childhood, and early adolescence. Emphasis is given to processes and mechanisms that have been proposed to explain developmental changes. This course includes attention to social and cultural contexts within which individuals develop. Prerequisite: Graduate level course work in Child Development or Psychology. Typically offered Fall Spring.

HDFS 60200 - Advanced Family Studies

Credit Hours: 3.00. Integrative and comprehensive assessment of both classic and recent contributions in the field of family studies. Other topics include major theory and research, historical, current, and future critical issues in family studies. Prerequisite: 12 hours of social sciences including six hours of advanced undergraduate courses preparing student for the study of the family. Typically offered Fall Spring.

HDFS 60300 - Theories Of Family Therapy

Credit Hours: 3.00. An examination of the history of family therapy, major family therapy theorists, and therapy treatment modalities. Prerequisite: Graduate level course work in Child Development. Typically offered Fall Spring.

HDFS 60500 - Seminar In Family And The Life Course

Credit Hours: 3.00. Intensive critical analysis of research and theory regarding family development and life course analysis. Prerequisite: HDFS 60200. Typically offered Fall Spring.

HDFS 61200 - Families In Social Context

Credit Hours: 3.00. Advanced study of the reciprocal effects of families and their social environments. Theory and research are reviewed and critically analyzed. Readings consider the mutual effects of families and their diverse contexts. Links between families and other social institutions are explored. Particular attention is given on how social contexts shape micro-level family interaction and organization. Prerequisite: HDFS 60200. Typically offered Fall Spring Summer.

HDFS 61300 - Statistical Approaches For Developmental And Family Researchers

Credit Hours: 4.00. This course provides a basic understanding of foundational concepts and tools used in statistical analysis in the behavioral sciences, with a focus on analysis of experimental data. Emphasis is placed on the conceptual and interpretive understanding of statistical methods, including the General Linear Model (GLM) approach to ANOVA and ANCOVA. Prerequisite: Undergraduate coursework in Statistics. Permission of instructor required. Typically offered Fall.

HDFS 61500 - Research Methods In Child And Family Study

Credit Hours: 4.00. Basic research methods employed in the study of children and families are examined, including quantitative and qualitative designs, data collection, analysis, and interpretation. In the laboratory component, students are afforded supervised practice in the application of various methods using selected statistical analysis programs. Prerequisite: Graduate course in Statistics. Permission of instructor required. Typically offered Fall Spring.

HDFS 61600 - Theory In Child And Family Study

Credit Hours: 3.00. A survey of theoretical approaches to the study of children and families. An examination of the relationship of theory to research and practice and an introduction to theory construction. Typically offered Fall Spring Summer.

HDFS 61700 - Advanced Research Methods In Child And Family Study

Credit Hours: 4.00. Focuses on measurement issues relevant to research with children and families. Perspectives on quantitative and qualitative research are provided through relations among theory, research design, and data analysis. The laboratory component provides practice in quantitative and qualitative data analysis with an emphasis on interpreting and reporting results of analyses. Prerequisites: STAT 50100 and STAT 50200 or HDFS 61300 and PSY 63100. Permission of instructor required. Typically offered Fall.

HDFS 61900 - Adolescent Development In Context

Credit Hours: 3.00. This course is a graduate level seminar of major issues concerning adolescents, with attention to a developmental perspective. The social ecology of adolescent development and an understanding of adolescents in their social contexts is emphasized. Prerequisite: Human Development & Family Studies majors only. Typically offered Spring.

HDFS 62000 - Current Issues In Early Childhood Education

Credit Hours: 3.00. Emphasis on current issues in early childhood education as they are affected by contemporary social change with observation and analysis of a variety of programs for young children. Prerequisite: HDFS 60100. Typically offered Fall Spring.

HDFS 62100 - Children's Development In Child Care And School Settings

Credit Hours: 3.00. Emphasis on children's emerging cognitive and social competence as related to their experiences in child care or school settings through middle childhood. Attention is given to diverse program settings, practices, and populations. Examines relations between theory, research, and practice. Prerequisite: HDFS 60100. Typically offered Fall Spring.

HDFS 62200 - Children's Development In The Context Of Family Relationships

Credit Hours: 3.00. Advanced study of child development in the context of family relationships. Included are a discussion of theoretical approaches to family influences on individual development and a review of research concerning sources of variation in children's relationships and interactions with parents, siblings, and other family members. Family influences on children's functioning in other contexts also are examined. Prerequisite: HDFS 60100. Typically offered Fall Spring Summer.

HDFS 62300 - The Infant In The Family

Credit Hours: 3.00. Examination of developing infant within context of the family. Focus on effects of family interaction on the infant and effect of infants on adult behavior and parent and marital roles. Prerequisite: HDFS 52000 and HDFS 60100 and PSY 65100. Typically offered Fall Spring.

HDFS 62400 - Children's Social Relationships

Credit Hours: 3.00. A critical examination of research and theoretical knowledge in the domain of social relationships from childhood through adolescence. Specific attention is devoted to developmental transitions in the characteristics and functions of children's relations with peers and adults, and to implications of these relationships for understanding children's psychosocial adjustment in family and educational settings. Prerequisite: HDFS 60100. Typically offered Fall Spring Summer.

HDFS 62500 - Child And Family Social Policy

Credit Hours: 3.00. An examination of selected issues related to child and family policy relevant to scholars of CDFS. These issues include: (1) influences of research on children and families on the policy process; (2) the role of child and family specialists as advocates and analysts; (3) policy formulation, enactment, and evaluation; and (4) child and family policy in cross-national perspective. Prerequisite: HDFS 60100 and HDFS 60200. Typically offered Fall Spring.

HDFS 62600 - Research On Parenting Interventions

Credit Hours: 3.00. Critical examination of research on interventions aimed at improving child outcomes by promoting parenting competence. Emphasis on experimental research designs for assessing outcomes of diverse types of programs targeted to families with young children. Attention to uses of empirical data to inform decisions about the design and implementation of interventions. Prerequisite: HDFS 60100 and HDFS 61300. Typically offered Spring.

HDFS 62700 - Multilevel Modeling In Developmental And Family Research

Credit Hours: 3.00. This course gives students a basic grounding in the class of statistical techniques known as multilevel modeling (MLM), also known as hierarchical linear modeling (HLM), mixed models, or random coefficient models. Primary discussions will be on applications of these models to the study of marriages, relationships, families, aging, and child and adult development, but also will touch on biomedical, educational, and economic examples. The focus is on three types of multilevel models: growth-curve models, organizational models, and daily experience models. Students will also learn how to use SAS Proc Mixed for conducting MLM analyses. Students are assumed to have taken at least two graduate statistics courses and have a solid understanding of regression analysis. Prerequisites: STAT 50100 and STAT 50200 or HDFS 61300 and PSY 63100. Typically offered Fall.

HDFS 62800 - Structural Equation Modeling

Credit Hours: 3.00. This course provides an introduction to classic structural equation models with latent variables (SEM). The primary steps of implementing SEMs will be covered to include: model specification, model identification, parameter estimation, and model evaluation (model fit). Background training in statistical regression is required. Permission of instructor required. Typically offered Spring.

HDFS 62900 - Family And Couple Interventions In Health Problems

Credit Hours: 3.00. This course will concentrate on family and contextual interventions in the management of chronic illness across the lifespan. Prerequisite: HDFS 68500. Typically offered Fall Spring.

HDFS 63000 - Intervention Research In Early Childhood Education

Credit Hours: 3.00. A critical examination of the design, implementation, and effects of interventions to promote young children's developmental competence, with a particular focus on children at risk due to poverty, disability, and language. There is attention to theoretical and empirical bases for intervention, to intervention type and context (home, center), and to evaluation of intervention effectiveness. Prerequisite: HDFS 60100 and HDFS 61300. Permission of instructor required. Typically offered Spring.

HDFS 63300 - Adult Development And Relationships

Credit Hours: 3.00. Examination of reciprocal influences between adults' relationships and individual development. Consideration of how relationships with friends, families, and the broader social network contribute to the course of development across adulthood. Critical review of research that focuses on how close and distal social partners affect physical, cognitive, and emotional well being throughout adulthood. The effects of changes in social relationships on well being also will be discussed. Typically offered Spring.

HDFS 64200 - Family Enrichment Programs

Credit Hours: 3.00. The various means society uses to improve marriage, parenthood, and family life will be examined with special emphasis on educational, therapeutic, governmental, and legislative programs. Prerequisite: 12 credit hours in Child Development. Typically offered Fall Spring.

HDFS 64400 - Biosocial Processes In Developmental And Family Research

Credit Hours: 3.00. In this course we discuss theoretical models and empirical research regarding the interplay between biology and context in development, focusing on the unique interactions that occur within families. Prerequisite: HDFS 60100 and HDFS 60200. Typically offered Fall.

HDFS 64900 - Multidisciplinary Gerontology

Credit Hours: 3.00. A multidisciplinary overview of aging that provides a background for graduate studies on aging. An examination of sociological, psychological, and biological theory and research in the field of aging. The aging process from cells to social security will be covered. Guest lectures introduce students to experts in gerontology on Purdue's campus. Projects will assist students in developing appropriate professional skills in their field of study. Students are expected to have basic research and writing skills in their field of study. The course serves as a graduate-level introduction to the field of gerontology. There are several options for course projects. Prerequisite: HDFS 60100 and STAT 50100. Typically offered Spring.

HDFS 65000 - Seminar In Family Gerontology

Credit Hours: 3.00. Analysis of recent research, theoretical developments and social issues relevant to aging and the family. Readings and discussions direct attention to major issues and topics in the field; opportunities are provided to specialize in a particular area of family gerontology. Prerequisite: PSY 53700 or HDFS 51500 and HDFS 60200. Typically offered Spring.

HDFS 65800 - Attachment Relationships

Credit Hours: 3.00. This graduate course studies child-parent relationships theory and research from the respective of Attachment Theory. Prerequisite: HDFS 60300 or CDFS 60300. Permission of instructor required. Prerequisite: HDFS 60100 and a basic graduate level statistic course. Typically offered Fall Spring.

HDFS 65900 - Family Therapy Of Addictions

Credit Hours: 3.00. Presents family therapy approaches to the treatment of alcohol and drug abuse and addiction. Emphasis on exploring a systemic biopsychosocial view of addictions and on the techniques that family therapists employ to disrupt patterns within abusing and addictive family systems. Prerequisite: HDFS 60300. Typically offered Fall Spring Summer.

HDFS 66100 - Contemporary Clinical Issues In Family Therapy

Credit Hours: 3.00. Study of clinical issues of key importance to family therapists. Possible issues include eating disorders, family violence, AIDS and the family, family systems medicine, and working with children. Prerequisite: HDFS 60300. Typically offered Fall Spring Summer.

HDFS 66200 - Foundations Of Marriage And Family Therapy

Credit Hours: 3.00. An examination of the seminal documents upon which family systems theory is built. Areas to be covered include cybernetics, ecology, epistemology, communications theory, general systems theory, and the writing of Gregory Bateson. Prerequisite: 12 credit hours in Child Development, Psychology or Sociology. Typically offered Fall Spring.

HDFS 66500 - Transgenerational And Specialized Family Therapies

Credit Hours: 3.00. Investigation of theory, research, and practice of transgenerational and specialized family therapies. Readings will include a wide range of original works of the major theorists. Prerequisite: HDFS 60300. Typically offered Spring.

HDFS 66600 - Supervision Of Marriage And Family Therapy

Credit Hours: 3.00. An in-depth examination of supervision of marriage and family therapy. Appropriate literature will be reviewed, and students will observe and practice the skills of marriage and family therapy supervision. Prerequisite: (HDFS 66700) and (HDFS 66900).Typically offered Fall Spring Summer.

HDFS 66700 - Practicum In Marriage Counseling

Credit Hours: 3.00. Supervised counseling experience in working with premarital and marital problems. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 66900 - Practicum In Family Therapy

Credit Hours: 3.00. Supervised counseling experience in family therapy. Typically offered Fall Spring Summer.

HDFS 67000 - Human Sexuality

Credit Hours: 3.00. Study of the broad scope of human sexual development and expression. Particular attention devoted to literature on sexual behavior over the life cycle, alternate forms of sexual expression, law, ethics, and cross-cultural perspectives. Permission of instructor required. Typically offered Fall Spring.

HDFS 67100 - Sex Therapy

Credit Hours: 3.00. Examination of the literature, research, and theories related to therapeutic interventions for sexual concerns in relationships. Particular attention is given to systemic approaches and to the relationship between marital and sex therapy. Prerequisite: HDFS 67000. Permission of instructor required. Typically offered Fall Spring.

HDFS 67200 - Outcome Research In Family Therapy

Credit Hours: 3.00. Critically evaluates the literature on outcome research in family therapy and enrichment programs. Emphasizes methodology and substantive findings. Prerequisite: HDFS 61500. Typically offered Fall Spring.

HDFS 67300 - Theories Of Family Therapy II

Credit Hours: 3.00. Exposes students to the current issues in family therapy theory. Recent books and journal articles will be read and critiqued. Prerequisite: HDFS 60300. Typically offered Fall Spring Summer.

HDFS 67400 - Seminar In Divorce Therapy

Credit Hours: 3.00. Investigates the theoretical and research literature on divorce from the perspective of the family professional interested in divorce therapy. The processes of divorce adjustment and related interventions are considered for adults and children, single parent families, remarriages, and reconstituted families. Prerequisite: HDFS 56000. Typically offered Fall.

HDFS 67500 - Gender And Multicultural Perspectives In Marriage And Family Therapy

Credit Hours: 3.00. Increases students' sensitivity and understanding of how the social construction of gender and culture impact their professional development and the process of family therapy. Scholarly investigation and self-exploration will be integrated by studying the current literature and by analyzing videotapes of movie clips, television shows, and therapy sessions. Prerequisite: HDFS 60300. Typically offered Fall Spring.

HDFS 67600 - Professional Writing For Child And Family Specialists

Credit Hours: 3.00. This course is designed to demystify grant writing and writing for publication. Emphasis on skill development activities, such as writing various sections of a grant or publishable paper, and giving and receiving feedback on works in progress. Typically offered Fall Spring Summer.

HDFS 67700 - Assessment In Marriage And Family Therapy

Credit Hours: 1.00 to 3.00. Trains students to administer marriage and family therapy assessment instruments. Also intended to familiarize marriage and family therapists with assessment instruments and clinical assessment procedures typically used in mental health settings. Prerequisite: HDFS 60300. Typically offered Fall Spring Summer.

HDFS 67800 - Externship In Marriage And Family Therapy

Credit Hours: 1.00 to 6.00 (West Lafayette) 3.00 to 9.00 (Calumet) Supervised clinical experience in marriage and family therapy at an approved externship site. Depending on the number of credit hours for which one is registered, will require 8-24 clinic hours and 3-9 experiential hours per week. Prerequisite: (HDFS 66700 or CDFS 66900) and (HDFS 66900 or CDFS 66900). Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 67900 - Qualitative Research On Families

Credit Hours: 3.00. Provides an introduction to qualitative research theory and methods and prepares graduate students to conduct and evaluate qualitative family research. Students conduct observations, interviews, and basic data analysis. Prerequisite: a course in research methods. Typically offered Fall Spring Summer.

HDFS 68000 - Professional Issues For Child And Family Specialists

Credit Hours: 3.00. Professional issues involved in working with children and families. Questions of ethics, legal relationships, and value problems may be pursued, as may such pragmatic inquiries as the role of professional organizations and labor unions in these fields. Typically offered Fall Spring.

HDFS 68500 - Current Research Topics In Child Development And Family Studies

Credit Hours: 1.00 to 3.00. Consideration of current subjects in child development and family studies research. Particular emphasis will be placed on one topic each semester according to the research interests of the instructor. Typically offered Fall Spring.

HDFS 68501 - Developmental Seminar

Credit Hours: 1.00. Consideration of current subjects in child development and family studies research. Particular emphasis will be placed on one topic each semester according to the research interests of the instructor. Typically offered Fall Spring Summer.

HDFS 68800 - Internship For Marriage & Family Therapy

Credit Hours: 1.00. A nine-twelve month, full time clinical placement at an approved internship site. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 69000 - Directed Research In HDFS

Credit Hours: 2.00 to 6.00. Directed research and supervised research on a topic in student's area of specialization. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 69700 - Colloquium

Credit Hours: 1.00. Research presentations by faculty members and graduate students and invited speakers. Includes attention to Responsible Conduct of Research. Requires concurrent enrollment in graduate program in behavioral sciences. Typically offered Fall Spring.

HDFS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

HDFS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Indiana University School of Medicine

IUSM 80100 - Indiana University School Of Medicine- Lafayette, First Year Course

Credit Hours: 0.00. Non-graded course to establish a mechanism to accommodate Indiana University School of Medicine medical students assigned to the IU School of Medicine's Lafayette regional campus at Purdue University. Course will be neither graded nor transcripted beginning June 2013. Course runs from June through May. Permission of department required. Typically offered Fall Spring Summer.

IUSM 80200 - Indiana University School Of Medicine- Lafayette, Second Year Courses

Credit Hours: 0.00. Non-graded course to establish a mechanism to accommodate Indiana University School of Medicine medical students assigned to the IU School of Medicine's Lafayette regional campus at Purdue University. Course will be neither graded nor transcripted beginning June 2013. Course runs from June through May. Permission of department required. Typically offered Fall Spring Summer.

IUSM 80300 - Indiana University School Of Medicine- Lafayette, Third Year Clerkships

Credit Hours: 0.00. Non-graded course to establish a mechanism to accommodate Indiana University School of Medicine medical students assigned to the IU School of Medicine's Lafayette regional campus at Purdue University. Course will be neither graded nor transcripted beginning June 2013. Course runs from June through May. Permission of department required. Typically offered Fall Spring Summer.

IUSM 80400 - Indiana University School Of Medicine- Lafayette, Fourth Year Clerkships

Credit Hours: 0.00. Non-graded course to establish a mechanism to accommodate Indiana University School of Medicine medical students assigned to the IU School of Medicine's Lafayette regional campus at Purdue University. Course will be neither graded nor transcripted beginning June 2013. Course runs from June through May. Permission of department required. Typically offered Fall Spring Summer.

Industrial Engineering

IE 20000 - Industrial Engineering Seminar

Credit Hours: 0.00. An orientation course to inform students of the major options in the industrial engineering program, assistance in selection of appropriate electives to meet career objectives, introduction to the faculty, and selection of an academic advisor. Typically offered Fall Spring.

IE 23000 - Probability And Statistics In Engineering I

Credit Hours: 3.00. An introduction to probability and statistics. Probability and probability distributions. Mathematical expectation. Functions of random variables. Estimation. Applications oriented to engineering problems. Typically offered Fall Spring.

IE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 30000 - Honors Program Seminar

Credit Hours: 0.00. An orientation course intended for juniors who have demonstrated exceptional academic ability and desire to conduct meaningful independent research or solve unique engineering design projects during their senior year of study. Typically offered Fall Spring.

IE 33000 - Probability And Statistics In Engineering II

Credit Hours: 3.00. Continuation of IE 23000. Introduction to statistical inference and experimental design. Correlation, regression, single and multi-factor ANOVA, non-parametric methods. Applications to statistical quality control. Typically offered Fall Spring.

IE 33200 - Computing In Industrial Engineering

Credit Hours: 3.00. Introduction to computing in industrial engineering. Reinforcement of scientific programming skills on typical IE tasks, together with introduction to simulation and related computer tools. Typically offered Fall Spring.

IE 33500 - Operations Research - Optimization

Credit Hours: 3.00. Introduction to deterministic optimization modeling and algorithms in operations research. Emphasis on formulation and solution of linear programs, networks flows, and integer programs. Typically offered Fall Spring.

IE 33600 - Operations Research - Stochastic Models

Credit Hours: 3.00. Introduction to probablistic models in operations research. Emphasis on Markov chains, Poisson processes, and their application to queueing systems. Typically offered Fall Spring.

IE 34300 - Engineering Economics

Credit Hours: 3.00. Cost measurement and control in engineering studies. Basic accounting concepts, income measurement, and valuation problems. Manufacturing cost control and standard cost systems. Capital investment, engineering alternatives, and equipment replacement studies. Not open to students with credit in CE 39400. Typically offered Summer Fall Spring.

IE 37000 - Manufacturing Processes I

Credit Hours: 3.00. Principal manufacturing processes; metal cutting, grinding and metal forming operations, machine tools, and tools and tooling. Nontraditional machining and welding. Introduction to computer-aided manufacturing and computer-aided graphics and design, N/C programming, robots, and flexible manufacturing systems. Classroom and laboratory demonstrations included. Not open to students with credit in ME 36300. Typically offered Summer Fall Spring.

IE 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 38299 - Professional practice Co-Op II

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 38300 - Integrated Production Systems I

Credit Hours: 3.00. Basic concepts in the design and operational control of integrated production systems. Includes topics on facility layout and material handling, material flow and information flow, resource and capacity planning, and shop floor control and scheduling. Typically offered Fall Spring.

IE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 38600 - Work Analysis And Design I

Credit Hours: 3.00. Fundamentals of work methods and measurement. Applications of engineering, psychological, and physiological principles to the analysis and design of human work systems. Typically offered Fall Spring.

IE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional practice with qualified employers in industry, government, or small business and a comprehensive written report of this practice. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

IE 39699 - Professional Practice Internship

Credit Hours: 0.00. Professional practice with qualified employers within industry, government, or small business and a comprehensive written report of this practice. Permission of department required. Typically offered Fall Spring Summer.

IE 43100 - Industrial Engineering Design

Credit Hours: 3.00. Capstone design experience for industrial engineering students involving analysis and synthesis of unstructured problems in practical settings. Students work in teams to formulate issues, propose solutions, and communicate results in formal written and oral presentations. Prerequisite: all 30000-level industrial engineering courses required for the BS IE degree. Typically offered Fall Spring.

IE 47000 - Manufacturing Processes II

Credit Hours: 3.00. The interrelations of materials, processes, and design with various aspects of manufacturing. Typically offered Fall Spring.

IE 47400 - Industrial Control Systems

Credit Hours: 3.00. Introduction to automatic controls with reference to automation of industrial machines and processes, including linear dynamic systems, feedback control, and elements of systems analysis. Introduction to digital control. Typically offered Fall Spring.

IE 48400 - Integrated Production Systems II

Credit Hours: 3.00. Extensions of topics on the design and operational control of integrated production systems. Includes production databases, facility layout, material handling, advanced control and scheduling, and physical distribution. Case studies, lab assignments, and projects. Typically offered Fall Spring.

IE 48600 - Work Analysis And Design II

Credit Hours: 3.00. Continuation of IE 38600. Applications of engineering, computer sciences, information sciences, and psychological principles and methods to the analysis and design of human work systems. Typically offered Fall Spring.

IE 49000 - Special Topics In Industrial Engineering

Credit Hours: 1.00 to 6.00. Special topic courses and projects of contemporary importance or of special interest that are outside the scope of the standard undergraduate curriculum. Permission of instructor required. Typically offered Fall Spring Summer.

IE 49500 - Industrial Practices Seminar

Credit Hours: 1.00. Solution of industrial engineering problems, with particular emphasis on current industrial experience obtained through the cooperative engineering education program. For cooperative program students only. Typically offered Fall Spring Summer.

IE 49600 - Professional Internship

Credit Hours: 0.00. Professional experience in Industrial Engineering. Program coordinated by school with cooperation of participating employers. Students submit a summary report. Permission of instructor required. Typically offered Fall Spring Summer.

IE 49900 - Research In Industrial Engineering

Credit Hours: 1.00 to 6.00. Individual research projects for students with honors standing, or other students with the approval of their advisors. Permission of instructor required. Typically offered Fall Spring Summer.

IE 53000 - Quality Control

Credit Hours: 3.00. Principles and practices of statistical quality control in industry. Control charts for measurements and for attributes. Acceptance sampling by attributes and by measurements. Standard sampling plans. Sequential analysis. Sampling inspection of continuous production. Typically offered Spring Fall Summer.

IE 53200 - Reliability

Credit Hours: 3.00. Reliability of components and multi-component systems. Application of quantitative methods to the design and evaluation of engineering and industrial systems and processes for assuring reliability of performance. Economic and manufacturing control activities related to product engineering aspects of reliability. Principles of maintainability. Product failure and legal liability. Typically offered Fall.

IE 53300 - Industrial Applications Of Statistics

Credit Hours: 3.00. The application of statistics to the effective design and analysis of industrial studies relating to manufacturing and human factors engineering in order to optimize the utilization of equipment and resources. Emphasis on conducting these studies at the least cost. Typically offered Spring.

IE 53500 - Linear Programming

Credit Hours: 3.00. Optimization of linear objective functions subject to linear constraints. Development of theory and algorithmic strategies for solving linear programming problems. Typically offered Spring Fall Summer.

IE 53600 - Stochastic Models In Operations Research I

Credit Hours: 3.00. An introduction to techniques for modeling random processes used in operations research. Markov chains, continuous time Markov processes, Markovian queues, reliability and inventory models. Typically offered Spring.

IE 53700 - Discrete Optimization Models And Algorithms

Credit Hours: 3.00. An introduction to classic models and algorithms for discrete optimization. Basic theory and computational strategies for exact and heuristic solution of integer, combinational, and network problems in the context of classic models. Typically offered Spring.

IE 53800 - Nonlinear Optimization Algorithms And Models

Credit Hours: 3.00. Survey of computational tools for solving constrained and unconstrained nonlinear optimization problems. Emphasis on algorithmic strategies and characteristic structures of nonlinear problems. Typically offered Spring.

IE 54500 - Engineering Economic Analysis

Credit Hours: 3.00. Analysis of engineering costs and capital investments. Applications of classical optimization, mathematical programming, and the theory of production to the analysis of investment proposals. Evaluation and selection of individual projects and formulation of capital investment programs. Typically offered Fall.

IE 54600 - Economic Decisions In Engineering

Credit Hours: 3.00. Topics in decision making and rationality including decision analysis, decision making under uncertainty, and various descriptive and prescriptive models from operations research, economics, psychology, and business. Applications are drawn from engineering decision making, public policy, and personal decision making. Attention also is paid to designing aids to improve decision making. Typically offered Spring.

IE 55600 - Job Design

Credit Hours: 3.00. (PSY 55600) Task analysis, personnel selection and training, job and organization design, and criteria development and use. Human factors related to job design in order to increase job satisfaction and productivity. Typically offered Fall.

IE 55800 - Safety Engineering

Credit Hours: 3.00. Application of human factors and engineering practice in accident prevention and the reduction of health hazards are presented. The objective of this course is to provide an understanding of the safety and health practices which fall within the responsibilities of the engineer in industry. Special attention is devoted to the detection and correction of hazards and to contemporary laws and enforcement on occupational safety and health. Typically offered Fall.

IE 55900 - Cognitive Engineering Of Interactive Software

Credit Hours: 3.00. (PSY 55500) Theory and applications of software design to improve productivity and job satisfaction on information processing and cognitive tasks in the work place. Human information processing models and cognitive theories will be used to provide a theoretical basis for how to choose and display information to the user. Other topics include user-friendly displays and empirical approaches to software design. Applications of the design theory are stressed by class projects. Typically offered Spring.

IE 56600 - Production Management Control

Credit Hours: 3.00. Background and development of production management, plus current concepts and controls applicable to production management functions. Not open to Industrial Enginering students with a minor in management. Typically offered Fall Spring.

IE 57000 - Manufacturing Process Engineering

Credit Hours: 3.00. Theories and applications of materials forming and removal processes in manufacturing, including product properties, process capabilities, processing equipment design, and economics. A systems approach to all aspects of manufacturing process engineering. Typically offered Spring Fall.

IE 57400 - Industrial Robotics And Flexible Assembly

Credit Hours: 3.00. Lab by arrangement. Design, analysis, and operation of robotic systems. System components and their control. Languages for robot control. Application design and analysis. Part feeders and tooling for robot workstations and automated assembly. Methods for planning robotic and assembly applications. Typically offered Spring.

IE 57700 - Human Factors In Engineering

Credit Hours: 3.00. (PSY 57700) Survey of human factors in engineering with particular reference to human functions in human-

machine systems, and consideration of human abilities and limitations in relation to design of equipment and work environments. Typically offered Spring Fall.

IE 57900 - Design And Control Of Production And Manufacturing Systems

Credit Hours: 3.00. Design and control of discrete part manufacturing systems in contemporary production environments, with emphasis on flexible, demand-driven, product-based manufacturing. Currently used planning and control methodologies, such as MRP, OPT, and JIT are reviewed and integrated with appropriate facility design methodologies, including cellular design algorithms. Introduction to Computer Integrated Manufacturing (CIM) architecture and reference models and relevant control procedures, including basis approaches to appropriate data management methodologies. Typically offered Spring Fall.

IE 58000 - Systems Simulation

Credit Hours: 3.00. Philosophy and elements of digital simulation language. Practical application of simulation to diverse systems. Computer simulation exercises and applications are required. Typically offered Fall.

IE 58100 - Simulation Design And Analysis

Credit Hours: 3.00. An introduction to simulation of stochastic systems on digital computers. Emphasis is on the fundamentals of simulation as a statistical experiment. Topics include uniform random numbers, input modeling, random variate generation, output analysis, variance reduction, and optimization. Typically offered Spring.

IE 58200 - Advanced Facilities Design

Credit Hours: 3.00. Study of the theoretical and applied aspects of manufacturing systems layout. Emphasis on contemporary manufacturing, including the layout of cellular systems, automated material handling systems, and storage systems. Typically offered Fall.

IE 58300 - Design And Evaluation Of Material Handling Systems

Credit Hours: 3.00. Analysis for design and evaluation of material handling systems with emphasis on material flow control and storage. Analytic models and simulation used. Economic justification models for material handling systems. Typically offered Fall.

IE 58800 - e-Work And e-Service

Credit Hours: 3.00. e-Work is defined as the collaborative, computer-and-communication-supported work in highly distributed organizations of humans/robots/autonomous systems. This course is devoted to learning the basic principles, theories, and applications for the design of effective e-Work and e-Service systems. Relevant discoveries at Purdue and elsewhere are also presented. Typically offered Spring.

IE 59000 - Topics In Industrial Engineering

Credit Hours: 1.00 to 6.00. Selected topics in industrial engineering for seniors and graduate students. Permission of instructor required. Typically offered Spring Fall Summer.

IE 63000 - Multiple Objective Optimization

Credit Hours: 3.00. Theory and applications of multiple objective optimization and multiple criteria decision making. Existence and specification of single and multiple attributive value and utility functions. Risk aversion. Characterization and generation of efficient (Pareto optimal) solutions to vector optimization problems. Domination cones. Interactive algorithms. Prerequisite: IE 53500. Typically offered Spring.

IE 63200 - Scheduling Models

Credit Hours: 3.00. Development and discussion of mathematical and simulation models for scheduling and sequencing the flow of jobs or activities in manufacturing environments. Techniques include dynamic programming, branch and bound, linear and integer programming, heuristics and stochastic network simulation. Prerequisite: IE 57900; IE 53500 or IE 53700. Typically offered Spring.

IE 63300 - Dynamic Programming

Credit Hours: 3.00. Theory and applications of finite and infinite stage sequential decision processes, including Markovian decision problems, efficient computational methods, and computer software package. Prerequisite: IE 53500, IE 53600. Typically offered Spring.

IE 63400 - Integer Programming

Credit Hours: 3.00. An advanced course on theory and algorithms for integer and mixed integer optimization problems. Convergence of integer programming algorithms, dual relaxations, Benders decomposition, cutting plane theory, group theory of integer programs, and linear diophantine equations. Prerequisite: IE 53500, IE 53700. Typically offered Spring.

IE 63500 - Theoretical Foundations Of Optimization

Credit Hours: 3.00. An advanced course in theoretical foundations of mathematical programming. Convex analysis, global and local duality and optimality, general algorithmic convergence. Offered in alternate years. Prerequisite: IE 53500. Typically offered Fall.

IE 63900 - Combinatorial Optimization

Credit Hours: 3.00. An advanced course in combinatorial optimization. Emphasis on the theory and strategies of combinatorial algorithms including complexity theory, advance issues in network flows, matching, matroids, and combinatorial polyhedra. Prerequisite: IE 53500. Typically offered Fall.

IE 64600 - Advanced Decision Theory

Credit Hours: 3.00. An advanced course on the theory and models of decision making and rationality. Material includes advanced topics in decision analysis, models of probabilistic reasoning, decision making in competitive situations, and models of human and computer reasoning (including artificial intelligence). Prerequisite: IE 54600. Typically offered Fall.

IE 65600 - Research Seminar In Human Factors

Credit Hours: 3.00. An in-depth study of topics of special interest in human factors. A variable title course where topics change from semester to semester. Possible topics include cognitive engineering in expert systems, human resource management, skills acquisition and retention, knowledge elicitation, and knowledge representation. Permission of instructor required. Typically offered Spring.

IE 65900 - Human Aspects In Computing

Credit Hours: 3.00. Advanced topics in ergonomic, cognitive, and social aspects of using computerized systems are discussed with regard to comfort and user satisfaction, ease and productive use of computerized systems, and effective implementation of computerized technologies in the workplace. Prerequisite: IE 55900. Typically offered Spring.

IE 67000 - Advanced Topics In Manufacturing Engineering

Credit Hours: 3.00. Advanced research topics and approaches in manufacturing engineering, including processes and equipment. Research methodology, nontraditional processes, manufacturing systems, and competitive aspects of manufacturing. Prerequisite: IE 57000. Typically offered Spring.

IE 67400 - Computer And Communication Methods For Production Control

Credit Hours: 3.00. The study of the theoretical foundation and relevance of advanced computer and communication methods in the planning and control of intelligent production operations; manufacturing operating systems; synchronization in decentralized systems; recovery in decentralized systems; parallel processing; distributed databases; factory networks; reasoning and logic for production control. Prerequisite: IE 57400 or 57500 or IE 57900. Typically offered Spring.

IE 68000 - Advanced Simulation Design And Analysis

Credit Hours: 3.00. An introduction to the literature of simulating stochastic systems, with emphasis on probabilistic and statistical aspects. Prerequisite: IE 58100. Typically offered Fall Spring.

IE 69000 - Advanced Topics In Industrial Engineering

Credit Hours: 1.00 to 6.00. Advanced study in various fields of industrial engineering for graduate students. Credits and hours to be arranged. Permission of instructor required. Typically offered Spring Fall Summer.

IE 69600 - Graduate Professional Practice

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. Permission of instructor required. Typically offered Fall Spring Summer.

IE 69700 - Seminar

Credit Hours: 0.00. Industrial engineering problems with particular emphasis on current research. Typically offered Fall Spring.

IE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

IE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Industrial Engineering Technology

IET 10400 - Industrial Organization

Credit Hours: 3.00. A detailed survey of organizational structures, operational, financial, marketing, and accounting activities; duties of management, planning, control, personnel, safety, wages, policy, and human factors necessary for effective management. Not open to students taking, or with credit in, IE 36600. Typically offered Fall Spring Summer.

IET 20400 - Maintaining Quality

Credit Hours: 3.00. Analysis of the basic principles of quality control. Includes an overall view of quality control from an engineering and manufacturing perspective. Includes the statistical aspects of tolerance, concepts of variation and control charting. Typically offered Fall Spring Summer.

IET 26200 - Motion Study Work Methods

Credit Hours: 3.00. The study of the various techniques of motion study including process charts, operation charts, multiple activity charts, micro and memo motion study, therbligs, the video camera, along with actual practice in their use. Study and application of the basic principles used to develop better methods of performing work. Typically offered Fall Spring.

IET 29000 - Experimental Design - Conventional Methods

Credit Hours: 3.00. An applications-oriented course for presenting the fundamental concepts and emphasizing the basic philosophy of design of conventional experiments using simple numerical problems, many from actual research work. For each type of experiment, the distinctions among the experiment, the design, and the analysis are emphasized. Typically offered Fall Spring Summer.

IET 29100 - Experimental Design - Taguchi Methods

Credit Hours: 3.00. An applications-oriented course in industrial problem solving using the experimental design concepts of Genichi Taguchi. The loss function is emphasized along with the differentiation among system design, parameter design, and tolerance design. Actual case histories are used to explain and promote comprehension of orthogonal arrays, linear graphs, classification of characteristics, and signal-to-noise ratio. Typically offered Fall Spring Summer.

IET 45000 - Production Cost Analysis

Credit Hours: 3.00. An introduction to financial statements and to the study of the costs of production in terms of break-even and least cost alternatives, including present and future costs when related to the time value of money, budgeting, labor and overhead, production cost control, and the role of the supervisor and the engineering technologist to cost control. Computer applications for determining rate of return for complex problems are introduced. Typically offered Fall Spring.

IET 45100 - Monetary Analysis For Industrial Decisions

Credit Hours: 3.00. An introduction to the time value of money and how it relates to capital investments, equipment replacement, production cost, and various engineering technology alternatives. Not open to students who have had IET 25000. Typically offered Fall Spring Summer.

Industrial and Physical Pharmacy

IPPH 10000 - Pharmaceutical Sciences Orientation

Credit Hours: 1.00. An orientation course for incoming freshmen or CODO students enrolled in the Bachelor of Sciences in the Pharmaceutical Sciences program. Provides an introduction to the scope of the program, the career opportunities for graduates, the curriculum rationale, and the faculty and staff support structure. Typically offered Fall.

IPPH 36200 - Basic Pharmaceutics I

Credit Hours: 3.00. Fundamental physical chemical principles and their application to pharmaceutical systems. Typically offered Fall.

IPPH 45100 - Industrial Practical Training

Credit Hours: 1.00. Course allows students to gain employment experience in industrial pharmacy. Students receive credit for

practical experience in the time period just prior to course enrollment when they complete the course paper requirement. Pre-approval of enrollment required prior to employment experience. Permission of instructor required. Typically offered Fall Spring Summer.

IPPH 47100 - Parenteral Products

Credit Hours: 2.00. Methods of preparing and testing injectable and other sterile dosage forms. Demonstrations are included to illustrate the principles of parenteral therapy, aseptic techniques, and the use of intravenous equipment. Typically offered Spring.

IPPH 47500 - Biopharmaceutics And Pharmacokinetics I

Credit Hours: 3.00. Characterization of the time course of drug absorption, distribution and elimination, drug accumulation. Concept of clearance, half-life and volume of distribution and design of multiple dosing regimens. Typically offered Spring.

IPPH 49000 - Special Topics

Credit Hours: 1.00 to 6.00. An honors course for superior students to be used in relation to, and to supplement, an existing course; an in-depth approach to topics of current interest, utilizing the original literature as prime source material. A laboratory project may be included. Permission of instructor required. Typically offered Fall Spring.

IPPH 56200 - Introduction To Pharmaceutical Manufacturing Processes

Credit Hours: 4.00. A course intended to provide the student with basic understanding of both the theoretical and practical aspects of pharmaceutical manufacturing by combining a thorough classroom treatment of the underlying principles of each pharmaceutical unit operation with hands-on execution of these activities in the laboratory. Permission of instructor required. Typically offered Fall.

IPPH 58000 - Physical Chemical Principles

Credit Hours: 3.00. Applications of physical chemical principles to pharmaceutical systems. Typically offered Fall.

IPPH 58300 - Advanced Biopharmaceutics

Credit Hours: 3.00. A comprehensive course dealing with the interaction of biological and physico-chemical considerations relating to drug effectiveness and dosage form design. Typically offered Spring.

IPPH 58700 - Pharmaceutical Solids

Credit Hours: 2.00. Provides students with the ability to identify and characterize polymorphs and hydrates and to understand their behavior in the presence of water. Both classical methods and new techniques for the study of pharmaceutical solids and their interaction with water are included. Scientific principles are blended with practical examples to provide a conceptual basis for understanding particular problems. Typically offered Summer.

IPPH 59000 - Special Topics In Industrial And Physical Pharmacy

Credit Hours: 1.00 to 6.00. Special topics in selected areas of industrial and physical pharmacy. Permission of instructor required. Typically offered Summer Fall Spring.

IPPH 69000 - Special Problems

Credit Hours: 1.00 to 6.00. Individual research topics selected from the areas of industrial pharmacy, physical pharmacy, or biopharmaceutics. Permission of instructor required. Typically offered Fall Spring Summer.

IPPH 69600 - Seminar In Industrial And Physical Pharmacy

Credit Hours: 0.00 or 1.00. Discussion of recent research developments in physical pharmacy, industrial pharmacy, and biopharmaceutics related to the physico-chemical properties, availability, effectiveness, and safety of drugs and drug products. Topics are presented by staff, students, and invited speakers. Typically offered Fall Spring.

IPPH 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

IPPH 87500 - Biopharmaceutics And Pharmacokinetics II

Credit Hours: 3.00. The study of pharmacokinetic principles applied clinically to the therapeutic management of individual patients and their disease states. Typically offered Spring.

Industrial Technology

IT 10100 - Industrial Technology Biotechnical Studies

Credit Hours: 3.00. Students are introduced to the fields of biotechnology, bioengineering, biomedical engineering, and bio-molecular engineering. Students design, fabricate and evaluate devices that solve biotechnical problems. Typically offered Summer Fall Spring.

IT 10200 - Industrial Technology Aerospace Studies

Credit Hours: 3.00. This course introduces students to the world of aeronautics, flight, and engineering. Students apply scientific and engineering concepts to design materials and processes that measure, repair, improves, and extend aeronautical systems. Typically offered Summer Fall Spring.

IT 10300 - Industrial Technology Exploring Civil Engineering And Architecture

Credit Hours: 3.00. Students learn various aspects of civil engineering and architecture, apply their knowledge to designing and development of a commercial property. Students learn about documenting their project, problem-solving, and communcations in the civil engineering community. Typically offered Summer Fall Spring.

IT 10400 - Industrial Organization

Credit Hours: 3.00. A detailed survey of organizational structures, operational, financial, marketing, and accounting activities; duties of management, planning, control, personnel, safety, wages, policy, and human factors necessary for effective management. Typically offered Fall Spring Summer.

IT 10500 - Industrial Technology Introduction To Design

Credit Hours: 3.00. This course develops students' problem solving skills, with emphasis placed upon the concept of developing a three-dimensional model of an object. Students focus on the application of visualization processes and tools currently used in the design and manufacturing environments. Typically offered Fall Spring.

IT 10600 - Industrial Technology Digital Electronics

Credit Hours: 3.00. This course is the study of applied digital logic. Students will study the application of electronic logic circuits and apply Boolean logic to the solution of problems. Students will design circuits, export their design to a printed program that generates printed circuit boards, and construct the design using electronic components. Typically offered Fall Spring.

IT 10700 - Industrial Technology Principles Of Engineering

Credit Hours: 3.00. This course explores various engineering systems and manufacturing processes. Students examine how the field of engineering technology addresses social and political consequences of technological change. Typically offered Fall Spring.

IT 10800 - Industrial Technology Computer-Integrated Manufacturing

Credit Hours: 3.00. This course builds on students' solid modeling skills to develop manufactured products. Students evaluate products using mass property analysis, make appropriate modifications, and use prototyping equipment to produce three-dimensional models of the solutions. Typically offered Fall Spring.

IT 10900 - Industrial Technology Engineering Design And Development

Credit Hours: 3.00. In this capstone course students work in teams to design and construct a solution to an engineering problem, applying the knowledge and skills previously developed. Students maintain a portfolio of their design and development activities. Teams are responsible for making final presentations of the solution to an engineering review panel. Typically offered Fall Spring.

IT 11100 - Prototyping In Engineering/Technology Education

Credit Hours: 1.00. This course provides basic instruction on the proper and safe use of tools and equipment used to fabricate prototypes. Students demonstrate technical competency related to fabrication of prototypes. Typically offered Fall Spring Summer.

IT 11400 - Problem-Solving In Manufacturing

Credit Hours: 3.00. The goal is to expose students to many of the current problem-solving processes used in industry. This includes the Six Sigma quality process, project management, and lean manufacturing concepts. Lecture and lab exercises use teamwork, process mapping, project management, and disciplined problem-solving. Typically offered Fall Spring Summer.

IT 19000 - Topics In Industrial Technology

Credit Hours: 1.00 to 3.00. Hours, credit, and subject matter to be arranged by staff. This is not for independent study. Permission of instructor required. Typically offered Fall Spring Summer.

IT 19100 - Supervised Work Experience

Credit Hours: 3.00. Supervised work experience directed toward providing background and orientation rather than depth in a particular specialty. Craft, technical, industrial, and participation in the conduct of industrial training programs are typical examples of acceptable experiences. Permission of department required. Typically offered Fall Spring Summer.

IT 19900 - Selected Topics For Vocational Teachers In Service

Credit Hours: 1.00 to 8.00. Designed primarily for conditionally certified vocational teachers for development and improvement of basic teaching skills and license upgrading. Typically offered Fall Spring Summer.

IT 21400 - Introduction To Lean Manufacturing

Credit Hours: 3.00. Lean manufacturing is a systematic approach to eliminating non-value added activities throughout a production system. Five basic principles characterize a lean production system: value definition, value stream mapping, flow optimization, pull production, and continuous improvement. Typically offered Fall Spring Summer.

IT 22600 - Biotechnology Laboratory I

Credit Hours: 2.00. Focuses on nucleic acid manipulation. Modules include, making a eukaryotic library, identifying clones, sub-cloning into a bacterial expression vector and verification of the clone's identity by restriction analysis and DNA sequencing. Basic laboratory techniques (solution making, buffer preparation, good safety techniques), sterile technique and compliance procedures. Typically offered Summer Fall Spring.

IT 22700 - Biotechnology Laboratory II

Credit Hours: 2.00. The second laboratory course should use the cloned material to produce a protein. This protein should be purified, utilized immunologically, checked for purity by Edman degradation, and in some kind of bio assay. Typically offered Summer Fall Spring.

IT 23000 - Industrial Supply Chain Management

Credit Hours: 3.00. A study of industrial supply chains. Emphasis is on in-plant shipping and receiving functions; modes of distribution; functions of, and services provided by supply chains. Emphasis is placed on how manufacturers, distributors and end users can provide value in the supply chain. Typically offered Fall Spring Summer.

IT 27200 - Gateway To Engineering/Technology Teacher Education

Credit Hours: 3.00. An introductory course into the components of teaching engineering/technology (E/T) education in today's public schools. Students explore the K-12 E/T education curriculum, national standards, and professional associations. Development of educational objectives and effective lesson planning is discussed. Typically offered Fall Spring.

IT 27500 - Teaching The T & E Of STEM

Credit Hours: 3.00. A course for teacher education majors that provides rationale and techniques for integrating engineering and technological literacy into the K-12 mathematics and science curriculum. Experiences focus on the engineering design process as it relates to mechanisms, robotics, materials, electrical circuits and electronics. Typically offered Fall Spring.

IT 27600 - Teaching Design And Communications Technology

Credit Hours: 3.00. This course focuses on the development of design and communications technology taught in middle and high school technology education courses. Students present design and communications technology lessons. Students explore activities in secondary design and communications technology in a laboratory setting. Typically offered Fall Spring.

IT 27700 - Teaching Manufacturing Technology

Credit Hours: 3.00. This course focuses on the development of manufacturing technology knowledge and skill required to teach middle level technology education courses. Students prepare and present manufacturing technology lessons and learning activities. Students explore, through laboratory activities, content areas included in secondary manufacturing technology. Typically offered Fall Spring.

IT 27800 - Teaching Construction Technology

Credit Hours: 3.00. This course focuses on construction technology knowledge and skill required to teach middle technology education courses. Students present construction technology lessons and learning activities. Students explore, through laboratory activities, the variety of content areas included in secondary construction technology. Typically offered Fall Spring.

IT 28100 - Industrial Safety

Credit Hours: 3.00. A course designed to develop understanding of, and insight into, the basic aspects of accident prevention and safety. Specific attention will be given to (1) the psychological aspects of accident prevention; (2) the principles of accident prevention; (3) the practical aspects of planning, implementing, and maintaining a safe environment; and (4) standards, current laws, and regulations. Field trips may be required. Typically offered Fall Spring Summer.

IT 29100 - Industrial Practice I

Credit Hours: 1.00. Practice in industry. Written reports required documenting practice. Admission to the Industrial Technology Cooperative Education Program required. Typically offered Fall Spring Summer.

IT 29200 - Industrial Practice II

Credit Hours: 1.00. Practice in industry. Written reports required documenting practice. For cooperative education students only. Typically offered Fall Spring Summer.

IT 33000 - Industrial Sales And Sales Management

Credit Hours: 3.00. Sales and sales management techniques for analyzing distribution challenges and providing solutions through effective communication; establishing credibility, effective questioning techniques, developing and presenting solutions, anticipating objections and gaining a commitment, plus techniques for building, developing and compensating an effective sales organization. Typically offered Fall Spring.

IT 33200 - Purchasing, Inventory, And Warehouse Management

Credit Hours: 3.00. A course designed to develop understanding of types of warehouses, methods of organizing the warehouse environment, and determining efficient inventory control procedures. Purchasing of products, storage of inventory, placement of inventory and other internal logistics management topics will be explored. Real world projects conducted in lab environment will be utilized. Typically offered Fall Spring.

IT 34200 - Introduction To Statistical Quality

Credit Hours: 3.00. Basic concepts of quality systems in business and manufacturing settings are presented. Basic statistical methods as applied to quality control, and an introduction to sampling plans are included. Field trips may be required. Typically offered Fall Spring Summer.

IT 34500 - Automatic Identification And Data Capture

Credit Hours: 3.00. The course provides a basic understanding of automatic identification and data capture technologies and concepts with regard to how their deployment affects business and industry. Laboratory applications of bar codes, radio frequency identification, card technologies, and biometrics will be emphasized. Typically offered Fall Spring Summer.

IT 35100 - Advanced Industrial Safety And Health Management

Credit Hours: 3.00. An introduction to OSHA and standards development for occupational health in general industry. Special emphasis is on fire protection and egress, flammable and combustible liquids, electrical, personal protective equipment, machine guarding, industrial hygiene/blood borne pathogens, ergonomics, and ISO 9000/14000 integration. Typically offered Summer Fall Spring.

IT 37100 - Instructional Planning And Evaluation

Credit Hours: 3.00. Students gain experience in determining content and writing instructional objectives. Emphasis is placed on developing good testing instruments and evaluating those instruments as they relate to measuring student achievement in the cognitive, affective, and psychomotor domains. Field trips may be required. Typically offered Fall Spring Summer.

IT 37200 - Teaching Civil Engineering And Architecture

Credit Hours: 3.00. Strategies for teaching secondary students about civil engineering and architecture, project planning, site planning, building design, and project documentation and presentation. Three-dimensional modeling software is used to design a structure for a simulated development site. Field trips may be required. Typically offered Summer Fall Spring.

IT 37700 - Teaching Design And Innovation I

Credit Hours: 3.00. This course focuses on the development of appropriate engineering design knowledge and skill required to effectively teach middle and high school engineering/technology education courses by infusing engineering design into the curriculum. Students will use 3-D solid modeling software, rapid prototyping, and other design technologies as they engage in the engineering design process through an open-ended engineering design challenge. Typically offered Fall Spring Summer.

IT 38100 - Total Productive Maintenance

Credit Hours: 3.00. This course is a study of the role and scope of total productive maintenance (TPM) in manufacturing. The three types of maintenance activities: corrective, preventive, predictive, and their associated quantitative techniques are studied. Reliability and queuing theory are discussed. Team projects are required. Field trips may be required. Typically offered Fall Spring.

IT 38500 - Industrial Ergonomics

Credit Hours: 3.00. A course designed to focus on work design and ergonomics in manufacturing. Specific attention will be focused on introducing the terminology and the techniques used in work design and on the fundamental concepts embodied in industrial ergonomics. During scheduled laboratory times, exercises will permit the student to apply the concepts of industrial ergonomics. Field trips may be required. Typically offered Fall Spring Summer.

IT 39300 - Industrial Practice III

Credit Hours: 1.00. Practice in industry. Written reports required documenting practice. For cooperative education students only. Typically offered Fall Spring Summer.

IT 39400 - Industrial Practice IV

Credit Hours: 1.00. Practice in industry. Written reports required documenting practice. For cooperative education students only. Typically offered Fall Spring Summer.

IT 39500 - Industrial Practice V

Credit Hours: 2.00. Practice in industry. Written reports required documenting practice. For cooperative education students only. Typically offered Fall Spring Summer.

IT 43200 - Financial Transactions In Distribution

Credit Hours: 3.00. The course is designed to familiarize students with various methods of pricing strategies, marketing concepts, and the terms and procedures involved. Special emphasis will be on computer applications and case study problems that help and enhance marketing of products and services. Field trips may be required. Typically offered Fall Spring Summer.

IT 43400 - Global Transportation And Logistics Management

Credit Hours: 3.00. A study of the various aspects of logistics in industrial systems and product support. The development, implementation, and control of physical transportation systems, product distribution, warehousing, and inventory policy models will be emphasized. The impact of logistics and transportation in the global environment will be discussed. Case studies and software applications will be included. Typically offered Fall Spring Summer.

IT 43500 - Distribution Management Policy

Credit Hours: 3.00. A course designed to build upon previous distribution-related courses with subjects related to managing a distribution enterprise. Modules in sales management, strategic planning, supply-chain logistics, purchasing, and the legalities of distribution manufacturer relationships will be combined with case studies to provide students with practice in making decisions and establishing policy from the manager's point of view. Field trips may be required. Typically offered Fall Spring Summer.

IT 44200 - Production Planning

Credit Hours: 3.00. A study of industrial organization and management, research and development, production, personnel, and sales. Examples of the procedures necessary to provide a product or service are included. Field trips may be required. Typically offered Spring Fall.

IT 44300 - Leadership Development For Technology Education

Credit Hours: 3.00. The role and function of technology education youth groups, planning programs, public relations, and social activities; responsibilities of officers; leadership principles and styles. Technology Students of America in concert with the International Technology Education Association activities will be emphasized. Field trips may be required. Typically offered Fall Spring Summer.

IT 44500 - Problem-Solving With Automatic Data Collection

Credit Hours: 1.00 to 3.00. The problem-solving skills learned in IT 34500 are applied to manufacturing, distribution, or business

data collection problems. Depending on the problem, one or more of the available data collection technologies will be used to address the issue of concern. Field trips may be required. Permission of instructor required. Typically offered Fall Spring Summer.

IT 44600 - Six Sigma Quality

Credit Hours: 3.00. A study of the six sigma quality and process improvement methodology, using the define, measure, analyze, improve, and control (DMAIC) process. The course addresses advanced topics in statistical quality as they pertain to the six sigma methodology and provides preparation for the Green Belt Certification exam. Typically offered Fall Spring.

IT 45000 - Production Cost Analysis

Credit Hours: 3.00. An introduction to financial statements and to the study of the costs of production in terms of break-even and least-cost alternatives, including present and future costs when related to the time value of money, budgeting, labor and overhead, production, cost control, and the role of the supervisor and the engineering technologist to cost control. Computer applications for determining rate of return for complex problems are introduced. Typically offered Summer Fall Spring.

IT 47000 - Teaching Design And Innovation II

Credit Hours: 3.00. This course builds on the student competencies developed in prerequisite courses. Students will apply rapid prototyping and other fabrication technologies to create a specified solution. Students will consider operations process flow chart planning and logistics of engineering/technology education laboratory management. Prototypes will be tested in real situations and data gathered on performance. Designs will be revised to reflect a deeper understanding of manufacturing and use, being sensitive to structure, function, and behavior from a systems-level perspective. Intellectual property, marketing, and infrastructure will be discussed. Typically offered Fall Spring Summer.

IT 47100 - Managing The Technology Education Laboratory

Credit Hours: 3.00. This course provides future technology education teachers with information on designing, organizing, and managing technology education facilities. An in-depth study of specific laboratory requirements related to safety is covered. Management skills related to students, equipment, and supplies are addressed. Students design a technology education laboratory. Typically offered Fall Spring Summer.

IT 47200 - Methods Of Teaching Technology Education

Credit Hours: 3.00. Students identify and demonstrate a variety of instructional techniques appropriate for teaching secondary

technology education. Students plan lessons and assess their effectiveness on student achievement. Methodological insights and understanding for teaching technical subject matter is stressed. Field trips may be required. Typically offered Fall.

IT 48300 - Facility Design For Lean Manufacturing

Credit Hours: 3.00. This capstone course integrates all aspects of manufacturing activities and materials handling focusing on lean concepts. A systematic approach is used to design a manufacturing facility integrating principles of lean production systems and eliminating waste through continuous improvement. Computer simulation and projects are required. Typically offered Fall Spring.

IT 49000 - Special Problems In Industrial Education

Credit Hours: 1.00 to 3.00. Supervised individual research in industrial education topics. Permission of instructor required. Typically offered Fall Spring Summer.

IT 50700 - Measurement And Evaluation In Industry And Technology

Credit Hours: 3.00. (TECH 50700 - PUI) An introduction to measurement strategies in industrial, technical, and human resource development environments. The evaluation of measurement outcomes will be the primary focus of the course. Typically offered Fall Spring Summer.

IT 50800 - Quality And Productivity In Industry And Technology

Credit Hours: 3.00. (AT 50800) Examines the contemporary issues of continuous improvement in quality and productivity in manufacturing and service industries. Includes a close examination of the evolving philosophies bearing on the scope, improvement, and costs of quality assurance programs in industry and technology. Typically offered Summer Fall Spring.

IT 51000 - Developing Courses For Industry And Technology

Credit Hours: 3.00. Principles and procedures in planning, organizing, and developing instructional content for industrial, technical, and human resource development courses. Typically offered Fall Spring Summer.

IT 53000 - Biometric Technology Test Design, Performance, and Evaluation

Credit Hours: 3.00. An introduction of methods of designing biometric testing, performance, and evaluation analyses. Specifically, methods of evaluating fingerprint, face recognition, iris, and voice recognition data are explored using ROC curves, CMC, Rank statistics, and DET curves. The course examines testing requirements from submission of IRB documents to the final analysis. A component of comparative analysis within modalities is included. Typically offered Fall Spring Summer.

IT 53500 - Global Supply Chain Management

Credit Hours: 3.00. The objective of this course is to provide in-depth knowledge of global supply chain management and its application in industries. This course explores supply chain management, expanding beyond the linkage between producer and distributor to include other enterprises in the product life cycle, beginning with concept design and ending in disposal. Learning methodologies include lecture, case study, and collaborative student group activities in applied research. Permission of department required. Typically offered Fall.

IT 54000 - Biometric Performance And Usability Analysis

Credit Hours: 3.00. An introduction of test methodologies from disciplines outside of biometrics, which include: usability, ergonomics, human factors, and human-computer interaction, in order to demonstrate how biometric data analysis can benefit from understanding how humans interact with biometric sensors during the testing and evaluation of biometric systems. The course explores test methods, case studies, and prior biometric testing reports in order to develop a test methodology that includes information on how users interact with biometric systems. Permission of department required. Typically offered Fall Spring Summer.

IT 54500 - Biometrics Technology And Applications

Credit Hours: 3.00. Examines biometrics technology as it relates to security, access control, and the authentication of individuals. The course will examine biometric technologies including iris, face, finger, hand geometry, dynamic signature verification, skin print analysis, and voice recognition. Permission of instructor required. Typically offered Summer Fall Spring.

IT 56800 - Developing Instructional Materials For Industry And Technology

Credit Hours: 3.00. Principles and procedures in locating, evaluating, producing, and integrating instructional materials and aids into industrial, technical, and human resource development programs. Typically offered Fall Spring Summer.

IT 57100 - Project Management In Industry And Technology

Credit Hours: 3.00. The factors influencing decisions during the initiation, implementation, and termination of industrial and

manufacturing projects are examined. Students work as project teams, using project management tools to develop implementation strategies. Permission of instructor required. Typically offered Fall Spring Summer.

IT 58100 - Workshop In Industrial Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Summer Fall Spring.

IT 59000 - Special Problems In Industrial Technology

Credit Hours: 1.00 to 6.00. Independent study of a special problem under the guidance of a member of the staff. Does not substitute for either M.S. thesis or M.S. project credit. Permission of instructor required. Typically offered Summer Fall Spring.

IT 59800 - Directed MS Project

Credit Hours: 1.00 to 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of department required. Typically offered Summer Fall Spring.

IT 65700 - Fingerprint Performance And Usability

Credit Hours: 3.00. This course covers topics of fingerprint capture, fingerprint feature extraction, fingerprint matching, and attacks on fingerprint systems. The course requires analysis of real fingerprint data and the integration of fingerprint recognition in existing infrastructures. Development of a fingerprint recognition system is required. Prerequisites: IT 54500 and either IT 50700 or STAT 50100. Typically offered Fall Spring Summer.

IT 65800 - Biometric Systems Interoperability: Applications And Challenges

Credit Hours: 3.00. This course provides a technology neutral approach to the discussion of biometric system interoperability. It examines the issues of biometric sub-systems of different biometric modalities and sub-systems of the general biometric model. Students will be able to critically evaluate the impact of interoperability of sub-systems on the performance of the entire system. Prerequisites: IT 54500 and either IT 50700 or STAT 50100. Typically offered Fall Spring Summer.

IT 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Interdisciplinary Engineering

IDE 20000 - Sophomore Seminar

Credit Hours: 0.00. IDE operations: design of plans of study, mechanics of approval, co-op program preregistrations; selected topics on related fields of study, employment, engineering registration, and professional development. Typically offered Fall.

IDE 29000 - Professional Internship

Credit Hours: 0.00. Professional experience in Interdisciplinary Engineering. Internship experience intended to complement academic coursework and help prepare for a career as a practicing engineer. Typically offered Summer Fall Spring.

IDE 29100 - Industrial Practice I

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. Must be accepted for the program by the cooperative program coordinator. Typically offered Fall Spring Summer.

IDE 29200 - Industrial Practice II

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. Typically offered Fall Spring Summer.

IDE 30000 - Junior Seminar

Credit Hours: 0.00. Continuation of IDE 20000. Typically offered Fall.

IDE 30100 - Professional Preparation In Interdiciplinary Engineering

Credit Hours: 1.00. Seminar covering topics required for professional preparation of engineers including functioning in teams,

communication, ethics, global and societal impacts, how people learn, and contemporary issues impacting and impacted by engineering. Typically offered Spring.

IDE 39300 - Industrial Practice III

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. Typically offered Fall Spring Summer.

IDE 39400 - Industrial Practice IV

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. Typically offered Fall Spring Summer.

IDE 39500 - Industrial Practice V

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. Typically offered Fall Spring Summer.

IDE 40000 - Senior Seminar

Credit Hours: 0.00. Employment opportunities, graduate study, continuing education, professional societies, and engineering registration. Required of all IDE seniors. Typically offered Fall.

IDE 48500 - Interdisciplinary Engineering Design

Credit Hours: 3.00. Capstone design experience for interdisciplinary engineering students. Physical system or process system design projects, related to contemporary or potential problems involving interdisciplinary teams of engineers. Use of patent literature. Creativity methods. Analysis of design alternatives using case studies, economics and optimization. Typically offered Spring.

IDE 48700 - Multidisciplinary Engineering Senior Professional Design Seminar

Credit Hours: 1.00. Senior professional design seminar covers and assesse students in Multidisciplinary Engineering professional outcomes including, teamwork, professional and ethical responsibility, communication, impact of engineering in context, lifelong

learning, impact of contemporary issues, and leadership. Presentation of student's designs. Methods to obtain a professional position after graduation. Permission of department required. Typically offered Spring.

IDE 49500 - Special Topics In Interdisciplinary Engineering

Credit Hours: 1.00 to 4.00. Primarily designed for interdisciplinary engineering subject areas for which there is no specific course offered, but for which there is sufficient student interest to justify teaching a specialized course on a trial basis. May be repeated for credit as long as the topic being taught is not repeated. Typically offered Summer Fall Spring.

Interdisciplinary Studies

IDIS 10100 - Perspectives Contemporary Issues

Credit Hours: 3.00. Perspectives Contemporary Issues. Typically offered Fall Spring Summer.

IDIS 11000 - Freshman Success Course

Credit Hours: 1.00 to 3.00. Freshman success course is designed to increase the success of freshmen by assisting them with the skills necessary to reach their educational goals. Topics in this course include: academic concerns (academic major information, learning skills, study skills, time management) and personal social concerns (interpersonal relationship skills, communication skills, setting goals). Credit for only one of: IDIS 11000, G1020, G1030, G1040. Typically offered Fall Spring.

IDIS 49000 - Directed Reading in Interdisciplinary Studies

Credit Hours: 1.00 to 3.00. Reading under the direction of the instructor in a particular field of study. Permission of instructor required. Typically offered Fall Spring Summer.

IDIS 49100 - Special Topics In Interdisciplinary Studies

Credit Hours: 1.00 to 4.00. Special topics or projects under the direction of the instructor in a particular field of specialization. Typically offered Fall Spring Summer.

IDIS 59000 - Directed Reading In Interdisciplinary Studies

Credit Hours: 1.00 to 3.00. Reading under the direction of the instructor in a particular field of study. Permission of instructor required. Typically offered Spring Fall Summer.

IDIS 59100 - Selected Topics In Interdisciplinary Studies

Credit Hours: 3.00. A study of selected topics, taught by an instructor in whose particular field of specialization the content of the course falls. Typically offered Spring Fall Summer.

Italian

ITAL 10100 - Italian Level I

Credit Hours: 3.00. A beginning Italian course with emphasis on communicative skills (listening and speaking), literacy (reading and writing) and culture. Typically offered Fall Spring Summer.

ITAL 10200 - Italian Level II

Credit Hours: 3.00. Continuation of ITAL 10100. Typically offered Fall Spring Summer.

ITAL 10500 - Accelerated Basic Italian

Credit Hours: 3.00. An accelerated basic Italian course that substitutes for ITAL 10100 and ITAL 10200. Knowledge of a foreign language required. Typically offered Summer Fall Spring.

ITAL 11100 - Italian Conversation I

Credit Hours: 1.00. Basic development of oral skills. Guided practice in conversation to enhance communicative competence. Small group discussions in Italian on practical topics. May be taken concurrently with Italian Level I. Typically offered Fall Spring.

ITAL 11200 - Elementary Italian Conversation

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in conversation to enhance communicative competence. Small group discussions in Italian on various topics. Typically offered Fall Spring.

ITAL 20100 - Italian Level III

Credit Hours: 3.00. A continuation of ITAL 10200. Typically offered Fall Spring Summer.

ITAL 20200 - Italian Level IV

Credit Hours: 3.00. An intermediate Italian course with emphasis on communicative skills (listening and speaking), literacy skills (reading and writing) and culture. Typically offered Fall Spring Summer.

ITAL 20500 - Accelerated Intermediate Italian

Credit Hours: 3.00. An accelerated second-year Italian course with focus on furthering the development of listening, reading, speaking and writing abilities at the intermediate level. Typically offered Summer Fall Spring.

ITAL 21100 - Italian Conversation III

Credit Hours: 1.00. Continuation of ITAL 11200. May be taken concurrently with ITAL 20100. Typically offered Fall Spring.

ITAL 21200 - Intermediate Italian Conversation

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in Italian conversation to enhance communicative competence. Small group discussions in Italian on various topics. Not open to students enrolled in or having credit for ITAL 30100 or above. Typically offered Fall Spring.

ITAL 23100 - Dante's Divine Comedy

Credit Hours: 3.00. Reading and discussion of Dante's Divine Comedy. The major critical approaches to Dante's masterpiece will be reviewed. All readings, papers, and examinations will be in English. Typically offered Fall Spring Summer.

ITAL 28000 - Italian Culture And Civilization

Credit Hours: 3.00. Course focuses on salient aspects of Italian culture and civilization from the Middle Ages to the present. In English. Typically offered Fall Spring Summer.

ITAL 28100 - The Italian Renaissance And Its Impact On Western Civilization

Credit Hours: 3.00. This course introduces students to the most important literary, cultural, and political writings of the Italian Renaissance, and shows the pivotal influence of the Renaissance on the development of Western civilization as a whole. Classes and readings entirely in English; no knowledge of Italian is needed. Typically offered Fall Spring Summer.

ITAL 30100 - Italian Level V

Credit Hours: 3.00. Continued development of Italian speaking, listening, reading, and writing abilities, using materials dealing primarily with everyday life and civilization in Italy from a variety of sources (e.g., newspapers, magazines, TV, recent literature, etc.). Conducted primarily in Italian. Typically offered Fall Spring.

ITAL 30200 - Italian Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading, and writing abilities in Italian, on the basis of materials dealing with the ideas and events that have shaped present-day Italy. Conducted primarily in Italian. Typically offered Fall Spring.

ITAL 31200 - Advanced Italian Conversation

Credit Hours 1.00. One credit hour advanced Italian conversation course focused on the development of oral and aural skills for self-expression. Course provides students with guided practice in conversation to enhance communicative competence. Discussions in Italian on various topics. Course may be taken concurrently with ITAL 30100, ITAL 30200, ITAL 34100 and ITAL 34200. Typically offered Fall Spring.

ITAL 33000 - The Italian Cinema

Credit Hours: 3.00. The development and evolution of Italian cinema after World War II. The class will center on the viewing and discussion of films and will survey a broad spectrum of directors and styles. Knowledge of Italian not required. Typically offered Fall Spring Summer.

ITAL 33300 - The Spirit Of Italian Comedy

Credit Hours: 3.00. This course explores various types of Italian comedy, focusing on theater and cinema. Particular emphasis will be given to Renaissance theater, commedia dell'arte, Goldoni, Pirnadello, Dario Fo, and to the new generation of Italian comedians. In English. Typically offered Summer Fall Spring.

ITAL 33500 - Italian-American Cinema

Credit Hours: 3.00. This course offers an overview of the major filmmakers associated with the representation of Italian Americans in the United States film world. Students will view and discuss major filmmakers and their films, and will write critical essays on film topics. Conducted in English. Typically offered Fall Spring Summer.

ITAL 34100 - Italian Literature I: From The Middle Ages To The Enlightenment

Credit Hours: 3.00. This is the first course of a two-semester sequence presenting an overview of Italian literature. Students will read and discuss major authors and texts and will write critical essays on literary topics. Readings, discussion, and papers in Italian. Typically offered Fall Spring.

ITAL 34200 - Italian Literature II: From Romanticism To The Present

Credit Hours: 3.00. This is the second course of a two-semester sequence presenting an overview of Italian literature. Students will read and discuss major authors and texts and will write critical essays on literary topics. Readings, discussion, and papers in Italian. Typically offered Fall Spring.

ITAL 38000 - Italian Culture And Civilization

Credit Hours: 3.00. Course focuses on salient aspects of Italian culture and civilization from the Middle Ages to the present. In English. Typically offered Summer Fall Spring.

ITAL 39300 - Special Topics In Italian Literature Or Cinema

Credit Hours: 3.00. This course will focus on particular aspects of Italian literature, cinema or culture. No knowledge of Italian required. Typically offered Summer Fall Spring.

ITAL 39400 - Special Topics In Italian Literature

Credit Hours: 3.00. This course studies a particular aspect in Italian literature (e.g., a theme, device, character type, motif, place) by reading a varied selection of works of different genres, styles, and/or periods. Readings, discussion, and papers in Italian. Typically offered Fall Spring Summer.

ITAL 39900 - Special Study Abroad Credit It Italian

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in Italian earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

ITAL 49300 - Advanced Topics In Italian Literature Or Cinema

Credit Hours: 3.00. This course will analyze in depth particular aspects of Italian literature, cinema or culture. No knowledge of Italian necessary. Typically offered Summer Fall Spring.

ITAL 59000 - Directed Reading In Italian

Credit Hours: 1.00 to 4.00. Directed readings in Italian. Permission of instructor required. Typically offered Spring Fall Summer.

Japanese

JPNS 10100 - Japanese Level I

Credit Hours: 3.00 or 4.00. A basic study of standard Japanese. Students will be introduced to spoken and written forms of the language from the beginning. Language form and use are equally emphasized. Relevant cultural aspects. Hiragana, Katakana, and 85 Kanji. Typically offered Fall Spring Summer.

JPNS 10200 - Japanese Level II

Credit Hours: 3.00 or 4.00. A continuation of the study of elementary Japanese. Task-oriented activities will be incorporated to

encourage language use as well as pattern practice for linguistic accuracy. Relevant cultural aspects will be introduced. 120 Kanji. Typically offered Fall Spring Summer.

JPNS 20100 - Japanese Level III

Credit Hours: 3.00 or 4.00. A study of intermediate Japanese. Occasional use of authentic materials for listening and reading practice. Task-oriented exercises, communicative activities, and pattern practice are used to facilitate learning of the spoken and written language. 110 Kanji. Typically offered Fall Spring Summer.

JPNS 20200 - Japanese Level IV

Credit Hours: 3.00 or 4.00. A continuation of intermediate Japanese. Active use of authentic materials for listening and reading practice. Task-oriented exercises, communicative activities, and pattern practice for learning of the spoken and written language. 150 Kanji. Typically offered Fall Spring Summer.

JPNS 23000 - Japanese Literature In Translation

Credit Hours: 3.00. Reading and discussion of selected texts from major writers and genres. The course provides a broad survey of the Japanese literary tradition and its cultural and historical background. Emphasis may vary from year to year. Knowledge of Japanese not required. Typically offered Fall Spring.

JPNS 24100 - Introduction To The Study Of Japanese Literature

Credit Hours: 3.00. Reading and discussion of selected Japanese poetry, prose, and drama; introduction to methods of literary criticism, applied to the reading of Japanese literary discourse. Texts, discussion, and written assignments largely in Japanese. Typically offered Fall Spring.

JPNS 28000 - Introduction To Modern Japanese Civilization

Credit Hours: 3.00. A survey of modern Japanese culture. Various aspects are covered, such as geography, economy, society, the political system, family, education, traditional arts, business, and language. Current issues will be discussed in a timely manner. Lectures in English. Typically offered Fall Spring.

JPNS 30100 - Japanese Level V

Credit Hours: 3.00. Continued development of Japanese speaking, listening, reading, and writing abilities, using materials dealing primarily with everyday life and civilization in Japan from a variety of sources (e.g., newspapers, magazines, TV, recent literature, etc.). Conducted primarily in Japanese. Typically offered Fall Spring.

JPNS 30200 - Japanese Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading, and writing abilities in Japanese, on the basis of materials dealing with the ideas and events that have shaped present-day Japan. Conducted primarily in Japanese. Typically offered Fall Spring.

JPNS 31300 - Intermediate Reading In Japanese I

Credit Hours: 3.00. This course provides students with further study in reading Japanese at the intermediate level. The course also reviews and introduces 500 basic kanji. Typically offered Fall Spring.

JPNS 33000 - Japanese Cinema

Credit Hours: 3.00. A survey of the development of Japanese cinema after World War II. The class focuses on the viewing and discussion of the films and examines a variety of directors with different styles and thematic messages. Typically offered Fall Spring.

JPNS 34100 - Japanese Literature I: Modern Japanese Literature

Credit Hours: 3.00. Selected reading of poetry, drama, and fiction of modern Japanese literature. Students will read and discuss major authors and texts and will write critical essays on literary topics. Conducted largely in Japanese. Typically offered Fall Spring.

JPNS 34200 - Japanese Literature II: Classical Japanese Literature

Credit Hours: 3.00. Selected reading of classical Japanese poetry, prose, and drama. Students will gain reading skills in classical Japanese and will discuss and write critical essays on various literary topics. Conducted largely in Japanese. Typically offered Fall Spring.

JPNS 36100 - Elementary Survey Of Japanese Linguistics

Credit Hours: 3.00. This course surveys all areas of Japanese Linguistics, including phonetics, phonology, morphology, syntax, semantics, and pragmatics, focusing on systematizing fragmentary knowledge students are assumed to have acquired through Japanese language courses. Typically offered Fall Spring.

JPNS 36200 - The Structure Of Japanese II: Advanced Sentence Structure And Applied Linguistics

Credit Hours: 3.00. Presents the structure of Japanese complex sentences as well as selected aspects of inter-sentential structures, and treats selected sociolinguistic and psycholinguistic aspects of the language. Typically offered Fall Spring.

JPNS 36300 - Relationship Of Japanese Language And Society

Credit Hours: 3.00. This course examines the Japanese language with reference to the way the language is being used in the Japanese society. Particular areas include keigo (honorific language), aizuchi (backchannel), silence, gender issues, in-group vs. out-group. Typically offered Fall Spring.

JPNS 39900 - Special Study Abroad Credit In Japanese

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in Japanese earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

JPNS 40100 - Japanese Level VII

Credit Hours: 3.00. Advanced work on the development of Japanese speaking, reading, and writing abilities, focusing on materials dealing with culture and the arts of Japan. Conducted mostly in Japanese. Typically offered Fall Spring.

JPNS 40200 - Japanese Level VIII

Credit Hours: 2.00. Further advanced work on speaking, listening, reading, and writing abilities in Japanese. Course materials will cover a variety of topics illustrated by film and other media, both print and nonprint. Typically offered Fall Spring.

JPNS 48000 - Japanese Civilization

Credit Hours: 3.00. This course introduces various aspects of contemporary Japanese culture through readings and discussions. Topics include geography, history, family, education, society, religion, and values. Typically offered Fall Spring.

JPNS 49000 - Special Topics In Japanese Language

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring.

JPNS 52100 - Teaching Japanese As A Foreign Language

Credit Hours: 3.00. Introduces a wide range of techniques used in teaching Japanese as a foreign language. Discusses theoretical issues concerned with the learning and teaching of Japanese. Permission of instructor required. Typically offered Spring Fall.

JPNS 54300 - Modern Japanese Popular Literature And Culture

Credit Hours: 3.00. A study of modern Japanese entertainment literature, together with cinema, comic strips, animations, and contemporary theaters. Emphasis is on the examination of the development of the modern Japanese cultural consciousness expressed in the area of popular literature and culture. Typically offered Spring Fall.

JPNS 56000 - Survey Of Japanese Linguistics

Credit Hours: 3.00. This course is intended to provide the student with a systematic overview of the Japanese language. It covers most major areas of linguistics, from phonetics to pragmatics. Conducted in Japanese. Typically offered Fall Spring.

JPNS 57500 - Theories Of Japanese Language Acquistion

Credit Hours: 3.00. Advanced course designed to provide an overview of major theoretical issues in Japanese language acquisition research. Permission of instructor required. Typically offered Summer Fall Spring.

JPNS 59000 - Directed Reading In Japanese

Credit Hours: 1.00 to 4.00. Directed readings in Japanese. Permission of instructor required. Typically offered Summer Fall Spring.

JPNS 59400 - Special Topics In Japanese Literature

Credit Hours: 1.00 to 4.00. Reading and extensive discussion of selected texts from different writers and genres. Provides in-depth research on a variety of issues related to Japanese literary and cultural traditions. Knowledge of advanced Japanese required. Permission of instructor required. Typically offered Spring Fall.

JPNS 59600 - Special Topics In Japanese Linguistics.

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

JPNS 67900 - Seminar In Japanese Linguistics

Credit Hours: 3.00. Advanced study and research on a significant topic in Japanese linguistics. Topic to be announced in advance. Permission of instructor required. Typically offered Fall Spring.

JPNS 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Fall Spring.

Jewish Studies

JWST 33000 - Introduction To Jewish Studies

Credit Hours: 3.00. An interdisciplinary course touching on the full range of Jewish experience from antiquity to the present. Several members of the Jewish Studies faculty and guest lecturers participate, representing such fields as anthropology, history, language, literature, philosophy, politics, religion, and sociology. Typically offered Spring.

JWST 59000 - Directed Readings In Jewish Studies

Credit Hours: 3.00. A reading course in aspects of Judaica directed by the instructor in whose particular field of specialization the content of the reading falls. Permission of Instructor required. Typically offered Fall Spring.

Landscape Architecture

LA 10100 - Survey Of Landscape Architecture

Credit Hours: 3.00. A general overview of the profession of landscape architecture and a description of Purdue's landscape architecture program. This course will provide entering prelandscape architecture and landscape horticulture-design students a preview of the profession that they have chosen to pursue and will be a general information course for students across the campus who have an interest in becoming familiar with landscape architecture. Typically offered Fall.

LA 11600 - Graphic Communication For Students Of Landscape Architects And Design

Credit Hours: 3.00. Introduction to design and presentation techniques fundamental to landscape architecture. Short projects give students exposure to a variety of presentation materials (pencil, ink, pastel, watercolor and acrylic, paper and board) to freehand lettering, and to two- and three-dimensional illustrations. Materials used are purchased by the student. Typically offered Fall.

LA 11700 - Computer Technology In Design

Credit Hours: 3.00. An introductory course that covers the computer technology skills needed to communicate, create, and implement designs in the field of landscape architecture. The course will include current technology in the following areas: CAD, desktop publishing, image processing, GIS, spread sheet, file transfer protocol, scanning, printing and file management. Permission of department required. Typically offered Spring.

LA 15000 - Preservation Issues

Credit Hours: 1.00. An introduction to the preservation movement in the United States, focusing on the chronology of developments and organizational structure of the public, private, and not-for-profit sectors at the federal, state, and local levels. Course meets during weeks 1-5. Typically offered Fall.

LA 15100 - Building Preservation

Credit Hours: 1.00. Identification of architectural styles, the language of preservation, preparation of a national register application, tax credits and tax incentives for historic preservation will be covered. The student is to develop a working knowledge of the Secretary of Interior Historic Preservation Guidelines. Course meets during weeks 6-10. Typically offered Fall.

LA 15200 - Community Preservation

Credit Hours: 1.00. Downtown revitalization using historic preservation as an economic development strategy will be presented. The unit focuses on the roles of the National Main Street Center, Indiana Main Street Center, federal, state, and local legislative initiatives and local historic districts, guidelines, and local historic review boards. Course meets during weeks 11-15. Typically offered Fall.

LA 16600 - History And Theory Of Landscape Architecture

Credit Hours: 3.00. A study of the historic evolution of landscape architecture to the status of a recognized profession. The course covers the social, economic, political, climatic, and other factors that have influenced the development of design styles and theories. Typically offered Spring.

LA 17600 - Urbanization And Change In The Midwest Landscape

Credit Hours: 2.00. This course traces the evolution and meaning of the human-made midwest environment from the retreat of the Wisconsin glacier to the present. The course intertwines economic, cultural, historical, political, technological, anthropological, and social data to develop a working model of change in the midwestern environment. Typically offered Spring.

LA 21600 - Landscape Architectural Design I

Credit Hours: 3.00. Landscape architectural site design, an introduction into processes and products. Building on the introduction to graphics in L A 116 this is an introduction to the processes and production of site design and development drawings. Recording, conceptualizing and presenting site design ideas through problem solving projects. Emphasis on hand and computer drafting and drawing skills to communicate design ideas. Permission of department required. Typically offered Spring.

LA 22600 - Landscape Architectural Design II

Credit Hours: 4.00. Methods, principles and the process of designing in the built environment. Basic principles of site organization and composition are presented and applied in a series of exercises and studio projects. Role of the design process is reinforced both as a problem-solving tool and as a means of creativity and ideation. Typically offered Spring.

LA 22700 - Planting Design I

Credit Hours: 3.00. Review of design principles as related to plant design characteristics; design implications of plant responses to environment; review of landscape plants in fall. Typically offered Fall.

LA 24600 - Site Systems I

Credit Hours: 4.00. Properties of hardscape materials, their methods of detailing and specification. Introduction to masonry, wood and site furnishings. Design of pavements, walls, steps, ramps and other common site elements. Standards and methods of detailing and notation are presented in small-format exercises. Typically offered Fall.

LA 25000 - Architectural Design

Credit Hours: 3.00. The course will focus on the language of architecture, from classical periods to current practices and explore the application of traditional systems of proportion and geometry. Typically offered Spring.

LA 26600 - Frank Lloyd Wright

Credit Hours: 2.00. The course is an overview of the architecture, philosophy, and biographical background of one of America's foremost architects, Frank Lloyd Wright. The lectures explore his prolific output of architectural commissions along with his efforts at community planning, furniture design, textile design, and related arts. L A 266 provides a broad overview of American architecture through a survey of Wright's predecessors, mentors, peers, and his antagonists. The course includes two field trips, one to Oak Park, Illinois, the community featuring the largest number of built works by Wright, and to the John E. Christian residence, 'Samara' in West Lafayette. Typically offered Spring.

LA 27500 - Honors Course - Lower Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to first- and second-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

LA 30900 - Co-Op Preparation

Credit Hours: 1.00. The material presented in this course consists of a broad overview of the employment opportunities in the professional practice of landscape architecture and the ways to secure an internship. It provides the student with information about career choices in landscape architecture and an appropriate knowledge base with which to make informed internship choices. Students prepare written and graphic documents for seeking employment. Students prepare for interviews and communications leading to employment as an intern in landscape architecture. Course meets during weeks 1-8. Typically offered Spring.

LA 31600 - Landscape Architectural Design III

Credit Hours: 5.00. Design theory and meaning in landscape architecture. Past, current and emerging design theories are investigated via lectures, research assignments and studio projects. Projects gain in size, complexity and depth of meaning. Emphasis on the role theory plays both as a stabilizing force and as a catalyst for change. Typically offered Fall.

LA 32500 - Planting Design II

Credit Hours: 3.00. Study of plants as unique elements of landscape design. Plants will be studied for their aesthetic and functional uses in the landscape. Various scales of planting and design will be approached. Natural distribution and ecological considerations in planting design will be explored. Requires class trips. Students will pay individual lodging or meal expenses when necessary. Typically offered Fall.

LA 32600 - Landscape Architectural Design IV

Credit Hours: 5.00. Community planning and design. Past, current and emerging planning theories are investigated via lectures, research assignments and studio projects. The interrelationship of land use, circulation, and open space are explored using environmental and sustainable principles within a framework of traditional neighborhood design. Typically offered Spring.

LA 34600 - Site Systems II

Credit Hours: 3.00. Earthwork, grading, surface drainage and storm water management. Properties of contour lines and topographic representation. Standards for grading practices, notation and nomenclature. Methods for calculating volumes of cut and fill. Methodology for horizontal and vertical alignment of roads and trails. Typically offered Fall.

LA 35600 - Site Systems III

Credit Hours: 4.00. Methods and standards of construction documentation using current technology. Preparation and packaging of site-related technical drawings and bid packages. Methods for site layout and dimensioning. Organization and composition of planting plans, plant lists, grading plans, lighting plans, and associated detail sheets. Standards and sequence of site-related specification documents. Typically offered Spring.

LA 39000 - Professional Cooperative Programs In Landscape Architecture

Credit Hours: 0.00. Supervised work experiences in landscape architectural offices and in the landscape construction or maintenance industry. Programs must be preplanned and conducted under the direction of the cooperative educational

coordinator in cooperation with an employer. Students must submit a summary report of the work experience. Consent of cooperative program coordinator required. Typically offered Fall Spring Summer.

LA 40000 - Landscape Architecture Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

LA 41600 - Landscape Architectural Design V

Credit Hours: 5.00. Understand issues, develop concepts and implement ideas beginning with research and precedents in urban design, which is then applied to the planning and design of complex urban sites, and resolved through detailed site design. Urban design will focus on the relationship and interaction between development patterns and land uses; access circulation and parking; and open space. Typically offered Spring.

LA 42600 - Capstone Course In Landscape Architecture

Credit Hours: 5.00. This course will focus on the integration and application of accumulated knowledge of landscape architecture from the student's previous coursework and internship experience. Students will be challenged to identify and solve problems in community-based projects. The students will also communicate, through reports and presentations, their results and plan to community audiences, faculty, and other students. Students will also do directed readings and then discuss topics related to the current and future practices of landscape architecture and environmental design. Typically offered Spring.

LA 45000 - In The English Landscape:Integrating History, Horticulture, and Landscape Architecture

Credit Hours: 3.00. Intensive four-weeks in residence in Corsham, UK with visits to significant sites to examine the intersections between human culture and the natural environment that results in the developed landscape. Offered in even-numbered years. Permission of instructor required. Typically offered Summer.

LA 47500 - Honors Course - Upper Division

Credit Hours: 1.00 to 4.00. Utilized to offer a new honors course for a maximum of three years. Variable title, credit, and instructional type. Course may be repeated for credit if content and titles are different. Offered primarily to third- and fourth-year students. Courses offered must be approved by departmental or program faculty and College of Agriculture Honors Committee. Permission of instructor required. Typically offered Fall Spring Summer.

LA 47600 - Professional Practice Of Landscape Architecture

Credit Hours: 2.00. A study of the principles and practice of landscape architecture in private and public offices. The course covers project acquisition, office management, and project implementation procedures. Preparation of a professional compendium is required. Typically offered Fall.

LA 48000 - Landscape Architecture Seminar

Credit Hours: 1.00. Exploration and discussion of current problems in the environmental design profession. Student presentation of selected landscape architectural problems. Typically offered Spring.

LA 49000 - Special Problems In Landscape Architecture

Credit Hours: 1.00 to 6.00. Independent in-depth study and presentation of specific research or design problems selected by the student in consultation with the instructor. Open only to advanced students. Permission of instructor required. Typically offered Fall Spring Summer.

LA 49900 - Thesis Research

Credit Hours: 1.00 to 6.00. For students doing individualized research on landscape architecture; report required. Arrange with academic advisor and honors research advisor before registering. Admission to the honors program required. Permission of instructor required. Typically offered Fall Spring Summer.

Land Surveying

LS 30000 - Land Survey Systems

Credit Hours: 3.00. History of the development of land survey systems. United States Public Land System from earliest instructions to present day regulations. Introduction to methods of describing property. Survey licensure. Present day developments in the concept of land information systems. Overview of base mapping methods for the cadastral layer of land information systems. Typically offered Fall.

LS 30100 - Property Surveys And Descriptions

Credit Hours: 3.00. Judicially accepted principles for interpretation of existing descriptions and rules guiding the writing of new descriptions. Senior rights and adjoiners, mathematical correctness, rule of intent, monumentation, nonlinear boundaries, weight of descriptive items, modification of existing descriptions, and partitioning of parcels. Right-of-way procedures. Systems of recording property descriptions in Indiana; boundary surveys, resurveys, and retracements. Surveyor's responsibility in research of records, documents, and field evidence. Typically offered Spring.

LS 40000 - Summer Geomatics Engineering Design Project

Credit Hours: 4.00. Four weeks of field instruction and practice on an integrated project during the summer following the junior year. Projects include client meetings, work scheduling, survey design, field observations, survey adjustment and analysis, map and report preparation, and final oral presentation. Projects typically involve aspects of one or more of the following: engineering surveys, land surveys, control surveys, topographic surveys, route surveys, and construction surveys. Different locations will be utilized each year and not necessarily on the Purdue campus. Typically offered Summer.

LS 40100 - Legal Aspects Of Surveying

Credit Hours: 3.00. Common and statute law; structure of the court system. Real property and classification of interests in it. Unwritten rights in land, such as riparian rights and adverse possession and their relationship to land surveying. Written transfers of land to include simultaneous and sequence conveyances, dedications, and reversions. Procedure of legal surveys. Rules of evidence to include classification of evidence, burden of proof, presumptions, and weight of classes of evidence. Discussion of ramifications when using measurements as evidence. Study of typical court cases. Title insurance. Rights, duties, and liability of a professional land surveyor. Typically offered Fall.

LS 40900 - Subdivision Planning And Design

Credit Hours: 3.00. Relationship between planning of individual subdivisions and the master plans and regulatory aspects of higher government authority. Role of the professional land surveyor in planning. Subdivision planning to include analysis and composing of control ordinances and regulations; preliminary planning; subdivision boundary and lot calculations, including computer applications; final platting; design of sanitary sewers, storm sewers, and streets within the domain of the professional land surveyor, as defined by Indiana statute. Boundary problems peculiar to subdivisions. Typically offered Spring.

LS 49700 - Land Surveying Projects

Arrange Hours and Credit. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

Languages and Cultures

LC 10100 - Special Topics In Foreign Languages I

Credit Hours: 3.00 or 4.00. Special topics in Foreign Languages. Permission of department required. Typically offered Summer Fall Spring.

LC 10200 - Special Topics In Foreign Languages II

Credit Hours: 3.0 or 4.00. Topics vary. Permission of department required. Typically offered Summer Fall Spring.

LC 20100 - Special Topics In Foreign Languages III

Credit Hours: 3.00 or 4.00. Topics vary. Permission of department required. Typically offered Summer Fall Spring.

LC 20200 - Special Topics In Foreign Languages IV

Credit Hours: 3.00 or 4.00. Special Topics in Foreign Languages IV. Permission of department required. Typically offered Summer Fall Spring.

LC 23000 - Crossing Borders: Introduction To Comparative Literature

Credit Hours: 3.00. (CMPL 23000) Foundations for comparison of works in different languages, thematic (philosophical, sociological, psychological) and structural (genre, composition, use of linguistic devices); parallel interrelation of theme and structure in works of different literatures. The importance of literary norms and systems of genres. Examination of crosscurrents in different literatures during successive periods of development. Typically offered Fall Spring Summer.

LC 23100 - Fairytale, Folktale, Fable

Credit Hours: 3.00. This course provides an overview of fairytale, folklore, and fable traditions across various cultures and historical periods, as well as en examination of their ongoing influence on contemporary cultures. Taught in English. Typically offered Fall Spring Summer.

LC 23300 - Love, Sex, And Gender In Western European Literature

Credit Hours: 3.00. The course examines major works in translation that were, and continue to be, formative upon modern attitudes to love, sex, and gender in the West. Typically offered Summer Fall Spring.

LC 23500 - East Asian Literature In Translation

Credit Hours: 3.00. Reading and discussion of selected East Asian poetry, prose, and drama. Focus will be on the traditions of China and Japan, but may include works of other cultures such as Korea. Emphasis may vary yearly, stressing traditional or modern literatures. Typically offered Fall Spring.

LC 23900 - Women Writers In Translation

Credit Hours: 3.00. An examination of international female writers' literary creativity in the context of women's studies and feminist theory, as articulated in their specific cultural and geographical milieu. Course content will vary in terms of cultural focus. In English. Typically offered Fall Spring Summer.

LC 26100 - Introduction To The Linguistic Study Of Foreign Languages

Credit Hours: 3.00. Overview of linguistics and the role of language in society; fundamental concepts of linguistic analysis. The course focuses on linguistic phenomena found in French, German, Russian, and Spanish, with material, examples, and assignments drawn primarily from those languages whenever appropriate. Credit will not be awarded for both LC 26100 and SLHS 22700/ENGL 22700. Typically offered Fall Spring.

LC 33100 - Comparative Literature In Translation

Credit Hours: 3.00. A course in the study of a special topic related to works in several foreign literatures, directed by an instructor whose particular field of specialization will be highlighted. Typically offered Fall Spring Summer.

LC 33300 - The Middle Ages On Film

Credit Hours: 3.00. Introduction to the Middle Ages through films in various languages and genres from the beginning of film history to the present. Reading literary, historical, legal, and film theory texts in conjunction with the films, students critically analyze representations of the Middle Ages and the cultural context from which these emerge. Typically offered Fall Spring.

LC 36100 - Sound And Form In Language

Credit Hours: 3.00. Examination of the nature of sound systems (phonology) and form systems (morphology) of language, as well as techniques of phonological and morphological analysis, using material from various languages. Central focus on phonetic and phonological structure, and on inflectional and derivational morphology. Typically offered Summer Fall Spring.

LC 36800 - Sociolinguistic Study Of African American English

Credit Hours: 3.00. A study of the history, structure, uses, and educational concerns of African American English in African American speech communities and the U.S. culture at large. Typically offered Fall Spring.

LC 37100 - Phonetics Of Foreign Languages

Credit Hours: 3.00. Introduction to articulatory phonetics for students of foreign languages. Mechanisms of production of speech sounds. Production and discrimination of sounds of other languages; contrast with English sounds; practice in pronunciation and phonetic transcription. Introduction to the International Phonetic Alphabet (IPA). Credit will not be awarded for more than one of SLHS 30600, LING 31500, and LC 37100. Typically offered Fall Spring.

LC 39900 - Special Study Abroad Credit In Foreign Languages

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in foreign languages earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

LC 49000 - Special Topics In Foreign Languages And Literatures

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

LC 49900 - Research In Foreign Languages

Credit Hours: 1.00 to 3.00. Undergraduate research into a topic in foreign languages. Permission of instructor required. Typically offered Summer Fall Spring.

LC 51900 - Teaching Of Foreign Languages

Credit Hours: 3.00. A basic course designed to provide a forum for ideas connecting theory and research to teaching practice. Explores issues related to how learning and teaching can be enhanced and presents ideas that can be implemented in the classroom. Permission of instructor required. Typically offered Summer Fall Spring.

LC 56100 - Introduction To The Linguistic Analysis Of Foreign Languages

Credit Hours: 3.00. Introduction to the fundamental concepts of linguistic analysis; overview of linguistics and the role of language in society. Focus on linguistic phenomena found in French, German, Russian, and Spanish; material, examples, and assignments drawn primarily from those languages whenever appropriate. Credit will not be given for both LC 26100 and 561. Typically offered Spring Fall.

LC 56300 - Historical Linguistics

Credit Hours: 3.00. (ANTH 56300, ENGL 56300) A survey of mechanisms and motivations of linguistic change. Topics include phonological, morphological, semantic and syntactic change, comparative and internal reconstruction, linguistic variation, language contact, and linguistic typology. Typically offered Spring Fall.

LC 56500 - Sociolinguistics

Credit Hours: 3.00. (ANTH 56500, COM 56500, ENGL 56500) An introduction to language in its social context, focusing on uses and users of language. Topics include social class, ethnic group, gender, language attitudes, and bilingualism. Typically offered Spring Fall.

LC 57000 - Introduction To Semiotics

Credit Hours: 3.00. (ANTH 51900, SLHS 58900, COM 50700, ENGL 57000) The study of languages, literatures, and other systems of human communication. Includes a wide range of phenomena that can be brought together by means of a general theory of signs. The course deals with three fundamental areas: 1) verbal communication, 2) nonverbal communication (iconic systems, gestures, body language, etc.), and 3) communication through art forms. Typically offered Spring Fall Summer.

LC 57500 - Theories Of Foreign Language Acquisition

Credit Hours: 3.00. An advanced course designed to provide an overview of major theoretical issues in foreign language acquisition research. Provides a broad historical introduction to theories of acquisition that underlie these different perspectives. This course also provides an understanding of skills assessment and selection of instructional materials. Permission of instructor required. Typically offered Summer Fall Spring.

LC 59000 - Directed Reading In Foreign Languages

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall Summer.

LC 59300 - Special Topics In Literature

Credit Hours: 1.00 to 4.00. Special topics in Literature. Permission of instructor required. Typically offered Spring Fall.

LC 59600 - Special Topics In Linguistics

Credit Hours: 1.00 to 4.00. Special topics in Linguistics. Permission of instructor required. Typically offered Spring Fall.

LC 63000 - Comparative Literature: Function And Methods

Credit Hours: 3.00. (CMPL 63000 and ENGL 66000) An introduction to methods, problems, and the bibliographical tools pertaining to comparative study. Required of all students in the Comparative Literature Program. Typically offered Fall.

LC 63900 - Seminar In Comparative Literature

Credit Hours: 3.00. (ENGL 66500 and CMPL 65000) Exploration of a significant topic in comparative literature, e. g., the arts of translation, thematology, genre studies, literary movements, literary relations between countries. (See Comparative Literature.) Prerequisite: ENGL 66000 or LC 63000. Typically offered Spring Fall Summer.

LC 65000 - Topics In Theory

Credit Hours: 3.00. Study of theoretical approaches to literature, the arts, or general culture (e. g., cognitive science, deconstruction, feminism, hermeneutics, postmodernism, postcolonial studies, reader response, semiotics). Examines methodologies and confronts them with literary texts. Permission of instructor required. Typically offered Spring Fall Summer.

LC 66500 - Methods Of Sociolinguistics Analysis

Credit Hours: 3.00. (ANTH 675, SLHS 665, ENGL 675) An advanced course in the application of theory to sociolinguistic analysis, with discussion of relevant theoretical concerns and experience with the current dominant paradigms. Prerequisite: ANTH 56500 or SLHS 56500 or ENGL 56500 or LC 56500. Typically offered Spring Fall Summer.

LC 67900 - Seminar In Linguistics

Credit Hours: 3.00. Advanced study and research on a significant topic in linguistics. Topic to be announced in advance. Permission of instructor required. Typically offered Summer Fall Spring.

LC 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

LC 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Latin

LATN 10100 - Latin Level I

Credit Hours: 3.00. This introduction to Latin language is designed to give the student mastery over basic Latin grammar and vocabulary and to enable the student to read simple Latin prose passages. Typically offered Fall Spring Summer.

LATN 10200 - Latin Level II

Credit Hours: 3.00. The first part of the semester is devoted to a review of the fundamentals of grammar through reading and analysis of relatively simple passages in prose (e.g., Caesar's Gallic Wars). Reading of Caesar is followed by reading and continuing analysis of selections from the speeches and letters of Cicero. Some attention to other prose writers (Pliny, Livy, Tacitus, et al.). Typically offered Fall Spring Summer.

LATN 20100 - Latin Level III

Credit Hours: 3.00. Intermediate reading course in Latin, designed to strengthen students' grasp of grammar and syntax, broaden vocabulary, and develop foundational skills in reading and translation. Typically offered Fall Spring Summer.

LATN 20200 - Latin Level IV

Credit Hours: 3.00. Upper intermediate reading course in Latin prose and poetry, designed to consolidate students' grasp of grammar and syntax, broaden vocabulary, and develop precision and confidence in reading and translation. Typically offered Fall Spring Summer.

LATN 34300 - Roman Oratory

Credit Hours: 3.00. Development of advanced Latin reading skills, alongside exploration of social, political, and rhetorical issues raised by the published versions of speeches performed in ancient Rome. Typically offered Summer Fall Spring.

LATN 34400 - Roman Epic

Credit Hours: 3.00. Development of advanced Latin reading skills, alongside exploration of social, political, and rhetorical issues raised by epics such as Vergil's Aeneid, Ovid's Metamorphoses, or other hexameter poetry. Typically offered Fall Spring Summer.

LATN 34500 - Roman Elegy

Credit Hours: 3.00. Readings and discussion of selections from Roman Elegy, including selected passages from such authors as Catullus, Tibullus, Propertius, and Ovid. Typically offered Summer Fall Spring.

LATN 34600 - Roman Rhetoric

Credit Hours: 3.00. Development of advanced Latin reading skills, alongside exploration of the social, political and literary questions raised by Roman rhetorical theory. Typically offered Fall Spring Summer.

LATN 34700 - Roman Comedy

Credit Hours: 3.00. Readings and discussion of Roman comedy, including selected works of Plautus and Terence. Typically offered Fall Spring Summer.

LATN 44200 - Roman Lyric Poetry

Credit Hours: 3.00. Readings and discussion of selections from Roman lyric poetry, with special attention to Catullus and Horace. Typically offered Summer Fall Spring.

LATN 44300 - Roman Satire

Credit Hours: 3.00. Readings and discussion of Roman satire, including selected passages from Horace, Juvenal, Petronius, and Seneca. Typically offered Summer Fall Spring.

LATN 44400 - Roman Philosophers

Credit Hours: 3.00. Readings and discussion of Roman philosophical texts. Typically offered Summer Fall Spring.

LATN 44500 - Roman Encyclopedists

Credit Hours: 3.00. Readings and discussion of texts representative of Roman encyclopedism, including selected passages from Pliny the Elder, Aulus Gellius, and Nonius Marcellus. Typically offered Summer Fall Spring.

LATN 44600 - Roman Historians

Credit Hours: 3.00. Readings and discussion of Roman historical texts. Typically offered Summer Fall Spring.

LATN 49000 - Directed Reading In Latin

Credit Hours: 1.00 to 3.00. Directs the reading of students with special interests. Guides students in profitable reading in subjects of their own choice. Permission of instructor required. Typically offered Fall Spring Summer.

LATN 51900 - Teaching College Latin

Credit Hours: 1.00. Designed to provide a forum for ideas connecting theory and research to teaching practice. Explores issues related to how learning and teaching can be enhanced and presents practical ideas that can be implemented in the classroom. Permission of department required. Typically offered Spring Fall.

LATN 59000 - Directed Reading In Latin

Credit Hours: 1.00 to 4.00. Directed reading of selected texts in classical and/or medieval Latin. Permission of instructor required. Typically offered Fall Summer Spring.

LATN 60100 - First Course To Establish Reading Knowledge

Credit Hours: 3.00. The first of two Latin courses designed to satisfy the graduate reading proficiency requirement. Typically offered Summer Fall.

LATN 60500 - Second Course To Establish Reading Knowledge

Credit Hours: 3.00. The second of two Latin courses designed to satisfy the graduate reading proficiency requirement. Prerequisite: LATN 60100. Typically offered Summer Fall.

Latina American and Latino Studies

LALS 25000 - Introduction To Latin American And Latino Studies

Credit Hours: 3.00. Interdisciplinary and integrative presentation and examination of the historical, political, economic, and cultural processes of Latin America, from independence to the present followed by an analysis of scholarly works that include theoretical models, methodological strategies, and analytical approaches to learning about US Latinos. Special emphasis is placed on the immigrant experience and its role in the incorporation of Latinos into the US society. Typically offered Fall.

LALS 26000 - U S Latino Culture

Credit Hours: 3.00. This course uses an interdisciplinary approach to study Latino culture in the United States through art, film, literature, music and theater. Typically offered Fall Spring Summer.

LALS 35500 - Political Economy Of Latin America

Credit Hours: 3.00. Examines the salient issues of the 21st century in the political economy of Latin America. The first part introduces students to the historical evolution of the region's economy and its socio-economic and political determinants. Then it focuses on topical inquiry, analyzing key policy areas, frameworks and choices at the core of the current political economy of the region's countries: fiscal and industrial policies, monetary and financial policies and policies on trade, migration and inequality, energy and the environment. Typically offered Spring.

LALS 49500 - Humanigration: A Border Experience

Credit Hours: 3.00. The purpose of this course is to introduce students to the highly debated topic of immigration. The topic of immigration will be centralized to the discussion of Mexican immigration and will further analyze current issues; however, a general history of immigration to the U.S. will also be covered. This course requires students to participate in an immersion trip to the Mexican/Arizona border during Spring Break. This course seeks to equip students with the knowledge surrounding the debate of immigration, while providing an understanding of the human or individual motivations to immigrate. Permission of instructor required. Typically offered Spring.

Linguistics

LING 20100 - Introduction To Linguistics

Credit Hours: 3.00. Basic concepts of linguistics and methods of analysis of language; overview of linguistics and the role of language in society. Introduction to phonology, morphology, syntax, and semantics, and to problem-solving techniques, with material drawn from a variety of languages. Typically offered Fall Spring.

LING 31100 - Fundamentals Of Phonology And Morphology

Credit Hours: 3.00. Basic concepts and tools of phonological and morphological analysis viewed through the material of American English. Current theoretical approaches to phonology and morphology, including word-formation processes and applications. Typically offered Fall Spring.

LING 31500 - Elements Of Phonetics

Credit Hours: 3.00. Introduction to articulatory phonetics. Mechanisms of production of speech sounds. Sounds of languages of the world, ear training for discriminating speech sounds, and practice in broad and narrow phonetic transcription. Introduction to

the International Phonetic Alphabet (IPA). Credit will not be given for both LING 31500 and AUS 30600. Typically offered Fall Spring.

LING 32100 - Foundations Of Syntax And Semantics

Credit Hours: 3.00. Introduction to syntactic and semantic analysis based on American English and its dialects. Underlying structure and its relation to meaning. Analysis of parts of speech, constituent phrases, sentence structure, representations, ambiguity, and applications of current theory. Credit will not be given for both LING 32100 and ENGL 32800. Typically offered Fall Spring.

LING 36800 - Sociolinguistic Study Of African American English

Credit Hours: 3.00. A study of the history, structure, uses, and educational concerns of African American English in African American speech communities and the United States culture at large. Typically offered Fall Spring.

LING 39800 - Special Topics In Linguistics I

Credit Hours: 3.00. Investigation of a special topic in linguistics. The topic will vary from semester to semester. Permission of instructor required. Typically offered Fall Spring.

LING 49000 - Directed Reading In Linguistics

Credit Hours: 1.00 to 4.00. Independent study and reading on a topic in linguistics directed by a faculty member. Permission of instructor required. Typically offered Fall Spring.

LING 49800 - Special Topics In Linguistics II

Credit Hours: 3.00. Investigation of a special topic in linguistics. The topic will vary from semester to semester. Permission of instructor required. Typically offered Fall Spring.

LING 49900 - Research In Linguistics

Credit Hours: 1.00 to 3.00. Undergraduate research into a designated topic in linguistics. Permission of instructor required. Typically offered Summer Fall Spring.

LING 50000 - Introduction To Linguistics

Credit Hours: 3.00. Fundamental concepts and methods of linguistic analysis of natural languages; overview of linguistics and the role of language in society. Introduction to phonology, morphology, syntax and semantics, and to problem-solving techniques, with material drawn from a wide variety of languages. Offered in conjunction with ANTH 51400 or AUSL 58000 or ENGL 50600 or LC 56100. Typically offered Spring Fall.

LING 51100 - Phonology I: Descriptive Analysis

Credit Hours: 3.00. Foundations of phonological analysis. Development of concepts and methods for the analysis of phonological data and the phonological structures of natural languages within the framework of generative phonology. Focuses on problem solving and linguistic argumentation. Offered in conjunction with ENGL 51300. Typically offered Spring Fall.

LING 51200 - Phonology II: Theoretical Approaches

Credit Hours: 3.00. Examination, comparison, and evaluation of contemporary phonological theories, with focus on the contribution of each theory to our understanding of representations and operations in phonological analysis. Primary emphasis is on autosegmental phonology, metrical phonology, lexical phonology, and optimality theory. Typically offered Spring Fall.

LING 52100 - Syntax I: Syntactic Analysis

Credit Hours: 3.00. Foundations of syntactic analysis and syntactic theory within the framework of generative grammar. Focuses on the central concepts of syntactic theory and on the principles and methods of syntactic analysis and argumentation using a core of topics relevant for syntactic theory. Offered in conjunction with ENGL 51200. Typically offered Spring Fall.

LING 52200 - Syntax II: Issues In Syntax

Credit Hours: 3.00. Deeper examination of a wider range of syntactic phenomena and evaluation of competing theoretical analyses proposed to account for them. Constructing theoretical analyses and evaluating their explanatory adequacy for Universal Grammar. Topics include LF phenomena, functional projections, and structural representations. Typically offered Spring Fall.

LING 53100 - Semantics I: Lexical And Sentential Semantics

Credit Hours: 3.00. Foundations of semantic analysis and survey of current linguistic semantic theories and methods. Semantics at the lexical and sentential levels. Combinatorial, truth-conditional, pragmatic, contextual, and computational semantics. Offered in conjunction with ENGL 51100. Typically offered Spring Fall.

LING 53200 - Semantics II: Formal And Grammatical Semantics

Credit Hours: 3.00. A formal, logic-based study of semantic relations. Semantics of individuals and objects, attributes, determiners, definite descriptions, quantifiers, events, time, and space. Typically offered Spring Fall.

LING 54100 - Historical Linguistics And Language Change

Credit Hours: 3.00. A general examination of the ways in which languages and their subsystems change over time and of the forces that produce change. The comparative method; internal reconstruction; geographical variation; and social variation. Overview of world language families and genetic relationships. Offered in conjunction with ENGL 56300 or LC 56300. Typically offered Spring Fall.

LING 56000 - Service Learning In Languages And Linguistics

Credit Hours: 1.00 to 4.00. This course aims to introduce the student to critical reflective thinking and experiential learning that address local and global needs and foster civic responsibility. This service learning course is a multifaceted method of teaching and learning that enriches a students' academic life and real life learning by engaging her/him in meaningful hands-on service to the community while gaining valuable knowledge and skills that integrate with course objectives. Typically offered Fall Spring Summer.

LING 56500 - Sociolinguistics

Credit Hours: 3.00. (ANTH 56500, COM 56500, ENGL 56500, LC 56500) An introduction to language in its social context, focusing on uses and users of language. Topics include social class, ethnic group, gender, language attitudes, and bilingualism. Typically offered Fall.

LING 57000 - Field Methods In Linguistics

Credit Hours: 4.00. This course deals with the basic techniques for collecting language data, and is designed to reproduce and explore the conditions and methods of linguistic fieldwork in a classroom. The course also addresses questions related to the ethics of retrieving linguistic data, the relations between the linguist and the speaking communities, and the use of the collected data. A non-Indoeuropean lesser-studied language will be examined with the help of a native speaker of the language. The main

area of its grammar will be covered: phonetic and phonological system, inflectional and derivational morphology, basic syntactic structures and basic semantic phenomena. The final goal is to obtain a basic grammatical description of the language. Lab sessions will be directed towards the training in the software and audio and video tools used for the trade. Typically offered Fall Spring Summer.

LING 57600 - Latin American Indigenous Languages And Cultures

Credit Hours: 3.00. This course will help students to learn the importance of understanding the diversity of Latin American indigenous languages and cultures as well as the intercultural understandings gained when these indigenous languages are valued within the global context. Moreover, this course will provide a general cultural and linguistic framework to understand the sociolinguistic status of the language within the context where it exists. In this course, students will deepen their knowledge of Latin American indigenous cultures and their historics, as a means to achieving a greater understanding of both a shared humanity and the variety of human experiences. Typically offered Fall Spring Summer.

LING 59000 - Directed Reading In Linguistics

Credit Hours: 1.00 to 4.00. Independent study and reading on a topic in linguistics directed by a faculty member. Permission of instructor required. Typically offered Spring Fall Summer.

LING 59100 - Special Topics In Phonology

Credit Hours: 3.00. Investigation of an advanced topic in phonology. Topic varies from semester to semester. Permission of instructor required. Typically offered Spring Fall.

LING 59300 - Special Topics In Semantics

Credit Hours: 3.00. Investigation of an advanced topic in semantics. Topic varies from semester to semester. Permission of instructor required. Typically offered Spring Fall.

LING 59400 - Special Topics In Historical Linguistics

Credit Hours: 3.00. Investigation of an advanced topic in historical linguistics. Topic varies from semester to semester. Permission of instructor required. Typically offered Fall Spring.

LING 59800 - Special Topics In Linguistics

Credit Hours: 1.00 to 4.00. Investigation of an advanced topic in linguistics. Topic varies from semester to semester. Permission of instructor required. Typically offered Fall Spring.

LING 61900 - Seminar In Phonology

Credit Hours: 3.00. Intensive study and research on a selected topic in phonology. Topic varies from semester to semester. Permission of instructor required. Typically offered Fall Spring.

LING 62900 - Seminar In Syntax

Credit Hours: 3.00. Intensive study and research on a selected topic in syntax. Topic varies from semester to semester. Typically offered Fall Spring.

LING 68900 - Seminar In Linguistics

Credit Hours: 3.00. Intensive study and research on a selected topic in linguistics. Topic varies from semester to semester. Permission of instructor required. Typically offered Summer Fall Spring.

LING 69000 - Individual Seminar

Credit Hours: 1.00 to 3.00. Under the individual guidance and supervision of a faculty member, students will select and investigate a topic and will produce a paper of professional caliber on the subject. Prerequisite: Doctoral student standing and Linguistics majors only. Permission of instructor required. Typically offered Summer Fall Spring.

LING 69800 - Research MA Thesis

Credit Hours: 1.00 to 6.00. Research MA Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

LING 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Management

MGMT 10000 - Introduction To Management

Credit Hours: 1.00. An introduction to and survey of the field of management. Exposure to the different functional areas of management will be stressed. Focus will be on the individual development of the student in regard not only to future professional employment but also to his or her educational planning. Required for freshman mangement students. Typically offered Fall Spring.

MGMT 17500 - Information Strategies For Management

Credit Hours: 1.00. Designed to build and sharpen students' information-gathering skills. Guides students in developing systematic methods for finding, evaluating, and presenting information. Organization and use of electronic and print tools will be explained through discussion, hands-on exercises, and homework assignments. Permission of instructor required. Typically offered Fall Spring.

MGMT 19000 - Freshman Level Problems In Management

Credit Hours: 1.00 to 4.00. Investigation into a specific topic area of Management. Arrange with instructor before enrolling. Typically offered Fall Spring Summer.

MGMT 19100 - Cooperative Work Experience I

Credit Hours: 0.00. Practice in business or other institutions. Admission to the cooperative program of education is required. Typically offered Fall Spring Summer.

MGMT 19200 - Cooperative Work Experience II

Credit Hours: 0.00. Practice in business or other institutions. Typically offered Fall Spring Summer.

MGMT 19300 - Cooperative Work Experience III

Credit Hours: 0.00. Practice in business or other institutions. Typically offered Fall Spring Summer.

MGMT 19400 - Cooperative Work Experience IV

Credit Hours: 0.00. Practice in business or other institutions. Typically offered Fall Spring Summer.

MGMT 19500 - Cooperative Work Experience V

Credit Hours: 0.00. Practice in business or other institutions. Typically offered Fall Spring Summer.

MGMT 20000 - Introductory Accounting

Credit Hours: 3.00. The objectives of the course are to help students: (1) understand what is in financial statements and what the statements say about a business, (2) identify the business activities that caused the amounts that appear in the statements, and (3) understand how, when, and at what amount the effects of manager and employee actions will appear in the statements. Typically offered Fall Spring Summer. CTL:IPO 1801 Accounting I

MGMT 20010 - Business Accounting

Credit Hours: 3.00. The two primary objectives are to teach the skills to produce financial information-to send the relevant signals to decision makers; and to teach the skills to interpret the financial report-to receive the signals. To meet these objectives the students will gain an understanding of the reasoning behind the processes used to record financial information and the manner in which it is reported to external decision makers; gain an understanding of the four basic statements; and an understanding of the importance of financial statement information in interpreting the performance of organizations. (Not a prerequisite for MGMT 20100.)Typically offered Fall Spring Summer.

MGMT 20100 - Management Accounting I

Credit Hours: 3.00. An introduction to management's internal use of accounting information--for decision making, production management, product costing, motivating and evaluating performance, and budgeting. Typically offered Fall Spring Summer. CCN:IPO 1802 Accounting II

MGMT 24200 - Contemporary Problems In Personal Finance For Minorities

Credit Hours: 3.00. This course is designed to allow students to make informed decisions regarding their current and future financial position. Utilizing basic tools such as financial statements and budgets, the students can learn how to plan effectively for continuous financial stability. Students also are able to acquire a basic understanding of different saving instruments, investments, and retirement planning methods, as well as the benefits of purchasing real assets and accumulating wealth to allow stability. Students also have the opportunity to explore other interesting topics of personal finance through presentations and voluntary participation in class discussion. Typically offered Fall Spring.

MGMT 24300 - Contemporary Thought Of Minorities In Management

Credit Hours: 3.00. The basic goal of this course is to introduce the minority student to the vast opportunities that are available in the field of management. The logic of a business education for the minority student is a reflection of the phenomenon that many corporations today are actively seeking minorities for managerial positions. Each semester, approximately 15 Fortune 500 companies are invited to the class to give presentations about entry-level opportunities with their firms. Other topics include the interview, resume writing, dual-career couples, the work force, affirmative action, minorities in the corporate world, etc. Each student is required to give a class presentation covering a business area of interest followed by class discussion over the topic. Typically offered Fall Spring.

MGMT 28500 - Knowledge Management

Credit Hours: 3.00. Practical, hands-on introduction to the major techniques of computer-based knowledge management including: text management, data base management, ad hoc inquiry, forms management, customized report generation, business graphics, spreadsheet analysis, and programming. These are examined from the standpoint of how they can be personally used by managers to solve typical problems. All are presented and illustrated within a unified conceptual framework and particular emphasis is given to the integration of techniques. The four major interface approaches are introduced. Students are also acquainted with the topics of business expert systems and remote communications. Typically offered Fall Spring Summer.

MGMT 29000 - Problems In Management

Credit Hours: 0.00 to 4.00. Arrange with instructor before enrolling. Investigation in a specific management field. Permission of instructor required. Typically offered Fall Spring Summer.

MGMT 30100 - Professional Career Management

Credit Hours: 1.00. Workshops and lectures involving students in the decision-making process for career planning. Visiting executives discuss career opportunities in their fields. Emphasis is on future academic planning, exploring careers, search strategy, interviewing, career progression, and other career and academic issues. Typically offered Fall Spring.

MGMT 30400 - Introduction To Financial Management

Credit Hours: 3.00. Introductory course providing a foundation in corporate finance and covering topics such as: discounted cash flow valuation, bond valuation, equity valuation, option valuation, factors influencing a firm's cost of capital, and international finance issues. Typically offered Fall Spring.

MGMT 30500 - Business Statistics

Credit Hours: 3.00. Introduction to business statistics as related to facilitating managerial decision making. Topics include descriptive statistics, probability models, estimation, hypothesis testing, and regression analysis. Students use software to do their own analyses. Typically offered Summer Fall Spring.

MGMT 30600 - Management Science

Credit Hours: 3.00. Use of optimization, simulation, and decision theory models to support management decision making. Emphasis on modeling and interpreting results for managerial applications of linear and integer programming models, network problems, simulation models, and decision analysis. Computer applications are stressed. Typically offered Fall Spring.

MGMT 31000 - Financial Management

Credit Hours: 3.00. Management of the financial affairs of the industrial enterprise. Working capital management, current asset management, capital budgeting, stock and bond valuation, and capital structure decisions. Typically offered Fall Spring Summer.

MGMT 32300 - Principles Of Marketing

Credit Hours: 3.00. This mixed lecture and case course provides an overview of the functional area of marketing. The course is taught from a managerial perspective; it focuses on inputs to the marketing decision-making process, the process itself, and its results. No credit for students in the School of Management, except economics majors. Typically offered Fall Spring.

MGMT 32400 - Marketing Management

Credit Hours: 3.00. The objectives of this course are to expose students to the problems commonly faced by marketing managers and to develop skills in analyzing marketing problems and preparing implementable plans of action based on analyses of given business situations. Cases and a marketing simulation are used to focus the discussion and to reinforce learning of key marketing concepts. Typically offered Summer Fall Spring.

MGMT 35000 - Intermediate Accounting I

Credit Hours: 3.00. Financial reporting for interested external parties. Emphasis on asset valuation, income measurement, and preparation of financial statements, and on appreciation of discretion available to preparers. Typically offered Fall Spring.

MGMT 35100 - Intermediate Accounting II

Credit Hours: 3.00. Continuation of Intermediate Accounting I. An examination of additional problems in financial reporting, including long-term assets, liabilities, owners' equity, income taxes, earnings per share, leases, and pensions. Typically offered Fall Spring.

MGMT 35400 - Legal Foundations Of Business I

Credit Hours: 3.00. An examination and study, for management students, of the nature and place of law in our society, both national and international, the social and moral bases of law enactment, regulation of business, legal liability, enforcement procedures, and the legal environment for managers. Typically offered Fall Spring Summer.

MGMT 36100 - Operations Management

Credit Hours: 3.00. This course provides an understanding of the issues involved in designing and managing manufacturing and service systems. Topics include manufacturing strategy, quality management, inventory systems, aggregate planning, just-in-time manufacturing, and operations scheduling. Case studies and articles integrate these topics and highlight managerial implications. Typically offered Fall Spring.

MGMT 38199 - Professional Practice Co-Op I

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Typically offered Fall Spring Summer.

MGMT 38200 - Management Information Systems

Credit Hours: 3.00. This case-oriented course is designed to familiarize students with existing and emerging technologies and their business applications. It also covers issues, problems, and opportunities that information systems (IS) executives and

general managers face when managing IS resources in their organizations. Includes lectures, presentations, case analyses and discussions, and a World Wide Web project. Case discussions cover real situations and deal with the operational and strategic decisions that every IS manager has to make in managing and exploiting the available information technology. Typically offered Summer Fall Spring.

MGMT 38299 - Professional Practice Co-Op II

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Industrial Practice Fee is attached to this course. Typically offered Fall Spring Summer.

MGMT 38399 - Professional Practice Co-Op III

Credit Hours: 0.00 or 1.00. Professional practice with qualified employers within industry, government, or small business. Industrial Practice Fee is attached to this course. Typically offered Fall Spring Summer.

MGMT 39000 - Junior Level Problems In Management

Credit Hours: 0.00 to 4.00. The Accounting Internship provides work experience in businesses or other institutions. Permission of instructor required. Typically offered Fall Spring Summer.

MGMT 39010 - Accounting Internship

Credit Hours: 1.00. An Accounting, Economics, Industrial Management or Management related work experience. This internship experience is intended to complement the student's academic plan-of-study and help prepare him/her for his/her future role in Accounting, Economics, Industrial Management or Management. A letter from the prospective employer stating the period of employment, hours per week, job title, job qualifications, and job description may be requested before registration will be permitted. Permission of instructor required. Typically offered Fall Spring.

MGMT 39020 - Management Internship

Credit Hours: 1.00. An Accounting, Economics, Industrial Management or Management related work experience. This internship experience is intended to complement the student's academic plan-of-study and help prepare him/her for his/her future role in Accounting, Economics, Industrial Management or Management. A letter from the prospective employer stating the period of employment, hours per week, job title, job qualifications, and job description may be requested before registration will be permitted. Permission of instructor required. Typically offered Fall Spring.

MGMT 39030 - Industrial Management Internship

Credit Hours: 1.00. An Accounting, Economics, Industrial Management or Management related work experience. This internship experience is intended to complement the student's academic plan-of-study and help prepare him/her for his/her future role in Accounting, Economics, Industrial Management or Management. A letter from the prospective employer stating the period of employment, hours per week, job title, job qualifications, and job description may be requested before registration will be permitted. Permission of instructor required. Typically offered Fall Spring.

MGMT 39040 - Economics Internship

Credit Hours: 1.00. An Accounting, Economics, Industrial Management or Management related work experience. This internship experience is intended to complement the student's academic plan-of-study and help prepare him/her for his/her future role in Accounting, Economics, Industrial Management or Management. A letter from the prospective employer stating the period of employment, hours per week, job title, job qualifications, and job description may be requested before registration will be permitted. Permission of instructor required. Typically offered Fall Spring.

MGMT 40100 - Krannert Executive Forum

Credit Hours: 1.00. A lecture-discussion course featuring executives from business firms and other organizations. Emphasis is placed on the actual practice of management in corporate America, on career selection and mobility, on styles of management, and on other topics not normally covered in undergraduate courses. Typically offered Fall Spring.

MGMT 40300 - Database Management Systems

Credit Hours: 3.00. Intensive study of computer-based tools and methods for developing information systems for accounting and other managerial applications. The course concentrates on data base management techniques as the foundation for construction information systems. The coverage has a highly practical orientation. Specific topics include tool selection criteria, file management techniques, data base management concepts, comparative study of the major data models, schema design methodology, procedural and nonprocedural access languages, data security, data integrity, performance tuning, multiuser processing, and software integration. Typically offered Fall Spring.

MGMT 40500 - Six Sigma And Quality Management

Credit Hours: 3.00. The course is an undergraduate elective offered as part of the Center for Manufacturing Management Enterprises (CMME) quality initiatives. Provides an overview of various tools and methods for total quality management. Typically offered Fall Spring.

MGMT 41100 - Investment Management

Credit Hours: 3.00. Examination of investment alternatives relevant to the individual and/or family-unit investor. Operations of the markets in which securities are traded. Theory and application of security valuation, portfolio construction, capital markets, and performance evaluation. Particular attention given to fixed income securities, common stocks, options, investment companies, and other popular investment alternatives. Typically offered Fall Spring.

MGMT 41200 - Financial Institutions And Markets

Credit Hours: 3.00. Introduction to financial markets and management of financial institutions. Emphasis on determinants of interest rates, and measurement and management of financial risk. Concentration on management of depository firms such as banks and savings and loans. Typically offered Fall Spring Summer.

MGMT 41300 - Advanced Corporate Financial Management

Credit Hours: 3.00. The course provides the theoretical and problem-solving tools needed in entry-level financial analysis positions in a corporate, commercial lending, or investment banking setting. Topics include corporate valuation, cash flow forecasting, project evaluation, capital structure, dividend policy, capital acquisition, and mergers/acquisition. Typically offered Fall Spring.

MGMT 41500 - International Financial Management

Credit Hours: 3.00. The course explores financial decision making in an international framework from the perspective of the management of a multinational corporation. Topics covered include the international financial markets, the measurement and management of exchange risk and political risk, and the financial aspects of the decision to set up cross-border operations. Typically offered Fall Spring.

MGMT 41601 - Corporate Mergers And Acquisitions

Credit Hours: 3.00. The financial analysis of corporate acquisitions, mergers, and reorganizations including asset acquisitions, joint ventures, spin-offs, sell-offs, equity carve-outs, bankruptcy proceedings and reorganizations, and corporate governance. The course uses a combination of lectures, readings, and case analysis. Typically offered Fall Spring Summer.

MGMT 42210 - International Marketing

Credit Hours: 3.00. Most U.S. businesses, large and small, are becoming deeply involved in international business. The trend is

going to grow even stronger because of the influence of the World Trade Organization and regional trade blocks. Under these circumstances, it is imperative that business managers possess the skill set to adapt their marketing strategies to the needs of international markets. The course will cover the concepts and theories pertaining to international marketing and provide the tools necessary to develop an international marketing plan. Typically offered Fall Spring.

MGMT 42300 - New Product Development

Credit Hours: 3.00. Provides an overview of the new product development process. Detailed insights are provided in the "fuzzy front end" of this process. Targeting positioning, and product decisions are also covered. The second half of the course completes the marketing mix and covers various market testing and product launch issues. Typically offered Fall Spring.

MGMT 42310 - Global Marketing Management

Credit Hours: 3.00. Most US businesses, large and small, are becoming deeply involved in international business. The trend is going to grow even stronger because of the influence of the World Trade Organization and regional trade blocks. Under these circumstances, it is imperative that business managers possess the skill set to adapt their marketing strategies to the needs of international markets. The course will cover concepts and theories pertaining to international marketing and provide the tools necessary to develop an international marketing plan. Typically offered Fall Spring.

MGMT 42500 - Marketing Research

Credit Hours: 3.00. The purpose of this course is to develop skills in the planning and execution of market research studies designed to acquire useful information for marketing decisions. It aims to familiarize students with techniques of research design, data collection, and analysis. Emphasis is placed on evaluating the results obtained from such investigations. Typically offered Fall Spring.

MGMT 42610 - Brand Management

Credit Hours: 3.00. This elective course is mainly for students having a marketing concentration and focuses on the issues of how to build brand equity, how to measure brand equity, and how to manage and/or grow the brand of interest. Typically offered Fall Spring.

MGMT 44301 - Management Of Human Resources

Credit Hours: 3.00. Survey of theory and techniques used in human resource management within organizations. Emphasis is placed on legal concerns, human resource staffing and development, reward systems, and the role of unions in American society.

Techniques studied include job analysis, the use of various recruitment and selection procedures, compensation, administration, and collective bargaining. No credit for students in the School of Management. Typically offered Fall Spring.

MGMT 44330 - Introduction To Organizational Behavior

Credit Hours: 3.00. This course investigates the impact of individuals, groups, and organizational structures have on behavior within organizations for the purpose of applying such knowledge toward improving an organization's effectiveness. Attention is given to such topics as personality, judgment and decision-making, motivation, team processes, organizational structure, leadership, conflict management, and organizational change. Emphasis is placed on developing management skills and applying organizational behavior theories. Typically offered fall Spring Summer.

MGMT 44428 - Human Resources Management

Credit Hours: 3.00. Survey of the techniques and practices used in human resource management. Emphasis is on legal requirements, cost/benefit considerations, and strategic needs in managing human resources. Topics include recruitment, selection and placement, compensation, work design, and reactions to work. Specific techniques reviewed include assessment centers, incentive plans, structured interviewing, and autonomous work groups. Current issues and managerial decision making are emphasized. Typically offered Summer Fall Spring.

MGMT 44429 - Employee Relations And Performance Management

Credit Hours: 3.00. This course focuses on the employer-employee relationship at work, and how managers work with employees to improve employee performance. Attention is given to the history of labor relations and performance management in work settings, with an emphasis, however, on contemporary approaches to managing the employer-employee relationship and the systems for managing employee performance. Typically offered Fall Spring.

MGMT 44500 - Introduction To Investments And Portfolio Management

Credit Hours: 3.00. Introduction to investments and portfolio management for non-management students. Covers characteristics of stock, bonds, portfolios, and financial markets. Includes introduction to interest rates and time value of money. Typically offered Fall Spring Summer.

MGMT 45100 - Strategic Management

Credit Hours: 3.00. The course focuses on understanding competitive forces and how organizations strive to build sustainable competitive advantages through business- and corporate-level strategies. It integrates and builds upon previous training in

functional areas and presents new analytical tools for developing an understanding of the strategic decisions that determine future directions and effectiveness of the organization. Typically offered Fall Spring.

MGMT 45200 - Manufacturing Strategy And Process Innovation

Credit Hours: 3.00. This course examines the management challenges posed by the growth in worldwide manufacturing capabilities, markets, and competition and by rapid advances in technology and the concomitant decline in product life cycles. The manufacturing function is considered within a broader context encompassing design, engineering, purchasing, marketing, and customer service in an effort to assess the degree to which existing management structures successfully meet the challenges arising from the changing manufacturing environment. Typically offered Fall Spring.

MGMT 45300 - Labor And Employment Law

Credit Hours: 3.00. A study of the common law and statutory law affecting union-management relations, with emphasis on current labor legislation including such areas as the National Labor Relations Act and amendments, the Railway Labor Act, wage and hour legislation, workmen's compensation, unemployment compensation, Occupational Health and Safety Acts and social security laws. Typically offered Fall Spring.

MGMT 45500 - Legal Background For Business I

Credit Hours: 3.00. The nature and place of law in our society, national and international, social and moral bases of law enactment, regulation of business, legal liability, and enforcement procedures. Special emphasis on torts, contracts, and agency. No credit to students in the School of Management. Typically offered Fall Spring Summer.

MGMT 45600 - Legal Foundations For Business II

Credit Hours: 3.00. A study of commercial law as prescribed by the Uniform Commercial Code, including the law of sales, documents of title, negotiable instruments, and the law relating to security interests. Additional material is presented covering the legal aspects of real estate transactions and personal property transfer. Typically offered Fall Spring.

MGMT 45700 - Legal Background For Business II

Credit Hours: 3.00. Course content same as MGMT 45600. No credit for students in the School of Management. Typically offered Fall Spring Summer.

MGMT 45800 - The Regulatory Process, Consumerism, And Public Policy

Credit Hours: 3.00. A legal analysis of the administrative process and regulatory agencies as they influence business decisions. Included will be a discussion of (1) concepts of the regulatory process from legal, economic, and social aspects; (2) administrative agencies and regulatory process; (3) legal and social implications of consumerism movement; and (4) impact of antitrust legislation on business decisions and conduct. Typically offered Summer Fall Spring.

MGMT 45900 - International Management

Credit Hours: 3.00. This course focuses on the challenges top managers face in developing strategies and management policies in multinational corporations (MNCs). Major topics usually covered include foreign market entry strategies, motivations and organizational challenges of internationalization, analyzing global industries, managing MNC/host government relations, building competitive advantage in global industries, international alliances and acquisitions, structuring and controlling MNCs, risk management, and the country manager role. Typically offered Spring.

MGMT 46100 - Management Operations

Credit Hours: 3.00. An introductory course concerned with the management of production, distribution, and service system operations. The topics covered include facilities planning, job design, materials control, work foce planning, and product quality. Typically offered Fall Spring.

MGMT 46200 - Advanced Manufacturing Planning And Control Systems

Credit Hours: 3.00. An intensive individual computer lab supplements lectures examining the role of computerized information and control systems in manufacturing. An elaborate series of case studies, enlivened by advanced computer simulations, bring together production planning, master scheduling, materials planning, short-range capacity planning, production floor execution, and quality control. Students plan and execute the production and purchasing of all parts, aided by an integrated MRP/capacity planning/shop-floor control system built into the computer simulation. Typically offered Fall.

MGMT 47000 - Transport Management I

Credit Hours: 3.00. Basic concepts and models for the transporting and distributing function. Typically offered Fall Spring.

MGMT 47100 - Transport Management II

Credit Hours: 3.00. Application of the trends in modern management to transportation, with emphasis on effective coordination and control. Typically offered Fall Spring.

MGMT 47200 - Advanced Spreadsheet Modeling And Simulation

Credit Hours: 3.00. This course covers up-to-date and practical spreadsheet modeling tools that can be applied to a wide variety of business problems from finance, marketing, and operations. The topical coverage consists of the following five modules: (1) Excel functions, skills and financial models; (2) deterministic and stochastic optimization techniques to determine the best managerial actions under internally-and/or externally-imposed constraints; (3) probability distribution fitting techniques to find the most likely description of the uncertainty in future business; (4) simulation modeling techniques to discover and analyze the risk and uncertainties in business environment and processes; (5) application of spreadsheet modeling and simulation techniques in forecasting asset dynamics(stock price) and pricing options and real investment opportunities. This course provides hands-on experience of computer application using Microsoft Excel and the spreadsheet add-ins @RISK,RISKOptimizer, SimQuick, etc. Typically offered Spring.

MGMT 48000 - Elements Industrial Management

Credit Hours: 3.00. An analytical treatment of basic problems of general management in industrial organizations, combining lectures, case studies, and readings and building on earlier course work in economics, quantitative methods, industrial relations, and general management. Typically offered Fall Spring.

MGMT 48100 - Contemporary Management Philosophy

Credit Hours: 3.00. A lecture-discussion course which features presentations by outstanding business and government executives. Emphasis is placed on the basic problems faced by contemporary senior management and their effects upon the organization. Typically offered Fall Spring.

MGMT 48400 - Management New Entrepreneurship

Credit Hours: 3.00. Analysis of problems and opportunities associated with starting and managing new and small firms. Topics include developing and appraising new business plans, raising capital, purchasing an established business, and dealing with problems of growth. Typically offered Fall.

MGMT 48800 - Electronic Commerce And Information Strategies

Credit Hours: 3.00. Discuss the new business models in electronic commerce that have been enabled by Internet technologies and analyze the impact these technologies and business models have on industries, firms and people. Typically offered Spring.

MGMT 49000 - Problems In Industrial Management

Credit Hours: 1.00 to 4.00. Investigation in a specific management field. Arrange with instructor before enrolling. Permission of instructor required. Typically offered Fall Spring Summer.

MGMT 50300 - Advanced Accounting

Credit Hours: 3.00. Advanced course in financial accounting. A range of contemporary issues in financial reporting, such as business combinations, investments, consolidations, inflation, multinationals, and tax allocation are covered. Both technical proficiency and user applications are emphasized. Typically offered Fall Spring.

MGMT 50400 - Tax Accounting

Credit Hours: 3.00. Basic tax course designed to provide an understanding of the various federal taxes, including income, gift, estate, excise, federal insurance contribution, self-employment, and unemployment taxes. Typically offered Fall Spring.

MGMT 50500 - Management Accounting II

Credit Hours: 3.00. The focus of the course is managerial decision making and the economic role of information. Topics covered include decentralized financial performance evaluation, cost analysis, and financial planning and control systems. Typically offered Fall.

MGMT 50600 - Auditing

Credit Hours: 3.00. A study of the concepts and procedures of auditing, which is the systematic process of objectively obtaining and evaluating evidence regarding assertions about economic actions and events. Primary emphasis is on audits conducted by independent certified public accountants, but topics covered apply to internal auditing as well. Typically offered Spring.

MGMT 50700 - Advanced Federal Income Taxes

Credit Hours: 3.00. Advanced course in federal income taxes, with a brief study of gift and estate taxes. Some issues covered in MGMT 50400 are studied in more depth, particularly taxation of corporations and partnerships. The course, which is taught in seminar format, gives the student considerable practice in doing tax research and reporting conclusions. It is especially appropriate for the student entering a career in a tax environment. Typically offered Spring.

MGMT 50900 - International Accounting

Credit Hours: 3.00. Provides insight into and an understanding of the many accounting problems and issues faced in an international business environment. The material is approached from two compatible and overlapping perspectives: the perspective of accounting or financial management in a U.S. multinational corporation and the perspective of an investor interested in understanding the international business environment. Typically offered Fall Spring.

MGMT 51100 - Fixed Income Securities

Credit Hours: 2.00. Introduction to fixed income securities. Discusses a variety of contracts-starting with pure discount bonds, coupon bonds, and callable bonds. Continues with options on bonds, caps, floors, and interest rate swaps. Introduces the theory of the term structure and present models for pricing fixed income securities. Topics include: spot and forward markets for debt instruments, simple models for interest rate risk management, duration, convexity, organized exchange-traded interest rate contracts, interest rate swaps, pricing relationships and the theory of the term structure, and single factor models for pricing interest rate claims. Typically offered Fall Spring.

MGMT 52000 - Pricing Strategy And Analysis

Credit Hours: 2.00. Builds on the introductory courses in marketing management. Enables students to formulate a systematic framework for approaching the problem of pricing a product, and more generally, a product line. The concepts and analytical methods necessary to develop such a framework are explored and incorporate marketing, economic, psychological, and organizational factors that influence pricing decisions, as well as competitive and legal aspects. Topics covered include value pricing, dynamic pricing, segmented pricing and price discrimination, bundling and multi-part tariffs, sales promotions, and pricing to the distribution channel. Typically offered Fall.

MGMT 52100 - Brand Management

Credit Hours: 2.00. Designed to provide an understanding of how to manage a brand, product, or product category. The course focuses on issues related to customer behavior and customer decision making, with an emphasis on how to utilize such customer-oriented knowledge, especially as it relates to developing ideal forms of advertising and communications, product and/or service adjustments or extensions, and appropriate decisions related to distribution and pricing, all of which must be concerned both with customer acquisition and retention. Typically offered Fall.

MGMT 52200 - New Product Development

Credit Hours: 2.00. Provides students with state-of-the-art management techniques to identify markets, develop new product ideas, measure customer benefits, and de-sign profitable new products. In addition, students will be taught techniques that will allow them to successfully interact in cross-functional teams that include members from marketing, R&D, engineering, and manufacturing. Typically offered Fall Spring.

MGMT 52300 - Marketing And E-Commerce

Credit Hours: 2.00. Investigates the fundamentals of Electronic Commerce to better understand and evaluate the major changes occurring in marketing as a result of the expansion of the Internet. Organized in two parts focused on: (1) business webs and models; and (2) customer management. Studies simple but powerful economic theories and examines empirical data to investigate strengths and weaknesses of Internet-based business models. Examines principles on web psychology and the ways they can be applied to enhance brand equity, consumer trust, and consumer satisfaction. Typically offered Fall Spring.

MGMT 52500 - Marketing Analytics

Credit Hours: 2.00. Deals with concepts, methods, and applications of decision modeling to address such marketing issues as segmentation, target market selection, new product forecasting, positioning, and resource allocation. Provides skills to translate conceptual understanding into specific operational plans-a skill in increasing demand in organizations today. Using market simulations and related exercises tied to PC-based computer software, students will develop marketing strategy and plans in various decision contexts. Typically offered Fall Spring.

MGMT 53000 - Financial Statement Analysis

Credit Hours: 3.00. The course is designed to help students: (a) understand the content of corporate financial reports and analyze the information therein, (b) use the information for evaluating the financial health, operating performance, and growth prospects of corporation-type companies, and (c) learn the various models available and estimate the value of such a company using those models and the information abstracted from the financial reports. The topics to be covered include the corporate financial statements and their relationships, ratio analysis for profitability and risk evaluation, assets/liabilities/owners' equality analysis, intercompany investments, forecasting financial statements, and company valuation models. Typically offered Fall Spring.

MGMT 53100 - Government/Not-For-Profit Accounting

Credit Hours: 3.00. This course is designed to provide students with a solid understanding of the financial reporting and accounting principles used in the preparation of governmental and not-for-profit entities. Topics include, but are not limited to, fund accounting, city government accounting, state government accounting, special funds, budgetary accounting for the general and special revenue funds, fiduciary funds and government-wide statements, university accounting, accounting for community foundations, not-for-profit accounting, and auditing not-for-profit entities. Typically offered Fall Spring.

MGMT 53200 - Forensic Accounting And Fraud Examination

Credit Hours: 3.00. This course is designed to help students apply their accounting, auditing, information systems and communication skills to detect financial fraud and unauthorized reporting acts to prepare and present a fraud case for criminal proceedings or civil litigation. These skills are highly valued in the rapidly growing field of forensic accounting. Upon completing this course, students will understand the role of forensic accountants in examining financial records for fraud and detecting insurance fraud; in providing litigation support; and in capturing digital evidence. This course will also review material related to the Certified Fraud Examiner (CFE) exam. Throughout the course, students will have opportunities to improve their written and oral communication skills, particularly as they relate to communication in the legal settings associated with investigating accounting. Typically offered Fall Spring.

MGMT 54400 - Database Management Systems

Credit Hours: 3.00. Covers the theory and practice of database design and usage. Students will learn the importance of data modeling concepts and how to use these effectively and how to plan and design a database, including issues such as data security and control. The following course is recommended: MGMT 29000 Programming for Business Applications or CS 15900 or CS 17700 or CNIT 17500, all with a C- or higher. Typically offered Fall Spring.

MGMT 54500 - Systems Development

Credit Hours: 3.00. Focuses on information systems development theories, practices, and tools for rapid adaptation and management of leading-edge as well as emerging computing paradigms. The following courses are recommended: MGMT 38200, with a C- or higher; and MGMT 29000 Programming for Business Applications or CS 15900 or CS 17700 or CNIT 17500, all with a minimum grade of C-. Permission of department required. Typically offered Spring.

MGMT 54600 - Decision Support And Expert Systems

Credit Hours: 3.00. Since a large percentage of societal and management problems can be characterized as relatively unstructured, this course explores how computers can be used to aid decision makers in dealing with unstructured, as well as structured, problems. Appropriate material from knowledge representation, artificial intelligence, and language theory is considered. Applications selected from environmental management and strategic planning in large organizations are used to illustrate theoretical ideas. Since the key computer software tool is database management, a development of the CODASYL approach to data management is presented. Typically offered Fall.

MGMT 54700 - Computer Communications Systems

Credit Hours: 3.00. Explores the convergence of telecommunications and computer technology, framed in terms of their strategic

impact in the business environment. Components of computer communication systems are surveyed. Major design and analysis issues in the development, implementation, and management of computer communication systems are examined. Relevant emerging trends are highlighted. The course is devoted to technical issues, applications, and case studies covering telecommunication systems used in business. Typically offered Fall.

MGMT 56000 - Manufacturing Planning And Control

Credit Hours: 2.00 or 3.00. An advanced course in manufacturing planning and control systems, emphasizing the integration of demand forecasting, inventory control, production scheduling, and production control. Topics are linked through case studies and an elaborate manufacturing computer simulation game. Typically offered Fall Spring.

MGMT 56100 - Logistics

Credit Hours: 2.00 or 3.00. Examines the distribution and delivery functions in a manufacturing or service industry. Topics include inventory control in distribution, transportation planning, distribution requirements planning, analysis of waiting lines, distribution system design and facility location and layout analysis. Typically offered Fall Spring.

MGMT 56200 - Project Management

Credit Hours: 2.00. Emphasizes the use of PC-based project management software and its applications, particularly in manufacturing organizations and especially new product development projects. Extensive use is made of several case studies to illustrate the planning and monitoring of a project. Class is held in a computer lab. Typically offered Fall Spring.

MGMT 56400 - Management Of Service Operations

Credit Hours: 2.00. Special characteristics of services require an interdisciplinary approach to analyzing operations. This course draws upon concepts from accounting, management science, and marketing. Differences and similarities between the service and manufacturing organizations are analyzed. Case studies of service organizations are used extensively. Prerequisite: MGMT 66000 (if Graduate student status) or else MGMT 36100 (if Undergraduate student status).Typically offered Spring Fall.

MGMT 56500 - Strategic Sourcing And Procurement

Credit Hours: 2.00. This course will address the process of procurement including terminology, metric, and decision making. Additionally, we will investigate the best practices and processes for managing the relationships with suppliers and their performance. We will also explore the sourcing decision and the strategic ramifications of producing/providing goods and services internally or purchasing them from external organizations. Prerequisites: Students are expected to have taken a basic

course on operations (such as the masters core class MGMT 66000: Introduction to Operations Management) and a basic course on supply chain management (such as the masters elective MGMT 66400: Supply Chain Management). Typically offered Fall.

MGMT 56600 - Global Supply Chain Management

Credit Hours: 2.00. This course will integrate issues from marketing (channels of distribution), logistics, and operations management to develop a broad understanding of a supply chain in a global context. Students will learn how different factors, including exchange rate risk, custom duty and trading policies, geographic distribution of resources and demand, availability and reliability of local supplier, and characteristics of consumer, affect the design and execution of global supply chain strategies. Prerequisites: Students are expected to have taken a basic course on operations (such as the masters core class MGMT 66000: Introduction to Operations Management) and a basic course on supply chain management (such as the masters elective MGMT 66400: Supply Chain Management). Exposure to a course on optimization is also preferred, but not required. The course requires logical and analytical thinking. Typically offered Fall.

MGMT 57000 - Spreadsheet Modeling And Simulation

Credit Hours: 2.00. Covers up-to-date and practical spreadsheet modeling tools, which can be applied to a wide variety of business problems in finance, marketing, and operations. Consists of simulation modeling techniques to analyze risk and uncertainties in business environment, optimization techniques to determine the best managerial actions under internally- and/or externally-imposed constraints, and real-world examples and cases to demonstrate broad applications of spreadsheet modeling and simulations in manufacturing and service operations, supply chain systems, yield management, asset dynamics, option pricing, etc. Typically offered Fall Spring.

MGMT 57100 - Data Mining

Credit Hours: 2.00. Introduces the concepts, techniques, tools, and applications of data mining. The material is approached from the perspective of a business analyst, with an emphasis on supporting tactical and strategic decisions. Includes a variety of techniques to identify nuggets of information or decision-making knowledge in bodies of data, and extracting these in such a way that they can be put to use in the area, such as decision support, prediction, forecasting, and estimation. Typically offered Fall Spring.

MGMT 57200 - Six Sigma And Quality Management

Credit Hours: 2.00. Establishes the link between quality and productivity design and improvement and variance reduction. The course examines some of the more traditional views on quality, as well as those today, which are gaining greater credibility and influence under the umbrella of TQM. It also covers up-to-date and practical spreadsheet modeling tools that can be applied to a wide variety of business problems from finance, marketing, and operations. Typically offered Summer.

MGMT 57300 - Optimization Modeling With Spreadsheets

Credit Hours: 2.00. The course emphasizes applications of optimization through cases and computer exercises. The applications are chosen to provide insights into business and economics. Areas covered include linear, network, integer, and nonlinear optimization. At the end of the course, the students should have the ability to model optimization problems work with software to solve optimization problems relate to optimization theory in a variety of application settings develop optimization insights into applications in marketing, finance, and operations and get some basic exposure to EXCEL automation. Prerequisites: Students are expected to have taken a basic MBA (core) course in business analytics (such as the masters core MGMT 67000). Typically offered Spring.

MGMT 58200 - Management Of Organizational Data

Credit Hours: 2.00. Provides the basic concepts and skills needed to analyze and organize business data, as well as to utilize the organized data to answer a variety of business queries. After successful completion, students will have an understanding of why database management is important and what it entails, how to analyze the data requirements of a business scenario and represent these requirements by means of entity-relationship (ER) diagrams, translate an ER diagram into normalized relations for a relational database management system, write simple and relatively complex data retrieval commands in the SQL language for an Oracle database, use Microsoft Access as a front end to a server database in Oracle, be familiar with several selected topics of current interest in the data management arena. Typically offered Fall Spring.

MGMT 59000 - Directed Readings In Management

Credit Hours: 1.00 to 4.00 (West Lafayette, North Central) 2.00 to 4.00 (Calumet) Supervised reading and reports in various subjects. Open only to a limited number of seniors and graduate students. . Permission of instructor required. Typically offered Fall Spring Summer.

MGMT 60000 - Accounting For Managers

Credit Hours: 2.00 or 3.00 (West Lafayette) 3.00 (Calumet, North Central) The two-course accounting sequence employs a user's perspective on the firm's database. First, the standard accounting model is developed into a working tool, as no prior study of accounting is assumed. Then illustrative business cases are discussed to show how external reports conform to financial contracts and public regulation. Public reports primarily directed to investors and creditors are analyzed to reconstruct the economic events and managerial decisions underlying generally accepted accounting standards. Prerequisite: Masters student standing and Management majors only. Typically offered Fall.

MGMT 60100 - Managerial Accounting

Credit Hours: 2.00 to 4.00 (West Lafayette) 3.00 (North Central) Oriented to managers, the course examines the firm's internal systems for costing products or services and their interpretation. A variety of manufacturing and service industries are studies to

demonstrate design of flexible cost systems to match the firm's technological, competitive and/or multinational environments. Applications to budgeting, variance analysis, pricing models, performance evaluation and incentives are demonstrated. Case discussion and analytical "what if" modes of instruction are used to enhance managerial skills of students. Design and use of accounting data are linked to other subjects in the program core and to ethical aspects of accounting policy issues. Prerequisite: MGMT 60000. Typically offered Fall Spring Summer.

MGMT 60200 - Valuation And Financial Statement Analysis

Credit Hours: 2.00. Establishes how to use accounting information to make business and investment decisions. Internally, the information is used to assess performance of units, to evaluate performance of upper-level management, to monitor the firm's investment and financing decisions, and for comparison purposes with the firm's rivals. Externally, accounting information is used by financial analysts, investors and (potential) acquirers to assess the value of the firm, by creditors to assess its credit-worthiness, and by regulators. Prerequisite: MGMT 60000, MGMT 60100. Typically offered Fall Spring.

MGMT 60300 - Taxes And Business Strategy

Credit Hours: 2.00. Provides a framework for analyzing tax planning. The framework offers an approach to tax planning and business strategy that remains useful long after the next revision of the tax code. It offers an approach that can be readily employed in an international setting. After developing the framework, it will be applied to a variety of business settings that integrate topics from accounting, finance, and economics in order to provide a more complete understanding of the role of taxes in business strategy. Two important concepts will be applied: the concept of implicit taxes (tax-induced differences in before tax rates of return) and the concept of tax clienteles (the effect of cross-sectional differences in tax rates). Typically offered Fall Spring.

MGMT 60600 - Seminar In External Reporting I

Credit Hours: 2.00 to 4.00. Seminar examines research issues on the production, dissemination, and use of financial accounting information for economic decisions by external users. The materials covered are primarily empirically oriented. The aim is to expose students to these issues as they are covered in the accounting and related literature. Prerequisite: ECON 60000. Typically offered Spring.

MGMT 60700 - Seminar in Internal Accounting

Credit Hours: 2.00 to 4.00. Development of a conceptual framework for evaluating information system alternatives. The seminar examines insights into information value provided by the literature. Both the decision-facilitating and contracting-facilitating roles of information are considered. Topics also include auditing issues. Prerequisite: ECON 60700, ECON 61500. Typically offered Spring.

MGMT 60800 - Selected Research Topics In Accounting

Credit Hours: 2.00 to 4.00. (West Lafayette, North Central) Credit Hours: 3.00. (Calumet) Individual and group study of current research problems in accounting. A limited set of problem areas will be covered in any one offering. Emphasis will be placed on current substantive problems and the research methods employed. Prerequisite:MGMT 60100. Typically offered Fall.

MGMT 60900 - Seminar in External Reporting II

Credit Hours: 2.00 to 4.00. Selective investigation of analytical research of informational and incentive issues in accounting. Emphasis is on the role of externally reported accounting information in asset pricing in financial markets. Prerequisite: ECON 60700, ECON 61000, ECON 61500. Typically offered Fall.

MGMT 61000 - Financial Management

Credit Hours: 0.00 to 4.00. Analysis of short-term working capital needs. Cash budgeting procedures, pro forma statements, major types of short-term loan arrangements, and short-term asset management. Prerequisite: MGMT 60000, Master's student standing or higher and Management and Computational Finance majors only. Typically offered Fall.

MGMT 61100 - Advanced Corporate Finance

Credit Hours: 2.00 to 4 .00 (West Lafayette, Calumet) 3.00 (North Central) Long-term capital structure planning, capital budgeting, treatment of uncertainty in investment decisions, security underwriting, dividend policies, and mergers. Prerequisite: MGMT 61000. Typically offered Fall Spring Summer.

MGMT 61200 - Financial Management III

Credit Hours: 2.00 to 4.00 (West Lafayette) 3.00 (Calumet, North Central) Further treatment of topics in the financial management of nonfinancial corporations, from the viewpoint of the internal financial officer. Topics include further coverage of cost of capital and financial planning, as well as cash management, working capital management, short-term financing, advanced capital budgeting, and leasing. Emphasis on applications. Continuation of MGMT 61100 with additional depth and topic coverage. Prerequisite: MGMT 61000. Typically offered Fall Spring.

MGMT 61400 - Investments

Credit Hours: 2.00 to 4.00. Examination of the process of asset valuation. Emphasis on portfolio analysis, security selection, risk-

return relationships, and performance evaluation. Additional topics considered include security analysis, option pricing and analysis, futures contracts, and security market operations. Typically offered Spring Fall.

MGMT 61500 - International Financial Management

Credit Hours: 2.00 to 4.00 (West Lafayette) 3.00 (Calumet) Integrative course dealing with the management of firms doing business internationally. Emphasis on decision making. Will draw upon, and adapt, managerial decision models developed for domestic operations, as well as cover appropriate international institutional material. Particular focus on finance and strategic management. Prerequisites: ECON 51500. Typically offered Fall Spring.

MGMT 61601 - Seminar In Capital Markets I

Credit Hours: 2.00. This is the first in a sequence of four PhD level finance courses that cover theoretical and empirical research in capital markets. Offered in alternate years. Typically offered Fall.

MGMT 61602 - Seminar In Capital Markets II

Credit Hours: 2.00. This is the second in a sequence of four PhD level finance courses that cover theoretical and empirical research in capital markets. Offered in alternate years. Prerequisite: MGMT 61601. Typically offered Fall.

MGMT 61701 - Seminar In Capital Markets III

Credit Hours: 2.00. This is the third in a sequence of four PhD level finance courses that cover theoretical empirical research in capital markets. Offered in alternate years. Prerequisite: MGMT 61602. Typically offered Spring.

MGMT 61702 - Seminar In Capital Markets IV

Credit Hours: 2.00. This is the fourth in a sequence of four PhD level finance courses that cover theoretical empirical research in capital markets. Offered in alternate years. Prerequisite: MGMT 61701. Typically offered Spring.

MGMT 61801 - Seminar In Managerial Finance I

Credit Hours: 2.00. This is the first in a sequence of four PhD level finance courses that cover theoretical empirical research in managerial finance. Offered in alternate years. Typically offered Fall.

MGMT 61802 - Seminar In Managerial Finance II

Credit Hours: 2.00. This is the second in a sequence of four PhD level finance courses that cover theoretical empirical research in managerial finance. Offered in alternate years. Prerequisite: MGMT 61801. Typically offered Fall.

MGMT 61900 - Seminar In Managerial Finance II

Credit Hours: 2.00. Continuation of Seminar in Managerial Finance I. Treats the relationships between external capital market phenomena and internal financial decisions. Emphasis on empirical evidence as tests of the theories, including model formulation for testing. Selected topics in capital structure planning and asset valuation. Offered in alternate years. Prerequisite: MGMT 61800. Typically offered Spring.

MGMT 61901 - Seminar In Managerial Finance III

Credit Hours: 2.00. This is the third in a sequence of four PhD level finance courses that cover theoretical empirical research in managerial finance. Offered in alternate years. Prerequisite: MGMT 61802. Typically offered Spring.

MGMT 61902 - Seminar In Managerial Finance IV

Credit Hours: 2.00. This is the fourth in a sequence of four PhD level finance courses that cover theoretical and empirical research in managerial finance. Prerequisite: MGMT 61901. Typically offered Spring.

MGMT 62000 - Marketing Management

Credit Hours: 2.00. to 4.00 (West Lafayette and Calumet) 3.00 (North Central) An integrated analysis of major marketing decisions, including product pricing, advertising, distribution, and sales force policies. Prerequisite: Master's student standing and Management majors only. Typically offered Fall Spring.

MGMT 62100 - Marketing Management II

Credit Hours: 2.00 to 4.00. Introduces students to the analytical, strategic, and tactical aspects of marketing management. Exposes students to the issues and challenges in the management of the marketing mix, including product policy, pricing, marketing communications, and distribution policy. Prerequisite: MGMT 62000. Typically offered Fall Spring.

MGMT 62200 - Marketing Strategy

Credit Hours: 2.00 to 4.00 (West Lafayette) 3.00 or 4.00 (Calumet) 3.00 (North Central) Key aspects of marketing strategy formulation and implementation are covered, including customer needs assessment, targeting, and positioning strategies in a competitive market. A managerial perspective allows development of decision-making skills necessary for successful marketing strategies. Prerequisite: MGMT 62000, MGMT 62100. Typically offered Fall Spring Summer.

MGMT 62300 - Business Marketing

Credit Hours: 2.00 to 4.00. Marketing of goods and services to businesses and other organizations for use in their production and further marketing of goods and services is studied. Emphasis is placed on management of the field sales force, industrial buying processes, distribution channel development and maintenance, development of new industrial products, pricing and promotion decisions. Prerequisite: MGMT 62000. Typically offered Fall Spring Summer.

MGMT 62500 - Marketing Research

Credit Hours: 2.00 to 4.00 (West Lafayette) 3.00 (Calumet) Application of statistical and other quantitative concepts to marketing management problems. Prerequisite: MGMT 67000. Typically offered Fall Spring Summer.

MGMT 62600 - Seminar In Marketing Models

Credit Hours: 2.00 to 4.00. Treatment of theoretical marketing models. Study of marketing models in research setting. Prerequisite: MGMT 62000, MGMT 67200. Typically offered Spring.

MGMT 63000 - Legal And Social Foundations Of Management

Credit Hours: 2.00 to 4.00 (West Lafayette) 3.00 (Calumet, North Central) An examination of the nature of the legal environment from the viewpoint of the social and moral bases of law. Emphasis is given to the operation of our legal system and its significance in decision functions of management. Prerequisite: Master's student standing and Management majors only. Typically offered Spring Summer Fall.

MGMT 63100 - The Legal And Social Foundations Of Management II

Credit Hours: 2.00 to 4.00. Covers the social and ethical dilemmas of business policy and decision making, often involving legal, social, and ethical considerations encountered by business managers. Prerequisite: MGMT 63000. Typically offered Fall Spring.

MGMT 63400 - Business Law For Accountants

Credit Hours: 2.00. This course is designed to help prepare students for their professional careers by familiarizing them with aspects of the law that are directly relevant to the practice of accounting. These topics are not only at work every day in business but are also tested on professional examinations such as the Uniform Certified Public Accounting (CPA) Exam. Specific topics include, but are not limited to, contract law, relevant provisions of the Uniform Commercial Code, bankruptcy, and the legal liability of accountants. The course will be taught through a mixture of lectures and class discussions. Students are expected to come to class having completed the assigned readings and ready to participate in class discussions. Typically offered Fall Spring.

MGMT 63401 - Communications For Accountants

Credit Hours: 2.00. Accountants spend much of their time designing and writing reports, narratives, memos, etc. and explaining those communications to others. They communicate regularly with external investors and creditors, regulators, clients and fellow professionals. This course is designed to help accounting students prepare for their professional careers by helping them develop their written and oral communication skills. This course begins with an overview of the writing process and then moves to document organization and design and how to write with conciseness and clarity. The last half of the course focuses on specific forms of written communication (e.g., letters, memos, reports, email, and essays on professional exams) and oral presentations. Typically offered Fall Spring.

MGMT 63410 - Communications For Accountants

Credit Hours: 2.00. Accountants spend much of their time designing and writing reports, memos, etc. and explaining those communications to others. They communicate regularly with external investors and creditors, regulators, clients and fellow professionals. This course is designed to help accounting students prepare for their professional careers by helping them develop their written and oral communication skills. The course begins with an overview of the writing process and then moves to document organization and design and how to write with conciseness and clarity. The last half of the course focuses on specific forms of written communication (e.g., letters, memos, reports, email, essays on professional exams) and oral presentations. Typically offered Fall Spring.

MGMT 63500 - Accounting Information Systems

Credit Hours: 3.00. Accounting information Systems is a course designed to provide students with a solid background in the information systems that accountants use. Topics include, but are not limited to, input, processing and output devices, data communications and networks, document and system flowcharts, organizing and manipulating data in databases, producing reports and forms, popular accounting software, enterprise-wide information systems, security, privacy and ethics for accounting

information, and information technology auditing. The course will advance students' abilities in the following areas. Typically offered Fall Spring.

MGMT 63800 - Pricing Strategies And Tactics

Credit Hours: 2.00 to 4.00. Focuses on pricing fundamentals. Students learn how to develop rational pricing decisions, taking into account the range of determinants of price. Discussion centers on the determination of proper costs, price sensitivity, and competition. With these established, the course then moves to a consideration of the range of pricing strategies and tactics. Prerequisite: MGMT 62000, MGMT 62100. Typically offered Fall Spring.

MGMT 63900 - Advanced Auditing And Professional Practice

Credit Hours: 3.00. This course is designed to help students prepare for their professional careers by strengthening their understanding of the CPA's attest function and familiarizing them with current assurance issues. After finishing the course, students should understand the current state of the Enterprise Risk Management and tools for risk evaluation, be able to identify best practices related to external audit, be prepared to manage an audit group, understand the key aspects of being an audit consultant and be able to work with all levels of internal and external audit professionals. Throughout the course, students will have opportunities to improve their written and oral communication skills, particularly as they relate to communication in the audit setting. The course will also emphasize the impact of recent and current regulatory actions, including the Sarbanes-Oxley Act of 2002, on the audit profession. Prerequisite: MGMT 50600 with a minumum grade of C. Typically offered Fall Spring.

MGMT 64100 - Options And Futures

Credit Hours: 2.00 to 4.00. Rigorous and applied coverage of the pricing and hedging of options and futures contracts with applications. Prerequisite: MGMT 61000. Typically offered Fall Spring.

MGMT 64200 - Portfolio Management II

Credit Hours: 2.00 to 4.00. Methods of analysis of common stocks and bonds for individual and institutional portfolios. Review of the empirical evidence of security market efficiency, and implications of that evidence for various methods of security analysis. Team projects to analyze the economy, the particular industry or sector, and selected firms within the industry or sector, and to make specific buy-hold-sell recommendations for the stocks and bonds of those firms. Prerequisite: MGMT 61000. Typically offered Fall Spring.

MGMT 64300 - Financial Risk Management

Credit Hours: 2.00 to 4.00. Provides a foundation for understanding ways in which financial institutions and industrial firms can

optimally manage financial risks. Concentrates on various "functional" risk measurement problems related to interest rate risk, default risk, exchange rates, and commodity prices. Prerequisite: MGMT 61000. Typically offered Fall Spring.

MGMT 64400 - Venture Capital And Investment Banking

Credit Hours: 2.00 to 4.00. Examines the process of corporate value creation through financial policy choices. The sequence of topics roughly parallels the life cycle of a typical corporation. Begins by studying the financing of entrepreneurial companies. Then studies the investment banking and capital acquisition process employed for public securities issues. Also examines capital acquisition and reorganization decisions, such as the use of hybrid securities like convertible debt and PIPEs, project financing bankruptcy reorganizations, and equity structurings. Prerequisite: MGMT 61000. Typically offered Fall Spring.

MGMT 64500 - Mergers, Acquisitions, And Corporate Control

Credit Hours: 2.00 to 4.00. Focuses on firms' internal governance structures and on pressure from the external market for corporate control, including executive compensation, board of directors' composition, shareholder activism, mergers, and takeovers. Prerequisite: MGMT 61000. Typically offered Fall Spring.

MGMT 64900 - Global Marketing Management

Credit Hours: 2.00 to 4.00. A seminar using lecture-discussions, cases, and projects. Designed to cover the global marketing environment, market-entry strategy, global marketing programs, organization and control of global marketing operations, and the future of global marketing. Prerequisite: MGMT 62000, MGMT 62100. Typically offered Fall Spring.

MGMT 65000 - Strategic Management I

Credit Hours: 2.00 to 4.00. Concepts and methods that integrate previous training in functional areas of management. The perspective is that of the general manager charged with directing the total enterprise. Emphasis is given to formulation and implementation of strategy. Prerequisite: MGMT 61000, MGMT 62000, Master's student standing and Management majors only. Typically offered Fall Spring Summer.

MGMT 65200 - Management Of New And Small Firms

Credit Hours: 2.00 or 3.00. Examines entrepreneurship with a focus on the start-up process for high growth new ventures. Cases will be used, and students will conduct a feasibility analysis of a new venture concept. Prerequisites: MGMT 61000 and MGMT 62000. Concurrent Prerequisites: MGMT 65000. Typically offered Fall Spring.

MGMT 65500 - Competitive Strategy

Credit Hours: 2.00 or 3.00. Examines how firms obtain and sustain superior returns through the development and implementation of a competitive strategy at the business-unit level. Focus is on strategies that develop and exploit two sources of superior returns: unique value-creating resources (e.g., patents, brand equity, operational capabilities), and powerful positions in markets and supply chains. Participants are expected to be familiar with basic competitive strategy concepts and tools, such as "five-forces analysis", the value chain, and generic strategies. Presents a more analytical perspective of strategy, drawing from game theory. Prerequisites: MGMT 65000. Typically offered Fall Spring Summer.

MGMT 65700 - Manufacturing Strategy And Process Innovation

Credit Hours: 2.00. In recent years many firms have rediscovered manufacturing and operations as a potential source of strategic advantage. In general, these firms have sought to develop capabilities in operations which provide a sustainable advantage in the marketplace. In addition, successful firms have developed processes for understanding the cross-functional implications of product and process choices. In this course, we will seek to understand the circumstances under which particular operating capabilities are most beneficial and how such capabilities can be developed so that operations can be exploited for competitive advantage. Concurrent Prerequisite: MGMT 61000, MGMT 65000, MGMT 66000. Typically offered Fall Spring.

MGMT 65900 - Strategic Management II

Credit Hours: 2.00 to 4.00. Further emphasis on understanding how organizations might achieve advantage relative to competitors. Focus is on corporate strategy: the decisions of a multi-business firm. Such decisions include: What range of businesses is appropriate within a single firm? What mode of expansion, e.g. alliance vs. acquisition, is appropriate? How should a firm's administrative systems and structure be organized across multiple businesses or markets to achieve maximum value? What is needed to foster innovation in the organization? Introduces a variety of analytical frameworks to help students qualitatively and quantitatively appraise corporate-level strategies given a firm's unique resource profile and the environment in which it competes. Prerequisite: MGMT 60000, 61000, 62000 and 65000. Typically offered Fall Spring.

MGMT 66000 - Introduction To Operations Management

Credit Hours: 2.00 to 4.00 (West Lafayette) 3.00 (Calumet, North Central) As goods and services are produced and distributed, they move through a set of inter-related operations or processes in order to match supply with demand. The design of these operations for strategic advantage, investment in improving their efficiency and effectiveness, and controlling these operations to meet performance objectives is the domain of Operations Management. The primary objective of the course is to provide an overview of this important functional area of business. Prerequisite: MGMT 67000, MGMT 67100. Typically offered Fall Spring Summer.

MGMT 66100 - Management Of Operating Systems

Credit Hours: 2.00 or 3.00. A project course in which students are exposed to a variety of operations problems as they arise in a real world setting. The focus of the course is problem formulation, analysis, and proposal(s) of an implementable scheme for their resolution. Prerequisite: MGMT 66000. Typically offered Fall Spring.

MGMT 66400 - Supply Chain Management

Credit Hours: 2.00 to 4.00. Continues the examination of the linkage between a firm's product-market strategy and the role of the operations (i.e., production) function initiated in MGMT 66000. Topics include material requirements planning, production activity control, and just-in-time systems. Prerequisite: MGMT 66000. Typically offered Fall Spring Summer.

MGMT 66700 - International Operations Management

Credit Hours: 2.00. Emphasizes the role of operations in the making of strategic decisions of where to locate and how to coordinate facilities to optimize the performance of a multinational organization. The impact of trade regulations and foreign exchange risk is considered. Case studies of international manufacturing firms develop and illustrate key concepts. Prerequisite: MGMT 66000. Typically offered Fall Spring.

MGMT 66900 - Operations Management: Practice And Models

Credit Hours: 2.00. A manufacturing laboratory course in which computer and visual information systems are applied to a small-scale replica of a manufacturing facility. Applications include material requirements planning, KANBAN systems, detailed scheduling, and simulation. The overriding objective is to experience how these information systems are implemented and used to improve the physical system. Concurrent Prerequisite: MGMT 66400. Typically offered Fall Spring.

MGMT 67000 - Business Analytics

Credit Hours: 2.00 to 4.00. Introduction to quantitative decision procedures under uncertainty. Applications of descriptive statistics, probability models, simulation models, interval estimates, and hypothesis testing to management problems. Managerial-oriented cases are used in instruction. Prerequisite: Master's student standing and Management majors only. Typically offered Fall.

MGMT 67100 - Quantitative Methods II

Credit Hours: 2.00 (West Lafayette) 3.00 (Calumet, North Central). A continuation of Quantitative Methods I. Applications of regression procedure, forecasting technique, and statistical design of experiment method to management problems. Managerial-oriented cases are used throughout the course. Prerequisite: MGMT 67000. Typically offered Fall.

MGMT 67200 - Advanced Business Analytics

Credit Hours: 2.00. Quantitative decision procedures under uncertainty applied to business problems. Basic concepts in econometrics and multivariate analysis are studied. Several managerial-oriented case studies are used to illustrate estimation, testing, and regression procedures. Prerequisite: MGMT 67100, Master's student standing and Management majors only. Typically offered Summer Spring.

MGMT 67700 - Seminar In Quantitative Methods In Management Research

Credit Hours: 3.00. Applications of quantitative methods of analysis to research problems in financial, marketing, and production management. Data processing and statistical inference in management research. Prerequisite: MGMT 67000, MGMT 67100, MGMT 67200. Typically offered Fall.

MGMT 68000 - Introduction To Information Technology

Credit Hours: 2.00 (West Lafayette) 3.00 (Calumet, North Central) An introduction to the capabilities, limitations, and applications of computers to the business environment. Addresses issues relating to computer hardware and software, data management, problem analysis, and other management information systems (MIS) topics. Students use the computer as programmers, as users of existing software systems, and in the role of managers within business decision-making contexts. Concurrent Prerequisite: MGMT 67000 or 67300. Typically offered Fall Spring Summer.

MGMT 68300 - Management Information Systems

Credit Hours: 2.00. The important technological issues of computing are presented. The emphasis is on the impact of technology on the organization. Topics include problem organization and complexity, database management, operating systems, data communications, and privacy. Research projects on an assigned topic provide greater depth of coverage of certain topics. Typically offered Summer Spring.

MGMT 68400 - Information Risk Management

Credit Hours: 2.00. Explores the various issues pertinent to maintaining acceptable levels of information security within organizations. Topics include risk analysis, resource identification, a basic introduction to information security architecture and infrastructure, policy development and deployment, and legal and regulatory issues, including those pertaining to privacy. The course is intended to raise awareness of information security issues across organizations and will be targeted towards managers in all areas, not just information systems. Prerequisite: MGMT 68300. Typically offered Summer.

MGMT 68600 - Knowledge Management Systems

Credit Hours: 2.00. Discusses the fundamentals of knowledge management and the role of information technology and systems in supporting organizational knowledge management. With a growing emphasis toward managing intangible knowledge assets (compared to tangible physical assets), knowledge management has become an indispensable tool kit for managers. Prerequisite: MGMT 68300. Typically offered Fall.

MGMT 68800 - Developing A Global Business Strategy

Credit Hours: 2.00 to 4.00. Provides an introduction regarding the business and strategy challenges faced by managers in our global economy, regardless of whether the firm is a small domestic company or a large multi-national. Major topics for the course include motivations and challenges of internationalization, international business fundamentals, foreign market entry strategies, organizing across countries, analyzing global industries, building competitive advantage in global industries, and the influence of culture and institutions. Prerequisite: MGMT 65000. Typically offered Fall Spring.

MGMT 69000 - Advanced Problems In Management

Credit Hours: 1.00 to 4.00. Advanced investigation in a specific management field at the graduate level. Typically offered Fall Spring Summer.

MGMT 69100 - Special Problems In Management

Credit Hours: 1.00 to 4.00. Advanced investigation in a specific management field at the graduate level. For students in the master's programs in management who are registered in the master's program summer session. Permission of instructor required. Typically offered Summer.

MGMT 69200 - Managerial Communication Skills

Credit Hours: 1.00. Enhances student professionalism in managerial contexts by improving oral communication skills by developing strong oral presentation techniques. Typically offered Fall.

MGMT 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Manufacturing Engineering Technology

MFET 24300 - Automated Manufacturing I

Credit Hours: 3.00. The application of industrial control components (relays, motor starters, etc.) and programmable logic controllers (PLCs) in both discrete and continuous automated manufacturing environments. The theory of operation and selection of common industrial control components is explored. Students learn to design, program, and troubleshoot PLC systems. An introduction to closed loop control systems is included. Typically offered Spring Fall.

MFET 24400 - Automated Manufacturing II

Credit Hours: 3.00. Shop floor components of computer-integrated manufacturing are introduced. Emphasis is focused on current applications and programming practices of various computer automated manufacturing processes and technologies. Topics include: CAD/CAM integration, computer-assisted numerical control programming, computer-assisted quality control, and automatic identification. Typically offered Fall Spring Summer.

MFET 24600 - High Performance Manufacturing

Credit Hours: 3.00. Manufacturing operations with an emphasis on the elimination of waste throughout the enterprise are the focus of this course. Topics include just-in-time manufacturing, lean production, formal planning and control systems, product data management and advanced manufacturing systems. Discrete manufacturing and process industry examples are considered. Typically offered Fall Spring Summer.

MFET 24800 - Automated Manufacturing III

Credit Hours: 3.00. Industrial robots and general motion control systems as they apply to the automated manufacturing environment are addressed. Topics include: robot classifications and programming, end-of-arm tooling, operation simulation, safety considerations, and robot vision systems and sensors. Students are introduced to general motion control through the application of stepper motor technology, servo motor technology, and feedback devices. . Typically offered Fall Spring.

MFET 29000 - Special Topics In Manufacturing Engineering Technology

Credit Hours: 1.00 to 3.00. Hours, subject matter, and credit to be arranged by faculty. Group instruction in new or specialty areas of Manufacturing Engineering Technology is provided by Technology faculty, subject to MFET curriculum subcommittee approval. Typically offered Fall Spring Summer.

MFET 29900 - Manufacturing Engineering Technology Independent Project

Credit Hours: 1.00 to 3.00. Hours and subject matter to be arranged by instructor and approved by the MFET curriculum committee. Primarily for third- and fourth-semester students with special interests. Permission of instructor required. Typically offered Fall Spring Summer.

MFET 30000 - Applications Of Automation In Manufacturing

Credit Hours: 3.00. Basic introduction to automation applications in manufacturing and the impact of computer-based systems on a manufacturing company. Coverage includes practices and the various issues related to the application of computer-integrated manufacturing. Emphasis placed on CAD, CAM, CNC, robotics, industrial control elements, PLCs, and computer-based process controls. Does not carry credit toward graduation in MFET. Typically offered Fall Spring Summer.

MFET 34200 - Advanced Manufacturing Processes And Practices

Credit Hours: 3.00. This course will address advanced manufacturing processes and practices. Topics include: the impact of product manufacturability upon manufacturing operations, concurrent engineering, rapid prototyping, nontraditional manufacturing processes, and design specifications for manufacturing tooling and machinery. Typically offered Fall Spring Summer.

MFET 34400 - Automated Manufacturing Processes

Credit Hours: 3.00. Shop floor components of computer-integrated manufacturing are explored. Emphasis is focused on current applications and programming practices of various computer automated manufacturing processes and technologies. Topics include CAD/CAM integration, computer-assisted numerical control programming for 2 ½ and 3 axis contouring, and CNC program verification. Typically offered Fall Spring Summer.

MFET 34800 - Industrial Robotics And Motion Control

Credit Hours: 3.00. Industrial robots and general motion control systems will be studied. Topics include: robot classifications and programming, end-of-arm tooling, operation simulation, safety considerations, robot vision systems and sensors. Students are introduced to general motion control through the application of stepper motor technology, servo motor technology, and feedback devices. Typically offered Fall Spring Summer.

MFET 37400 - Manufacturing Integration I

Credit Hours: 3.00. The fundamentals of data communications and local area networks are taught in order to show students how to integrate modern manufacturing systems. Emphasis is on the various levels of communications between shop floor computers, PLCs, robots, and automatic identification equipment. Database technology is used as an integration tool. This course prepares students for the MFET capstone course. Typically offered Fall Spring Summer.

MFET 40000 - Computer Integrated Manufacturing

Credit Hours: 3.00. This course will study the technology associated with computer integrated manufacturing (CIM). Conventional manufacturing technologies and methods will be introduced, followed by computer automation and CIM. The course will include computer-aided design (CAD), automated manufacturing processes, integrated manufacturing processes, integrated manufacturing systems, and other related topics. Does not carry credit toward graduation in MET/CIMT. Typically offered Spring Fall Summer.

MFET 44600 - Advanced Manufacturing Operations

Credit Hours: 3.00. Application and implementation of formal control systems for production and inventory control, advanced manufacturing planning, operations management, and related topics. Topics will include advanced software applications and the integration of planning and control systems for manufacturing. Typically offered Fall Spring Summer.

MFET 44800 - Integrated Materials Handling And Facilities Planning

Credit Hours: 3.00. Integrated materials-handling systems and a systematic approach to facilities planning are introduced. Course topics will include automatic identification, common material handling equipment used in manufacturing, and simulation of material flows. Typically offered Fall Spring Summer.

MFET 45100 - Manufacturing Quality Control

Credit Hours: 3.00. (MET 45100) Quality control practices used in manufacturing industries; management, statistical control charts, reliability, sampling plans, economics, computer methods, and test equipment are presented and applied. Credit will not be granted for both MET 45100 and MFET 45100. Typically offered Fall Spring Summer.

MFET 47400 - Manufacturing Integration II

Credit Hours: 3.00. Examination of sensors, data acquisition systems, and the fundamentals of control system technology and theory of operation, including common industrial sensors. Interfacing of various sensors to data acquisition systems and

collection and monitoring of process data using data acquisition systems. Open loop and closed loop control system fundamentals are addressed. Typically offered Fall Spring Summer.

MFET 47500 - Advanced Manufacturing Networks

Credit Hours: 3.00. Advanced topics in data communications and local area networks (LANs) are examined in the context of a fully integrated modern manufacturing facility. Topics include data communications hardware, LAN topologies, media, medium access control, common network protocols, and internetworking. Typically offered Fall Spring.

MFET 48000 - Project Planning For Integration

Credit Hours: 3.00. This is the first of two courses that complete the capstone requirement. The course focus is on the project planning, system design and management activities necessary for the implementation of a successful manufacturing integration project. Typically offered Fall Spring Summer.

MFET 48100 - Integration Of Manufacturing Systems

Credit Hours: 3.00. This capstone course emphasizes the integration of manufacturing activities into a complete system. The course brings together elements of prior courses including: production processes, planning systems, system integration, and manufacturing controls. Primary course activities are centered around a semester-long team project. Typically offered Fall Spring.

MFET 49000 - Special Topics In Manufacturing Engineering Technology

Credit Hours: 1.00 to 3.00. Hours, subject matter, and credit to be arranged by faculty. Group instruction in new or specialty areas of Manufacturing Engineering Technology is provided by Technology faculty, subject to MFET curriculum subcommittee approval. Typically offered Fall Spring Summer.

MFET 49900 - Manufacturing Engineering Technology Independent Project

Credit Hours: 1.00 to 3.00. Hours and subject matter to be arranged by instructor and approved by MFET curriculum committee. Primarily for seventh- and eighth-semester students with special interests. Permission of instructor required. Typically offered Fall Spring Summer.

Mathematics

MA 10800 - Mathematics As A Profession And A Discipline

Credit Hours: 1.00. A "walking tour" of a few topics in mathematics, conducted by a series of guest lecturers. Some talks focus on interesting areas of mathematics, such as chaos theory, fractals, or the mathematics of sending pictures over the Internet. Others focus on where people with degrees in mathematics or statistics work and what they do. This class is open to anyone with an interest in mathematics, regardless of major. Typically offered Fall.

MA 13700 - Mathematics For Elementary Teachers I

Credit Hours: 3.00. Designed for prospective elementary school teachers. Problem solving. Numerical reasoning including self-generated and conventional algorithms. Whole and fractional number systems, elementary number theory. (Not available for credit toward graduation in the College of Science.). Typically offered Fall Spring.

MA 13800 - Mathematics For Elementary Teachers II

Credit Hours: 3.00. Elementary school teachers must understand how multiplication gives rise to exponents and how to represent, interpret, and compute exponents from problem situations. They must also understand how to represent practical situations using algebraic and fractional expressions, and verbally interpret graphs of functions. They have to know basic concepts of probability theory. This course covers conceptual and practical notions of exponents and radicals; algebraic and rational functions, algebraic equations and inequalities, systems of linear equations, polynomial, exponential, and logarithmic functions. Notions of probability. Typically offered Fall Spring.

MA 13900 - Mathematics For Elementary Teachers III

Credit Hours: 3.00. Geometric, measurement and spatial reasoning in one, two and three dimensions as the basis for elementary school geometry. Metric and non-metric geomery, transformation geometry. (Not available for credit toward graduation in the College of Science.) Typically offered Fall Spring.

MA 15200 - College Algebra

Credit Hours: 3.00. This is a course in college algebra for students who do not need the technical skills required for those who are planning to continue with calculus. There will be an emphasis on applied problems and graphing techniques. Topics covered: real numbers, linear functions, solving linear equations and systems of linear equations, absolute value equations and inequalities, rational expressions, complex numbers, proportions, solving quadratic equations, exponential and logarithmic functions, circle and parabola equations, and the mathematics of finance including compound interest and annuities. Students receiving and "A" or "B" in MA 15200 may continue with MA 15400. (Not available for credit toward graduation in the College of Science.) Prerequisite: demonstrated competence in intermediate algebra. Typically offered Fall Spring Summer.

MA 15300 - Algebra And Trigonometry I

Credit Hours: 3.00. Exponents and radicals; algebraic and fractional expressions. Equations and inequalities, systems of linear equations. Polynomial, exponential, and logarithmic functions. Not open to students with credit in MA 15900. Not available for credit toward graduation in the School of Science. Typically offered Fall Spring Summer. CTL:IMA 1601 College Algebra

MA 15400 - Algebra And Trigonometry II

Credit Hours: 3.00. While MA 15400 is a continuation of MA 15300, the course MA 15300 is not a prerequisite. It is suggested that students have a C- or better in MA 15300 or a B- or better in MA 15200. Topics covered include the trigonometric functions, analytic geometry, laws of sines and cosines, vectors, dot product, conic sections, and rational functions. Not open to students with credit in MA 15900. Not available for credit toward graduation in the College of Science. Typically offered Fall Spring Summer. CTL:IMA 1608 Trigonometric Functions

MA 15800 - Precalculus- Functions And Trigonometry

Credit Hours: 3.00. Functions, Trigonometry, and Algebra of calculus topics designed to fully prepare students for all first semester calculus courses. Functions topics include Quadratic, Higher Order Polynomials, Rational, Exponential, Logarithmic, and Trigonometric. Other focuses include graphing of functions and solving application problems. Not Available for credit toward graduation in the College of Science. Students may not receive credit for both MA 15400 and MA 15800. Students may not receive credit for both MA 15900 and MA 15800. Typically offered Fall Spring Summer.

MA 15910 - Introduction To Calculus

Credit Hours: 3.00. A survey of differential and integral calculus. Applications to the agricultural, life, managerial, and social sciences. Not available for credit toward graduation in the School of Science. Typically offered Fall Spring.

MA 16010 - Applied Calculus I

Credit Hours: 3.00. Topics include trigonometric and exponential functions; limits and differentiation, rules of differentiation, maxima, minima and optimization; curve sketching, integration, anti-derivatives, fundamental theorem of calculus. Properties of definite integrals and numerical methods. Applications to life, managerial and social sciences. Typically offered Fall Spring Summer.

MA 16020 - Applied Calculus II

Credit Hours: 3.00. This course covers techniques of integration; infinite series, convergence tests; differentiation and integration of functions of several variables; maxima and minima, optimization; differential equations and initial value problems; matrices, determinants, eigenvalues and eigenvectors. Applications. Typically offered Fall Spring Summer.

MA 16021 - Applied Calculus II And Differential Equations

Credit Hours: 3.00. Techniques of integration and applications to technology problems such as work and fluid pressure; infinite series, convergence tests; differential equations and initial value problems; separable differential equations, second order differential equations; Laplace transform; Fourier series. Typically offered Fall Spring Summer.

MA 16100 - Plane Analytic Geometry And Calculus I

Credit Hours: 5.00. Introduction to differential and integral calculus of one variable, with applications. Some schools or departments may allow only 4 credit hours toward graduation for this course. Designed for students who have not had at least a one-semester calculus course in high school, with a grade of "A" or "B". Not open to students with credit in MA 16500. Demonstrated competence in college algebra and trigonometry. Typically offered Fall Spring Summer.

MA 16200 - Plane Analytic Geometry And Calculus II

Credit Hours: 5.00. Continuation of MA 16100. Vectors in two and three dimensions, techniques of integration, infinite series, conic sections, polar coordinates, surfaces in three dimensions. Some schools or departments may allow only 4 credit hours toward graduation for this course. Typically offered Fall Spring Summer.

MA 16500 - Analytic Geometry And Calculus I

Credit Hours: 4.00. Introduction to differential and integral calculus of one variable, with applications. Conic sections. Designed for students who have had at least a one-semester calculus course in high school, with a grade of "A" or "B", but are not qualified to enter MA 16200 or MA 16600, or the advanced placement courses MA 17300 or MA 27100, or the honors calculus course MA 18100. Demonstrated competence in college algebra and trigonometry. Typically offered Fall Spring. CTL:IMA 1602 Calculus - Long I

MA 16600 - Analytic Geometry And Calculus II

Credit Hours: 4.00. Continuation of MA 16500. Vectors in two and three dimensions. Techniques of integration, infinite series, polar coordinates, surfaces in three dimensions. Not open to students with credit in MA 16200. Typically offered Fall Spring. CTL:IMA 1603 Calculus - Long II

MA 17000 - Introduction To Actuarial Science

Credit Hours: 2.00. (STAT 17000) An introduction to actuarial science from the point of view of practicing actuaries from life insurance, casualty insurance and consulting; introduction to insurance and the mathematical theory of interest; application of spreadsheets to problems related to actuarial science. Typically offered Fall.

MA 17300 - Calculus And Analytic Geometry II

Credit Hours: 5.00. Calculus of transcendental functions, techniques of integration, conic sections, polar coordinates, parametric equations, infinite series. Admission restricted to those who have extablished credit in Calculus I. Typically offered Fall.

MA 17400 - Multivariable Calculus

Credit Hours: 4.00. Continuation of MA 17300. Differential and integral calculus of functions of several variables. Typically offered Spring.

MA 18100 - Honors Calculus I

Credit Hours: 5.00. This is an honors version of second-semester calculus (MA 16200/MA 16600/MA 17300). Integration and applications, methods of integration, infinite sequences and series, conic sections and polar coordinates. Students must have demonstrated competence in first-semester calculus (ordinarily by exam). Typically offered Fall.

MA 18200 - Honors Calculus II

Credit Hours: 5.00. Continuation of MA 18100. This is an honors version of third-semester calculus (MA 22600/MA 17400/MA 27100). Vectors, vector-valued functions, partial derivatives, multiple integrals, line and surface integrals. Typically offered Spring.

MA 18300 - Professional Practicum I

Credit Hours: 0.00. Professional Practicum. For Cooperative Education students only; must be accepted for the program by the cooperative program coordinator. Permission of department required. Typically offered Fall Spring Summer.

MA 18400 - Professional Practicum II

Credit Hours: 0.00. Professional Practicum. Permission of department required. Typically offered Fall Spring Summer.

MA 19000 - Topics In Mathematics For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading courses as well as special topics courses for undergraduates are given under this number. Permission of instructor required. Typically offered Fall Spring Summer.

MA 22000 - Introduction To Calculus

Credit Hours: 3.00. A survey of differential and integral calculus. Applications to the agricultural, life, managerial, and social sciences. Not available for credit toward graduation in the School of Science. Typically offered Fall Spring.

MA 22100 - Calculus For Technology I

Credit Hours: 3.00. MA 22100-MA 22200 is a two-semester sequence in the technique of calculus for students enrolled in certain technical curricula. Not available for credit toward graduation in the School of Science. Prerequisite: demonstrated competence in algebra and trigonometry. Typically offered Fall Spring.

MA 22300 - Introductory Analysis I

Credit Hours: 3.00. Differential calculus with applications to management and economics. Prerequisites: Demonstrated competence in algebra and trigonometry. Typically offered Fall Spring Summer. CTL:IMA 1604 Calculus - Short I

MA 22400 - Introductory Analysis II

Credit Hours: 3.00. Integral calculus; partial derivatives; differentials; introduction to differential equations. Applications to management and economics. Typically offered Fall Spring Summer. CTL:IMA 1605 Calculus - Short II

MA 25000 - Problem Solving In Probability

Credit Hours: 2.00. (STAT 25000) This course is designed to teach techniques for solving problems in probability theory which are relevant to the actuarial sciences. It is intended to help actuarial students prepare for the Society of Actuaries and Casualty Actuarial Society Exam P/1. Credit of Examination is not available for this course. MA 41600/STAT 41600 is strongly recommended. Typically offered Fall Spring.

MA 26100 - Multivariate Calculus

Credit Hours: 4.00. Planes, lines, and curves in three dimensions. Differential calculus of several variables; multiple integrals. Introduction to vector calculus. Not open to students with credit in MA 17400 or MA 27100. Typically offered Fall Spring Summer.

MA 26200 - Linear Algebra And Differential Equations

Credit Hours: 4.00. Linear algebra, elements of differential equations. Not open to students with credit in MA 26500 or MA 26600. Typically offered Fall Spring Summer.

MA 26500 - Linear Algebra

Credit Hours: 3.00. Introduction to linear algebra. Systems of linear equations, matrix algebra, vector spaces, determinants, eigenvalues and eigenvectors, diagonalization of matrices, applications. Not open to students with credit in MA 26200, 27200, 35000 or MA 35100. Typically offered Fall Spring Summer.

MA 26600 - Ordinary Differential Equations

Credit Hours: 3.00. First order equations, second and n'th order linear equations, series solutions, solution by Laplace transform, systems of linear equations. It is preferable but not required to take MA 26500 either first or concurrently. Not open to students with credit in MA 26200, 27200, MA 36000, 36100, or MA 36600. Typically offered Fall Spring Summer.

MA 27100 - Several Variable Calculus

Credit Hours: 5.00. Solid analytic geometry, infinite series, differential and integral calculus of several variables. Admission restricted to those who have extablished credit for calculus I and II. Prerequisite: demonstrated competence in calculus, plane analytical geometry, Calculus I & II. Typically offered Fall.

MA 27900 - Modern Mathematics In Science And Society

Credit Hours: 3.00. The course covers topics in combinatorics and probability applied to real life situations such as the paradoxa of democracy, weighted voting, fair division, apportionment, traveling salesmen, the mathematics of networks, Fibonacci numbers, golden ratio, growth patterns in nature, mathematics of money, symmetry, fractals, censuses and surveys, random sampling, sample spaces, permutations and uniform probability spaces. Typically offered Fall Spring.

MA 28400 - Professional Practicum III

Credit Hours: 0.00. Professional Practicum. Permission of department required. Typically offered Fall Spring Summer.

MA 29000 - Topics In Mathematics For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading courses as well as special topics courses for undergraduates are given under this number. Permission of instructor required. Typically offered Fall Spring Summer.

MA 30100 - An Introduction To Proof Through Real Analysis

Credit Hours: 3.00. An introduction to abstract reasoning in the context of real analysis. Topics may include axioms for the real numbers, mathematical induction, formal definition of limits, density, decimal representations, convergence of sequences and series, continuity, differentiability, the extreme value, mean value and intermediate value theorems, and cardinality. The emphasis, however, is more on the concept of proof than on any one given topic. Typically offered Fall Spring.

MA 30300 - Differential Equations and Partial Differential Equations for Engineering and the Sciences

Credit Hours: 3.00. This is a methods course for juniors in any branch of engineering and science, designed to follow MA 26200. Basic techniques for solving systems of linear ordinary differential equations. Series solutions for second order equations, including Bessel functions, Laplace transform, Fourier series, numerical methods, separation of variables for partial differential equations and Sturm-Liouville theory. Not open to students with credit in MA 30400. Typically offered Fall Spring Summer.

MA 30400 - Differential Equations And Analysis Of Nonlinear Systems For Engineering And The Sciences

Credit Hours: 3.00. This is a differential equations course designed to follow MA 26500-MA 26600. Same description as MA

30300 except that material on the qualitative behavior of solutions to nonlinear systems is substituted for material on Laplace transforms. Not open to students with credit in MA 30300. Typically offered Summer Fall Spring.

MA 30800 - Elementary Discrete Mathematics

Credit Hours: 3.00. Intended for prospective secondary school teachers. Basic concepts of mathematics including number systems, propositional calculus, sets, functions, and mathematical induction are studied in the context of computer experiences designed according to a Piagetian-based constructivist learning theory. Students will deepen their understanding of these concepts and will be introduced to a particular method of fostering the learning process. No previous experience with computers is assumed. Typically offered Fall Spring.

MA 34100 - Foundations Of Analysis

Credit Hours: 3.00. An introductory course in rigorous analysis, covering real numbers, sequences, series, continuous functions, differentiation, and Riemann integration. MA 30100 is helpful but not required. Typically offered Fall Spring.

MA 35100 - Elementary Linear Algebra

Credit Hours: 3.00. Systems of linear equations, finite dimensional vector spaces, matrices, determinants, eigenvalues and eigenvector applications to analytical geometry. Not open to students with credit in MA 26500. Typically offered Fall Spring.

MA 35300 - Linear Algebra II With Applications

Credit Hours: 3.00. Factoring matrices, orthogonal projections (with application to least squares estimation), diagonalization and Jordan canonical form (with applications to Markov chains and systems of differential equations), Hermitian matrices, convexity (with application to linear programming). Emphasis on problem solving and applications from science, engineering, economics, or business. Not open to students with credit in MA 51100. Typically offered Fall Spring.

MA 36000 - Advance Calculus Differential Equations Honors

Credit Hours: 3.00. Elementary ordinary differential equations. Special functions defined by power series and by integrals, Fourier series. An honors version of MA 36100. Not open to students with credit in MA 36100. Typically offered Fall Spring.

MA 36200 - Topics In Vector Calculus

Credit Hours: 3.00. Multivariate calculus; partial differentiation; implicit function theorems and transformations; line and surface integrals; vector fields; theorems of Gauss, Green, and Stokes. Credit granted for only one of MA 36200 and MA 51000. Typically offered Fall Spring.

MA 36600 - Ordinary Differential Equations

Credit Hours: 4.00. An introduction to ordinary differential equations with emphasis on problem solving and applications. The one-hour computer lab will give students an opportunity for hands-on experience with both the theory and applications of the subject. Typically offered Spring Fall.

MA 37300 - Financial Mathematics

Credit Hours: 4.00. A mathematical treatment of some fundamental concepts of financial mathematics and financial economics, and their application to real world business situations and basic risk management. Includes discussions of valuing investments, capital budgeting, valuing contingent cash flows, yield curves, spot rates, forward rates, short sales, Macaulay duration, modified duration, convexity, and immunization, financial derivatives, and their use in risk management. Provides preparation for the SOA/CAS Actuarial Exam FM/2. Typically offered Fall Spring.

MA 37500 - Introduction To Discrete Mathematics

Credit Hours: 3.00. Induction, permutations, combinations, finite probability, relations, graphs, trees, graph algorithms, recurrence relations, generating functions. Problem solving in all these areas. Credit granted for only one of MA 27600 and 37500. Typically offered Fall Spring.

MA 38500 - Introduction To Logic

Credit Hours: 3.00. Propositional calculus and predicate calculus with applications to mathematical proofs, valid arguments, switching theory, and formal languages. Typically offered Spring.

MA 38600 - Professional Practicum IV

Credit Hours: 0.00. Professional Practicum. Permission of department required. Typically offered Fall Spring Summer.

MA 39000 - Topics In Mathematics For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading courses as well as special topics courses for undergraduates are given under this number. Permission of instructor required. Typically offered Fall Spring Summer.

MA 41600 - Probability

Credit Hours: 3.00. (STAT 41600) An introduction to mathematical probability suitable as a preparation for actuarial science, statistical theory, and mathematical modeling. General probability rules, conditional probability and Bayes theorem, discrete and continuous random variables, moments and moment generating functions, joint and conditional distributions, standard discrete and continuous distributions and their properties, law of large numbers and central limit theorem. Typically offered Fall Spring.

MA 42100 - Linear Programming And Optimization Techniques

Credit Hours: 3.00. Solution of linear programming problems by the simplex method, duality theory, transportation problems, assignment problems, network analysis, dynamic programming. Typically offered Fall Spring.

MA 42500 - Elements Of Complex Analysis

Credit Hours: 3.00. Complex numbers and complex-valued functions; differentiation of complex functions; power series, uniform convergence; integration, contour integrals; elementary conformal mapping. Typically offered Spring.

MA 42800 - Introduction To Fourier Analysis

Credit Hours: 3.00. Topics include: Fourier series, convolutions, kernels, summation methods, Fourier transforms, applications to the wave, heat, and Laplace equations. Prerequisites: Vector calculus and linear algebra. Typically offered Fall Spring.

MA 44000 - Real Analysis Honors

Credit Hours: 3.00. Basic real analysis, limits, continuity, differentiation, and integration. Typically offered Fall.

MA 44200 - Multivariate Analysis I Honors

Credit Hours: 3.00. Topics covered may include a unified modern treatment of functions of several variables. Topics covered

include the topology of Euclidean spaces, mappings of Euclidean spaces, exterior algebra, Lebesgue integration, and integration on manifolds. Typically offered Spring.

MA 45000 - Algebra Honors

Credit Hours: 3.00. This course, which is essentially the first half of MA 55300, is recommended for students wanting a more substantial background in algebra than is afforded by MA 45300, in particular students intending to do graduate work in science or engineering. Topics include the elements of number theory and group theory; unique factorization in polynomial rings and in principal ideal domains. Typically offered Fall.

MA 45300 - Elements Of Algebra I

Credit Hours: 3.00. Fundamental properties of integers, polynomials, groups, rings, and fields, with emphasis on problem solving and applications. Not open to students with credit in MA 45000. Typically offered Fall Spring.

MA 45400 - Galois Theory

Credit Hours: 3.00. An introduction to Galois theory, covering both its origins in the theory of roots of polynomial equations and its modern formulation in terms of abstract algebra. Topics include finite extension fields and their symmetries, ruler and compass constructions, complex roots of unity, solvable groups, and the solvability of polynomial equations by arithmetic and radical operations. Typically offered Spring.

MA 46000 - Geometry

Credit Hours: 3.00. This is a course in Euclidean geometry. It begins at the high-school level and then moves quickly to intermediate and advanced topics. Emphasis on proofs. Typically offered Fall Spring.

MA 46200 - Elementary Differential Geometry

Credit Hours: 3.00. The geometry of curves and surfaces based on familiar parts of calculus and linear algebra. An introduction to the study of differentiable manifolds and Riemannian geometry. Typically offered Fall Spring Summer.

MA 47400 - Methods Of Random Modeling

Credit Hours: 3.00. (STAT 47400) Poisson and compound Poisson processes, plus topics in discrete and continuous time Markov chains, Brownian motion (including the Black-Scholes formula) and simluation. Typically offered Spring.

MA 48100 - Advanced Problem-Solving Seminar

Credit Hours: 1.00. Seminar intended to prepare students for the national Putnam examination in mathematics. Typically offered Fall.

MA 48400 - Seminar On Teaching College Algebra And Trigonometry

Credit Hours: 3.00. This course is a seminar on the teaching of mathematics for our best undergraduate mathematics education students. It provides supervised teaching experience along with a chance for the students to perfect their knowledge of algebra before going on to be high school teachers. Students who take this class will also teach a section of MA 15300. Permission of instructor required. Typically offered Fall.

MA 48700 - Professional Practicum V

Credit Hours: 0.00. Professional Practicum. Permission of department required. Typically offered Fall Spring Summer.

MA 49000 - Topics In Mathematics For Undergraduates

Credit Hours: 1.00 to 6.00. Supervised reading courses as well as special topics courses for undergraduates are given under this number. Permission of instructor required. Typically offered Fall Spring Summer.

MA 50300 - Abstract Algebra

Credit Hours: 3.00. Group theory: definitions, examples, subgroups, quotient groups, homomorphisms, and isomorphism theorems. Ring theory: definitions, examples, homomorphisms, ideals, quotient rings, fraction fields, polynomial rings, Euclidean domains, and unique factorization domains. Field theory: algebraic field extensions, straightedge and compass constructions. Typically offered Fall.

MA 50400 - Real Analysis

Credit Hours: 3.00. Completeness of the real number system, basic topological properties, compactness, sequences and series, absolute convergence of series, rearrangement of series, properties of continuous functions, the Riemann-Stieltjes integral, sequences and series of functions, uniform convergence, the Stone-Weierstrass theorem, equicontinuity, and the Arzela-Ascoli theorem. Typically offered Fall.

MA 51000 - Vector Calculus

Credit Hours: 3.00. Calculus of functions of several variables and of vector fields in orthogonal coordinate systems. Optimization problems, implicit function theorem, Green's theorem, Stokes' theorem, divergence theorems. Applications to engineering and the physical sciences. Not open to students with credit in MA 36200 or MA 41000. Typically offered Fall Spring Summer.

MA 51100 - Linear Algebra With Applications

Credit Hours: 3.00. Real and complex vector spaces; linear transformations; Gram-Schmidt process and projections; least squares; QR and LU factorization; diagonalization, real and complex spectral theorem; Schur triangular form; Jordan canonical form; quadratic forms. Typically offered Summer.

MA 51400 - Numerical Analysis

Credit Hours: 3.00. (CS 51400) Iterative methods for solving nonlinear; linear difference equations, applications to solution of polynomial equations; differentiation and integration formulas; numerical solution of ordinary differential equations; roundoff error bounds. Typically offered Fall Spring.

MA 51500 - Mathematics Of Finance

Credit Hours: 3.00. An introduction to the mathematical tools and techniques of modern finance theory, in the context of Black-Scholes option pricing. Brownian motion and its stochastic calculus, Ito's formula, and Feynman-Kac formula. Pricing and hedging of claims on Black-Scholes assets. Incomplete markets. Path-dependent options. Stochastic portfolio optimization. Typically offered Spring.

MA 51600 - Advanced Probability And Options With Numerical Methods

Credit Hours: 3.00. Stochastic interest rate models. American options from the probabilistic and PDE points of view. Numerical methods for European and American options, including binomial, trinomial, and Monte-Carlo methods. Typically offered Fall.

MA 51800 - Advanced Discrete Mathematics

Credit Hours: 3.00. The course covers mathematics useful in analyzing computer algorithms. Topics include recurrence relations, evaluation of sums, integer functions, elementary number theory, binomial coefficients, generating functions, discrete probability, and asymptotic methods. Typically offered Spring.

MA 51900 - Introduction To Probability

Credit Hours: 3.00. (STAT 51900) Algebra of sets, sample spaces, combinatorial problems, independence, random variables, distribution functions, moment generating functions, special continuous and discrete distributions, distribution of a function of a random variable, limit theorems. Typically offered Spring Fall.

MA 52000 - Boundary Value Problems Of Differential Equations

Credit Hours: 3.00. Separation of variables; Fourier series; boundary value problems; Fourier transforms; Bessel functions; Legendre polynomials. Typically offered Fall Spring Summer.

MA 52100 - Introduction To Optimization Problems

Credit Hours: 3.00. Necessary and sufficient conditions for local extrema in programming problems and in the calculus of variations. Control problems; statement of maximum principles and applications. Discrete control problems. Typically offered Fall.

MA 52300 - Introduction To Partial Differential Equations

Credit Hours: 3.00. First order quasi-linear equations and their applications to physical and social sciences; the Cauchy-Kovalevsky theorem; characteristics, classification and canonical forms of linear equations; equations of mathematical physics; study of Laplace, wave and heat equations; methods of solution. Typically offered Fall Spring Summer.

MA 52500 - Introduction To Complex Analysis

Credit Hours: 3.00. Complex numbers and complex-valued functions of one complex variable; differentiation and contour integration; Cauchy's theorem; Taylor and Laurent series; residues; conformal mapping; applications. Not open to students with credit in MA 42500. Typically offered Fall Spring Summer.

MA 52700 - Advanced Mathematics For Engineers And Physicists I

Credit Hours: 3.00. Courses MA 52700 and MA 52800 constitute a two-semester sequence covering a broad range of subjects useful in early graduate engineering courses. Topics in MA 52700 include linear algebra, systems of ordinary differential equations, Laplace transforms, Fourier series and transforms, and partial differential equations. MA 51100 is recommended. Typically offered Fall.

MA 52800 - Advanced Mathematics For Engineers And Physicists II

Credit Hours: 3.00. MA 52700 and 52800 constitute a two-semester sequence covering a broad range of subjects useful in early graduate engineering courses. Topics in MA 52800 include divergence theorem, Stokes theorem, complex variables, contour integration, calculus of residues and applications, conformal mapping, and potential theory. MA 51000 is recommended. Typically offered Spring.

MA 53000 - Functions Of A Complex Variable I

Credit Hours: 3.00. Complex numbers and complex-valued functions of one complex variable; differentiation and contour integration; Cauchy's theorem; Taylor and Laurent series; residues; conformal mapping; special topics. More mathematically rigorous than MA 52500. Typically offered Fall Spring.

MA 53100 - Functions Of A Complex Variable II

Credit Hours: 3.00. Advanced topics. Typically offered Fall Spring Summer.

MA 53200 - Elements Of Stochastic Processes

Credit Hours: 3.00. (STAT 53200) A basic course in stochastic models, including discrete and continuous time Markov chains and Brownian motion, as well as an introduction to topics such as Gaussian processes, queues, epidemic models, branching processes, renewal processes, replacement, and reliability problems. Typically offered Spring.

MA 53800 - Probability Theory I

Credit Hours: 3.00. (STAT 53800) Mathematically rigorous, measure-theoretic introduction to probability spaces, random variables, independence, weak and strong laws of large numbers, conditional expectations, and martingales. Typically offered Spring.

MA 53900 - Probability Theory II

Credit Hours: 3.00. (STAT 53900) Convergence of probability laws; characteristic functions; convergence to the normal law; infinitely divisible and stable laws; Brownian motion and the invariance principle. Typically offered Fall.

MA 54200 - Theory Of Distributions And Applications

Credit Hours: 3.00. Definition and basic properties of distributions; convolution and Fourier transforms; applications to partial differential equations; Sobolev spaces. Typically offered Fall.

MA 54300 - Ordinary Differential Equations And Dynamical Systems

Credit Hours: 3.00. This course focuses on the theory of ordinary differential equations and methods of proof for developing this theory. Topics include basic results for linear systems, the local theory for nonlinear systems (existence and uniqueness, dependence on parameters, flows and linearization, stable manifold theorem) and the global theory for nonlinear systems (global existence, limit sets and periodic orbits, Poincare maps). Permission of instructor required. Typically offered Spring.

MA 54400 - Real Analysis And Measure Theory

Credit Hours: 3.00. Metric space topology; continuity, convergence; equicontinuity; compactness; bounded variation, Helly selection theorem; Riemann-Stieltjes integral; Lebesgue measure; abstract measure spaces; LP-spaces; Holder and Minkowski inequalities; Riesz-Fischer theorem. Typically offered Fall Spring.

MA 54500 - Functions Of Several Variables And Related Topics

Credit Hours: 3.00. Differentation of functions; Besicovitch covering theorem; differentation of one measure with respect to another; Hardy-Littlewood maximal function; functions of several variables; Sobolev spaces. Typically offered Spring.

MA 54600 - Introduction To Functional Analysis

Credit Hours: 3.00. Fundamentals of functional analysis. Banach spaces, Hahn-Banach theorem. Principle of uniform boundedness. Closed graph and open mapping theorems. Applications. Hilbert spaces. Orthonormal sets. Spectral theorem for Hermitian operators and compact operators. Typically offered Fall.

MA 55300 - Introduction To Abstract Algebra

Credit Hours: 3.00. Group theory: Sylow theorems, Jordan Hlder theorem, solvable groups. Ring theory: unique factorization in polynomial rings and principal ideal domains. Field theory: ruler and compass constructions, roots of unity, finite fields, Galois theory, solvability of equations by radicals. Typically offered Fall.

MA 55400 - Linear Algebra

Credit Hours: 3.00. Review of basics: vector spaces, dimension, linear maps, matrices determinants, linear equations. Bilinear forms; inner product spaces; spectral theory; eigenvalues. Modules over a principal ideal domain; finitely generated abelian groups; Jordan and rational canonical forms for a linear transformation. Typically offered Fall Spring.

MA 55600 - Introduction To The Theory Of Numbers

Credit Hours: 3.00. Divisibility, congruences, quadratic residues, Diophantine equations, the sequence of primes. Typically offered Fall Spring Summer.

MA 55700 - Abstract Algebra I

Credit Hours: 3.00. Review of fundamental structures of algebra (groups, rings, fields, modules, algebras); Jordan-Holder and Sylow theorems; Galois theory; bilinear forms; modules over principal ideal domains; Artinian rings and semisimple modules. Polynomial and power series rings; Noetherian rings and modules; localization; integral dependence; rudiments of algebraic geometry and algebraic number theory; ramification theory. Typically offered Fall.

MA 55800 - Abstract Algebra II

Credit Hours: 3.00. A continuation of MA 55700. Typically offered Spring.

MA 56000 - Fundamental Concepts Of Geometry

Credit Hours: 3.00. Foundations of Euclidean geometry, including a critique of Euclid's "Elements" and a detailed study of an axiom system such as that of Hilbert. Independence of the parallel axiom and introduction to non-Euclidean geometry. Typically offered Fall Spring Summer.

MA 56200 - Introduction To Differential Geometry And Topology

Credit Hours: 3.00. Smooth manifolds; tangent vectors; inverse and implicit function theorems; submanifolds; vector fields; integral curves; differential forms; the exterior derivative; DeRham cohomology groups; surfaces in E3., Gaussian curvature; two dimensional Riemannian geometry; Gauss-Bonnet and Poincare theorems on vector fields. Typically offered Fall.

MA 57100 - Elementary Topology

Credit Hours: 3.00. Fundamentals of point set topology with a brief introduction to the fundamental group and related topics, topological and metric spaces, compactness, connectedness, separation properties, local compactness, introduction to function spaces, basic notions involving deformations of continuous paths. Typically offered Fall.

MA 57200 - Introduction In Algebraic Topology

Credit Hours: 3.00. Singular homology theory; Eilenberg-Steenrod asioms; simplicial and cell complexes; elementary homotopy theory; Lefschetz fixed point theorem. Typically offered Spring.

MA 57500 - Graph Theory

Credit Hours: 3.00. Introduction to graph theory with applications. Typically offered Summer Fall Spring.

MA 58400 - Algebraic Number Theory

Credit Hours: 3.00. Dedekind domains, norm, discriminant, different, finiteness of class number, Dirichlet unit theorem, quadratic and cyclotomic extensions, quadratic reciprocity, decomposition and inertia groups, completions and local fields. Typically offered Fall Spring.

MA 58500 - Mathematical Logic I

Credit Hours: 3.00. Propositional and predicate calculus; the Gdel completeness and compactness theorem, primitive recursive and recursive functions; the Gdel incompleteness theorem; Tarski's theorem; Church's theorem; recursive undecidability; special topics such as nonstandard analysis. Typically offered Fall.

MA 59800 - Topics In Mathematics

Credit Hours: 1.00 to 5.00. Supervised reading courses as well as dual-level special topics courses are given under this number. Permission of instructor required. Typically offered Fall Spring Summer.

MA 61100 - Methods Of Applied Mathematics I

Credit Hours: 3.00. Banach and Hilbert spaces; linear operators; spectral theory of compact linear operators; applications to linear integral equations and to regular Sturm-Liouville problems for ordinary differential equations. Prerequisite: MA 51100, MA 54400. Typically offered Spring.

MA 61500 - Numerical Methods For Partial Differential Equations I

Credit Hours: 3.00. (CS 61500) Finite element method for elliptic partial differential equations; weak formulation; finite-dimensional approximations; error bounds; algorithmic issues; solving sparse linear systems; finite element method for parabolic partial differential equations; backward difference and Crank-Nicholson time-stepping; introduction to finite difference methods for elliptic, parabolic, and hyperbolic equations; stability, consistency, and convergence; discrete maximum principles. Prerequisite: MA 51400, MA 52300. Typically offered Spring.

MA 62000 - Mathematical Theory Of Optimal Control

Credit Hours: 3.00. Existence theorems; the maximum principle; relationship to the calculus of variations; linear systems with quadratic criteria; applications. Offered in alternate years. Prerequisite: MA 54400. Typically offered Spring.

MA 63100 - Several Complex Variables

Credit Hours: 3.00. Power series, holomorphic functions, representation by integrals, extension of functions, holomorphically convex domains. Local theory of analytic sets (Weierstrass preparation theorem and consequences). Functions and sets in the projective space Pn (theorems of Weierstrass and Chow and their extensions). Prerequisite: MA 53000. Typically offered Fall Spring Summer.

MA 63800 - Stochastic Processes I

Credit Hours: 3.00. (STAT 63800) Advanced topics in probability theory which may include stationary processes, independent increment processes, Gaussian processes; martingales, Markov processes, ergodic theory. Prerequisite: MA 53900. Typically offered Spring.

MA 63900 - Stochastic Process II

Credit Hours: 3.00. (STAT 63900) Continuation of MA 63800. Typically offered Fall.

MA 64200 - Methods Of Linear And Nonlinear Partial Differential Equations I

Credit Hours: 3.00. Second order elliptic equations including maximum principles, Harnack inequality, Schauder estimates, and Sobolev estimates. Applications of linear theory to nonlinear equations. Prerequisite: MA 52300. Typically offered Fall Spring Summer.

MA 64300 - Methods Of Partial Differerntial Equations II

Credit Hours: 3.00. Continuation of MA 64200. Topics to be covered are Lp theory for solutions of elliptic equations, including Moser's estimates, Aleksandrov maximum principle, and the Calderon-Zygmund theory. Introduction to evolution problems for parabolic and hyperbolic equations, including Galerkin approximation and semigroup methods. Applications to nonlinear problems. Prerequisite: MA 64200. Typically offered Spring.

MA 64400 - Calculus Of Variations

Credit Hours: 3.00. Direct methods; necessary and sufficient conditions for lower semicontinuity of multiple integrals; existence theorems and connections with optimal control theory. Prerequisite: MA 54400. Typically offered Fall Spring Summer.

MA 65000 - Commutative Algebra

Credit Hours: 3.00. The study of those rings of importance in algebraic and analytic geometry and algebraic number theory. Prerequisite: MA 55800. Typically offered Fall Spring Summer.

MA 66100 - Modern Differential Geometry

Credit Hours: 3.00. Topics chosen by the instructor. Prerequisite: MA 54400, MA 55400. Typically offered Fall Spring Summer.

MA 66300 - Algebraic Curves And Functions I

Credit Hours: 3.00. Algebraic functions of one variable from the geometric, algebraic, or function-theoretic points of view. Riemann-Roch theorem, differentials. Prerequisite: MA 55800. Typically offered Fall Spring Summer.

MA 66400 - Algebraic Curves And Functions II

Credit Hours: 3.00. Continuation of MA 66300. Topics chosen by the instructor. Prerequisite: MA 66300. Typically offered Fall Spring Summer.

MA 66500 - Algebraic Geometry

Credit Hours: 3.00. Topics of current interest will be chosen by the instructor. Prerequisite: MA 65000 or MA 66300. Typically offered Fall Spring Summer.

MA 68400 - Class Field Theory

Credit Hours: 3.00. Ideles, adeles, L-functions, Artin symbol, reciprocity, local and global class fields, Kronecker-Weber Theorem. Prerequisite: MA 58400. Typically offered Fall Spring.

MA 69000 - Topics In Algebra

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

MA 69200 - Topics Applied Math

Credit Hours: 1.00 to 3.00. Topics in applied math. Permission of instructor required. Typically offered Fall Spring Summer.

MA 69300 - Topics In Analysis

Credit Hours: 1.00 to 3.00. Topics in analysis. Permission of instructor required. Typically offered Fall Spring Summer.

MA 69400 - Topics In Differntial Equations

Credit Hours: 1.00 to 3.00. Topics In Differntial Equations. Permission of instructor required. Typically offered Fall Spring Summer.

MA 69600 - Topics In Geometry

Credit Hours: 1.00 to 3.00. Topics in geometry. Permission of instructor required. Typically offered Fall Spring Summer.

MA 69700 - Topics In Topology

Credit Hours: 1.00 to 3.00. Topics in topology. Permission of instructor required. Typically offered Fall Spring Summer.

MA 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Materials Engineering

MSE 19000 - Introduction To Materials Engineering

Credit Hours: 1.00. An introduction to materials science and engineering. Emphasis on the "processing, structure, properties, performance" relationships that lead to the development of materials for society's needs. Examples drawn from the major materials classes. Typically offered Fall Spring.

MSE 23000 - Structure And Properties Of Materials

Credit Hours: 3.00. The relationship between the structure of materials and the resulting mechanical, thermal, electrical, and optical properties. Atomic structure, bonding, atomic arrangement; crystal symmetry, crystal structure, habit, lattices, defects, and the use of X-ray diffraction. Phase equilibria and microstructural development. Applications to design. Typically offered Fall Spring.

MSE 23500 - Materials Properties Laboratory

Credit Hours: 3.00. Laboratory experiments involving usage of standard equipment in the measurement of mechanical, microstructural, thermal, electrical, and optical properties. Introduction to computer aided data analysis. Experiments are carried out with metal, ceramic, and polymeric materials to illustrate property-structure-processing relationships. Typically offered Fall.

MSE 25000 - Physical Properties In Engineering Systems

Credit Hours: 3.00. Class connects math, science and engineering practice and applications. Presents foundational aspects of engineering problem solving, use of computer math tools for engineering problem solving, basic engineering statics, dynamics and mechanics, group problem solving approaches, and introductory aspects of design and materials selection. Typically offered Spring.

MSE 26000 - Thermodynamics Of Materials

Credit Hours: 3.00. Fundamental laws of thermodynamics and their applications to material systems; criteria for equilibrium; reaction and phase equilibria; properties of solutions; thermodynamic origins of phase diagrams. Typically offered Spring.

MSE 27000 - Atomistic Materials Science

Credit Hours: 3.00. Introductory course with an atomistic view point on material properties. Three primary class sections: bonding crystallography and statistical mechanics. Bonding topics include introduction to quantum mechanics, emphasis on understanding of metallic, ionic and covalent bonding. Crystallography topics include crystal descriptions and symmetry principles. Statistical mechanics development with application to electronic and thermodynamic properties. Typically offered Spring.

MSE 29100 - Industrial Practice I

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

MSE 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional experience in Materials Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

MSE 29200 - Industrial Practice II

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

MSE 29299 - Professional Practice Extensive II

Credit Hours: 0.00. Professional experience in Materials Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

MSE 33000 - Processing And Properties Of Materials

Credit Hours: 3.00. An introduction to the relationships between the processing of materials and their properties. Heat treating, forming, casting, consolidation, and other more material-specific manufacturing processes. Elucidation of the role of phenomena such as heat flow, mass diffusion, nucleation, interfacial tension, elastic and plastic deformation, precipitation, grain growth. Typically offered Spring.

MSE 33500 - Materials Characterization Laboratory

Credit Hours: 3.00. The principles of analytical methods for characterization of materials for structure and composition; optical microscopy, scanning electron microscopy, X-ray spectroscopy and diffraction, atomic absorption, emission spectroscopy, and mass spectrometry. Laboratory experiments in X-ray spectroscopy, X-ray diffraction, optical microscopy, and scanning electron microscopy. Typically offered Fall.

MSE 34000 - Transport Phenomena

Credit Hours: 3.00. Mechanism and rates of heat, mass, and momentum transfer. Macroscopic and differential energy, mass, and momentum balances. Application to systems with phase transformations and chemical reaction. Typically offered Fall.

MSE 36700 - Materials Processing Laboratory

Credit Hours: 3.00. This laboratory is intended as an intensive experience in processing techniques used for ceramics, metals, and polymers. Sintering of a ceramic, casting and post-processing (work hardening, heat treatment, etc.) of a metal, and preparation and extrusion of a polymer are the suggested processes. The measurements (e.g., powder size, compaction force, temperature, grain size, molecular weight) applicable to the successful processing of the material and the final properties (e.g., hardness, ductility, strength, stiffness) will be emphasized. Typically offered Spring.

MSE 37000 - Electrical, Optical, And Magnetic Properties Of Materials

Credit Hours: 3.00. An introductory course to provide basic background on the behavior of materials; electronic band structure, electronic and ionic conduction, electronic processes in semiconductors, dielectric, optical, and magnetic properties, and superconductivity; emphasis is on the relation between the properties and the structural aspects of materials. Typically offered Fall.

MSE 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. To obtain practice with qualified employers within industry, government, or small business. Permission of Department required. Typically offered Fall Spring Summer.

MSE 38200 - Mechanical Response Of Materials

Credit Hours: 3.00. This course encompasses deformation-based microscopic mechanisms, including dislocation motion, diffusion, and viscoplasticity. Macroscopic mechanical response of metals, ceramics, polymers, and composites will be related to elasticity and plasticity concepts for single crystal, polycrystalline, and amorphous materials. Practical design considerations for deformation will be included as well as an introduction to fracture mechanisms. Typically offered Spring.

MSE 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. To obtain practice with qualified employers within industry, government, or small business. Permission of Department required. Typically offered Fall Spring Summer.

MSE 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. To obtain practice with qualified employers within industry, government, or small business. Permission of Department required. Typically offered Fall Spring Summer.

MSE 39000 - Materials Engineering Seminar

Credit Hours: 0.00. Presentation and discussion of current topics in materials engineering. Typically offered Fall Spring.

MSE 39300 - Industrial Practice III

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

MSE 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional experience in Materials Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

MSE 39400 - Industrial Practice IV

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

MSE 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional experience in Materials Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

MSE 39500 - Industrial Practice V

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

MSE 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional experience in Materials Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

MSE 39600 - Professional Internship

Credit Hours: 0.00. Professional experience in materials engineering. Program coordinated by the school with cooperation of participating employers. Proposed internships must be approved by the head of the school. Students submit a summary report. Permission of instructor required. Typically offered Fall Spring.

MSE 39699 - Professional Practice Internship

Credit Hours: 0.00. Professional experience in Materials Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

MSE 43000 - Materials Processing And Design I

Credit Hours: 3.00. Experience in the initiation and execution of a specific materials project or study involving research, processing, and design; a written proposal on the project prepared by the student under the supervision of an individual faculty member; oral progress report at the end of the semester. Typically offered Fall.

MSE 44000 - Materials Processing And Design II

Credit Hours: 3.00. Continuation and completion of the materials project or study initiated in MSE 43000 and presentation of a written dissertation on the results and conclusions. Competence in technical writing is emphasized in the preparation of the dissertation. Typically offered Spring.

MSE 44500 - Materials Engineering Systems Analysis And Design

Credit Hours: 3.00. Integration of materials engineering core coursework with statistical, economic and environmental considerations for analysis and design of systems. Analysis of primary materials processing operations using mathematical and statistical models for predicting interactive effects and process optimization. Specification of materials and processes for

mechanical designs, incorporating properties assessment and tradeoffs, cost analysis, and performance optimization with multiple constraints. Typically offered Fall.

MSE 49000 - Directed Studies In Materials Engineering

Credit Hours: 1.00 to 3.00. Supplementary individual instruction for students from other engineering schools enrolled in 30000-50000 level MSE courses. Permission of instructor required. Typically offered Fall Spring.

MSE 49700 - Selected Topics In Materials Engineering

Arrange Hours and Credit. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

MSE 49900 - Research In Materials Engineering

Arrange Hours and Credit. Available upon prior approval of, and arrangement with, a faculty research advisor. Permission of instructor required. Typically offered Fall Spring Summer.

MSE 50200 - Defects In Solids

Credit Hours: 3.00. Structures and interactions of point, line, and planar defects in solids, with emphasis on properties of defects. Generic basis of defect energies and interactions, with reference to specific materials and material classes as examples. Types of point defects found in crystals, their origins, interactions, and motion. Overview of dislocation theory and point-defect/dislocation interactions. Structural aspects of surfaces and interfaces, including point and line defect interactions. Typically offered Fall.

MSE 50500 - Modeling and Simulation of Materials Processing

Credit Hours: 3.00. Modeling of various materials processes using finite volume techniques, with an introduction to finite difference and finite element methods. Simulation of microstructural evolution using cellular automata. Links between microscopic and macroscopic modeling. Approximate modeling, uncertainty analysis, and sensitivity analysis as aids to numerical simulation. Limitations on numerical modeling in practical problems. Project work drawn from current problems in materials processing.Offered in alternate years. Typically offered Spring.

MSE 50800 - Phase Transformations In Solids

Credit Hours: 3.00. Description of stress effects on transforming systems. Development of classical models for nucleation and growth and spinodal decomposition. Application of models to discontinuous precipitation, bainite formation, and martensitic transformations. Typically offered Spring.

MSE 51000 - Microstructural Characterization Techniques

Credit Hours: 3.00. A broad variety of analytical tools will be presented. The intent is to allow the student to make an educated selection of characterization techniques, or critical analysis of published data, for materials and defect analysis. The techniques will be assessed in terms of the probe type and material response, of what device and specimen requirements are typical, and of what data can or cannot be derived from each type of analysis. Typically offered Spring.

MSE 51200 - Powder Processing

Credit Hours: 3.00. Processing of engineering materials from powders. Synthesis of metals, ceramics, and polymers in powder form. Characteristics of particulates. Behavior of collections of particles; surface forces, particle agglomeration and dispersion, gelation, particle packing. Consolidation of powders; mechanics of dry flow and compaction, slurry rheology, shaping processes. Densification and microstructural development; geometry, thermodynamics, and kinetics of sintering, liquid-phase sintering, reaction densification, infiltration. Powder processing of composites. Typically offered Fall.

MSE 52300 - Physical Ceramics

Credit Hours: 3.00. Physical and chemical processes responsible for microstructure development in modern ceramic materials, and the relationship between microstructures and physical properties. The material covered is divided into three parts: solid state processes, including structural defects, diffusion, sintering and grain growth, reaction rates, nucleation and growth, and microstructure development; mechanical and thermal behavior, including deformation, strength, thermal properties, and thermal and compositional stresses; and electrical and magnetic behavior, including electrical conductivity, dielectric properties, and magnetic properties. Offered in alternate years. Typically offered Spring.

MSE 52500 - Struct-Property Relationships Of Engineering Polymers

Credit Hours: 3.00. Structure-property relationships developed for commodity and engineering resins. Focus on connecting bonding and polymer structure (i.e., molecular weight, tacticity, crystallinity as it regards spherulites) to mechanical (yield phenomena and fracture) and thermomechanical behavior (viscoelasticity). Thermal characterization techniques, including DSC, TGA, TMA, and DMTA. Flow of polymer melts related to common melt processing techniques (i.e., extrusion and injection molding). Offered in alternate years. Typically offered Spring.

MSE 53000 - Materials Processing In Manufacturing

Credit Hours: 3.00. Examination of the production/synthesis of engineering materials and the subsequent processing steps required to obtain a desired shape and microstructure. The course covers four major categories of materials processing: primary processing or materials synthesis, solidification processing, deformation processing, and powder processing, and provides specific examples from the processing of polymers, metals, and ceramics. The goal is to connect fundamental principles of materials processing to manufacturing processes. Credit will not be given for both MSE 5300 and MSE 36700. Typically offered Fall.

MSE 53100 - Quantitative Analysis Of Microstructure

Credit Hours: 3.00. A review will be presented of basic probability theory and statistical analysis, with particular emphasis on terms and definitions of a microstructure. The properties accessible to quantification, the basic stereological relationships and the mathematical foundations, and the microstructural tools needed to quantify the structure will be emphasized. The last one-third of the course will cover applications of quantitative metallography to problems in failure analysis, solidification, heat treatment, phase equilibria, and deformation behavior. Offered in alternate years. Typically offered Spring.

MSE 53600 - Solidification Of Castings

Credit Hours: 3.00. A study of solidification of metal in molds involving the characteristics of liquid-solid phase transformations, sand and metal thermal behavior, macroscopic structures, mechanical properties, and casting defects. Typically offered Fall.

MSE 54700 - Introduction To Surface Science

Credit Hours: 3.00. Classical thermodynamics of surfaces: surface tension, surface excess properties, and surface segregation. Atomic structure of surfaces and surface reconstruction. Electronic structure of surfaces, surface states, and the electronic structure/properties of interfaces. Adsorption, surface diffusion, and clustering of adsorbates. Chemical reactions at surfaces. Offered in alternate years. Typically offered Fall.

MSE 54800 - Deposition Processing Of Thin Films And Coatings

Credit Hours: 3.00. Processing and microstructural development of thin films and layered structures. Includes vapor, liquid, and reactive processing, as well as layer modification by annealing and beam techniques. Offered in alternate years. Typically offered Fall.

MSE 55000 - Properties Of Solids

Credit Hours: 3.00. Critical examination of fundamental concepts of physical properties of solids and the relation of these

properties to thermal and mechanical treatments. Approach is atomistic rather than electronic, and an emphasis is made to connect the fundamental knowledge of solid state physics to actual processing of materials and to a qualitative understanding of current research in the area of materials science. Offered in alternate years. Typically offered Fall.

MSE 55500 - Deformation Mechanisms In Crystalline Solids

Credit Hours: 3.00. Focuses on the mechanisms for deformation and fracture of metal, intermetallic, and ceramic materials, with particular emphasis on high temperature properties. The industrial success of superalloys, dispersion-strengthened alloys, stainless steels, composites, and thermal barrier coatings will serve as the basis for exploring the relationship between composition, microstructure, and component application in high temperature performance. Topics included are alloying effects on dislocation climb and glide, grain boundary and lattice diffusion, and dynamic recrystallization. The interactions between environment and thermal and mechanical cycling also will be considered. Design tools for prediction and evaluation of component life will be investigated in detail, including an exploration of deformation mechanism maps. Offered in alternate years. Typically offered Fall.

MSE 55600 - Fracture Of Materials

Credit Hours: 3.00. The failure and fracture of materials under applied stress are the focal points of this course, with particular emphasis on the material characteristics that influence fracture. The initial subjects covered in this course will include introductions to linear elastic fracture mechanics (LEFM) and elastic plastic fracture mechanics (EPFM). Subsequently, the strength and toughness of metals, ceramics, and polymers will be explored with regard to processing property relationships and microstructure. Special topics will include racture mechanism maps, Weibull statistics, toughening mechanisms, and failure analysis. This course is distinct from a course on fracture mechanics in that the fundamental materials aspects of fracture are of paramount importance. Offered in alternate years. Typically offered Spring.

MSE 55900 - Phase Equilibria In Multicomponent Systems

Credit Hours: 3.00. A detailed examination of the thermodynamics of phase equilibria in multicomponent systems, experimental methods of determining these equilibria by measurements of thermodynamic activity and graphical method of representing the equilibria. This is followed by an examination of theoretical models of the behavior of solutions and an examination of the extent to which observed phenomena can be understood and predicted in terms of the models. Offered in alternate years. Typically offered Fall.

MSE 56000 - The Production Of Inorganic Materials

Credit Hours: 3.00. Examination of the production of inorganic materials of engineering importance (metals, ceramics, and glasses) from ore concentrates, raw materials, and recycled materials. Individual stages in the extraction, refining, and syntheses processes are examined from the viewpoints of thermodynamics and kinetics, and alternative production routes are compared and contrasted. Topics covered include carbothermic and metallothermic reduction of oxide concentrates, smelting and conversion of

sulfide mattes, electrolysis and electrowinning from aqueous solutions and molten salts, distillation and vacuum refining, glass-forming, and the synthesis of carbide and nitride ceramics. Offered in alternate years. Typically offered Fall.

MSE 56700 - Polymer Synthesis

Credit Hours: 3.00. Analyze properties of polymers and correlate them to chemical structure. Apply methods and mechanisms of polymer chemistry to industrial and laboratory synthesis. Examine the kinetic and design factors that control polymer structures. Offered in alternate years. Typically offered Spring.

MSE 57500 - Transport Phenomena In Solids

Credit Hours: 3.00. Energetics and kinetics of phase changes in metals and alloys. Nucleation and growth models, with special emphasis on the role of crystal defects. Selected topics in multicomponent diffusion. Offered in alternate years. Typically offered Spring.

MSE 57600 - Corrosion

Credit Hours: 3.00. Rate-controlling steps in electrode processes; activation, ohmic, and concentration polarization; passivation; potentiostatic studies and alloy design; applications to engineering systems. Offered in alternate years. Typically offered Spring.

MSE 58100 - Scanning Electron Microscopy Skills

Credit Hours: 1.00. Components and operation of the scanning electron microscope (SEM). Limits to resolution; signals, detectors, and imaging modes; and interpretation of results. Laboratory sessions emphasize the practical operation of the instrument and culminate in a test of student skills. This course must be completed before undertaking any SEM research in the School of Materials Engineering. Weeks 1 - 5. Permission of instructor required. Typically offered Summer Fall Spring.

MSE 58200 - Transmission Electron Microscopy Skills

Credit Hours: 1.00. Principal components and operation of the transmission electron microscope (TEM). Limits to resolution; imaging and diffraction modes; and interpretation of results. Laboratory sessions emphasize the practical operation of the instrument and culminate in a test of student skills. This course must be completed before undertaking any TEM research in the School of Materials Engineering. Weeks 6 - 10. Permission of instructor required. Typically offered Fall Spring.

MSE 58300 - Energy-Dispersive X-Ray Microanalysis Skills

Credit Hours: 1.00. Theory of X-ray generation, components and operation of the energy dispersive X-ray spectrometer (EDS); limits to resolution; qualitative, semi-quantitative and fully quantitative analysis; and interpretation of results. Laboratory sessions emphasize the practical operation of the instrument and culminate in a test of student skills. Weeks 11 - 15. Permission of instructor required. Typically offered Fall.

MSE 59700 - Selected Topics In Materials Engineering

Arrange Hours and Credit. Hours and credits to be arranged. Permission of instructor required. Typically offered Fall Spring Summer.

MSE 64000 - Transmission Electron Microscopy And Crystal Imperfections

Credit Hours: 3.00. Theory and application of TEM to problems in materials science and engineering. Principles of electron diffraction and microscopy are reviewed with the emphasis on the relationship between real and reciprocal space. Diffraction theory of imperfect crystals will be introduced. A primary part of the course will be a discussion of image contrasts in terms of atomistic structures of key crystal imperfections, including dislocations and grain boundaries. Experimental applications and image simulations will be included to amplify theoretical concepts. Offered in alternate years. Permission of instructor required. Typically offered Fall.

MSE 69000 - Seminar In Materials Engineering

Credit Hours: 0.00. Required of all MSE graduate students. Typically offered Fall Spring.

MSE 69700 - Selected Topics In Materials Engineering

Arrange Hours and Credit. Hours and credits to be arranged. Prerequisite: two upper-division mathematics courses: one on linear algebra and one on abstract algebra. Permission of instructor required. Typically offered Fall Spring.

MSE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

MSE 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Mechanical Engineering

ME 20000 - Thermodynamics I

Credit Hours: 3.00. First and second laws of thermodynamics, entropy, reversible and irreversible processes, properties of pure substances. Application to engineering problems. Typically offered Spring Summer Fall.

ME 26300 - Introduction To Mechanical Engineering Design, Innovation And Entrepreneurship

Credit Hours: 3.00. The product design process. Development of product design specifications using customer inputs, benchmarking, product/market research and patent review. Concept generation and evaluation using brainstorming, functional decomposition, modeling and decision matrices. Detailed product design including assembly, economic analysis, CAD, and bill of materials. Oral and written design reviews. Key skills developed include teamwork, communication, project planning, innovation, design, and entrepreneurship. Typically offered Fall Spring.

ME 27000 - Basic Mechanics I

Credit Hours: 3.00. Vector operations, forces and couples, free body diagrams, equilibrium of a particle and of rigid bodies. Friction. Distributed forces. Centers of gravity and centroids. Applications from structural and machine elements, such as bars, trusses, and friction devices. Kinematics and equations of motion of a particle for rectilinear and curvilinear motion. Typically offered Fall Spring Summer.

ME 27400 - Basic Mechanics II

Credit Hours: 3.00. Review and extension of particle motion to include energy and momentum principles. Planar kinematics of rigid bodies. Kinetics for planar motion of rigid bodies, including equations of motion and principles of energy and momentum. Three-dimensional kinematics and kinetics of rigid bodies. Linear vibrations, with emphasis on single-degree-of-freedom systems. Typically offered Fall Spring Summer.

ME 28500 - Industrial Practice I

Credit Hours: 0.00. Professional practice of engineering in industry. Comprehensive written report of this experience required. For cooperative program students only. Typically offered Fall Spring Summer.

ME 28600 - Industrial Practice II

Credit Hours: 0.00. Professional practice of engineering in industry. Comprehensive written report of this experience required. For cooperative program students only. Typically offered Fall Spring Summer.

ME 28700 - Industrial Practice III

Credit Hours: 0.00. Professional practice of engineering in industry. Comprehensive written report of this experience required. For cooperative program students only. Typically offered Fall Spring Summer.

ME 28800 - Industrial Practice IV

Credit Hours: 0.00. Professional practice of engineering in industry. Comprehensive written report of this experience required. For cooperative program students only. Typically offered Fall Spring Summer.

ME 28900 - Industrial Practice V

Credit Hours: 0.00. Professional practice of engineering in industry. Comprehensive written report of this experience required. For cooperative program students only. Typically offered Fall Spring Summer.

ME 29000 - Global Engineering Professional Seminar

Credit Hours: 1.00. Forum on contemporary issues in the global profession of mechanical engineering. Professionalism and ethics. Interactions with engineering faculty and with professionals outside the University. Quizzes on assigned readings in the areas of globalization, cultural difference and collaborating across cultural boundaries. Individually developed professional profiles describe technical interests and convey awareness of ethical responsibilities in global context. Typically offered Fall Spring.

ME 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional experience in mechanical engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. Professional experience in mechanical engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 29700 - Mechanical Engineering Sophomore Projects

Credit Hours: 1.00 to 6.00. Projects or special topics of contemporary importance can be studied under the Mechanical Engineering Projects course. Interested students should seek a faculty advisor by meeting with individual faculty members who work in their area of special interest. Students submit a summary report. Permission of instructor required. Typically offered Summer Fall Spring.

ME 30000 - Thermodynamics II

Credit Hours: 3.00. Properties of gas mixtures, air-vapor mixtures, applications. Thermodynamics of combustion processes, equilibrium. Energy conversion, power, and refrigeration systems. Typically offered Fall Spring.

ME 30900 - Fluid Mechanics

Credit Hours: 4.00. Continuum, velocity field, fluid statics, manometers, basic conservation laws for systems and control volumes, dimensional analysis. Euler and Bernoulli equations, viscous flows, boundary layers, flow in channels and around submerged bodies, one-dimensional gas dynamics, turbomachinery. Typically offered Fall Spring.

ME 31500 - Heat And Mass Transfer

Credit Hours: 4.00. Fundamentals of heat transfer by conduction, convection, and radiation; mass transfer by convection. Relevance to engineering applications. Typically offered Fall Spring Summer.

ME 32300 - Mechanics Of Materials

Credit Hours: 3.00. Integrated approach to mechanics of materials emphasizing mechanics fundamentals as applied to machine design applications. Stress and strain in machine elements; mechanical properties of materials; extension, torsion, and bending of members; thermal stress; pressure vessels; static indeterminacy, stress transformation, Mohr's circle. Typically offered Fall Spring.

ME 35200 - Machine Design I

Credit Hours: 4.00. Introduction to the principles of design and analysis of machines and machine components. Design for functionality, motion, force, strength, and reliability. The laboratory experience provides open-ended projects to reinforce the design process. Typically offered Fall Spring Summer.

ME 36300 - Principles And Practices Of Manufacturing Processes

Credit Hours: 3.00. Manufacturing processes for engineering materials, both metallic and non-metallic. Fundamentals of manufacturing processes with a "hands-on" laboratory sequence. Analysis and design of processes for various engineering materials and their link to engineering design. Hands-on experiences through laboratory experiments and demonstrations. Not open to students with credit in IE 37000. Typically offered Fall.

ME 36500 - Measurement And Control Systems I

Credit Hours: 3.00. Introduction to engineering measurement fundamentals, including digital and frequency domain techniques, noise, and error analysis. Typically offered Fall Spring Summer.

ME 37500 - System Modeling And Analysis

Credit Hours: 3.00. Introduction to modeling electrical, mechanical, fluid, and thermal systems containing elements such as sensors and actuators used in feedback control systems. Dynamic response and stability characteristics. Closed loop system analysis including proportional, integral, and derivative elements to control system response. Typically offered Fall Spring.

ME 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional experience in mechanical engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional experience in mechanical engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional experience in mechanical engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

ME 39600 - Professional Internship II

Credit Hours: 0.00. Professional experience in mechanical engineering. Program coordinated by school with cooperation of participating employers. Students submit a summary report. Typically offered Fall Spring Summer.

ME 39699 - Professional Practice Internship

Credit Hours: 0.00. Professional experience in mechanical engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Permission of department required. Typically offered Fall Spring Summer.

ME 41300 - Noise Control

Credit Hours: 3.00. Fundamentals of acoustic waves. Psychoacoustics and theories of hearing. Environmental and building acoustics. Measurement methods and common instrumentation. Noise control methods. Machinery noise. Community reaction. Legal aspects. Design-oriented semester project. Course work in differential equations. Typically offered Spring.

ME 41500 - Energy Systems Engineering

Credit Hours: 3.00. Application of thermodynamics, fluid mechanics, and heat transfer fundamentals to the design of energy systems. Applications include thermal regulation in buildings, nuclear/fossil fuel power plants, internal combustion engines, gas turbines, electronic equipment, processing of primary metals and plastics, and manufacturing processes. Optimization techniques, energy costs, economics, and environmental issues. Typically offered Spring.

ME 41800 - Engineering Of Environmental Systems And Equipment

Credit Hours: 3.00. Design and analysis of systems and equipment used in conditioning buildings. Review of fundamentals in thermodynamics, heat transfer, fluid mechanics, economics, non-linear equation solving, optimization. Analysis of building heating and cooling requirements for design and annual energy use. Design and selection of equipment. Typically offered Spring.

ME 43000 - Power Engineering

Credit Hours: 3.00. Rankine cycle analysis, fossil-fuel steam generators, energy balances, fans, pumps, cooling towers, steam turbines, availability (second law) analysis of power systems, energy management systems, and rate analysis. Typically offered Fall.

ME 43300 - Principles Of Turbomachinery

Credit Hours: 3.00. Unified treatment of principles underlying fluid mechanic design of hydraulic pumps, turbines and gas compressors. Similarity and scaling laws. Cavitation. Analysis of radial and axial flow machines. Blade element performance. Radial equilibrium theory. Centrifugal pump design. Axial compressor design. Typically offered Fall.

ME 43800 - Gas Turbine Engines

Credit Hours: 3.00. Basic operating principles and analysis of performance characteristics of gas turbine engines for aircraft and vehicular propulsion and stationary power. Turbojet, turbofan, turboshaft cycle analysis. Analysis of flow through compressors, turbines, combustors, inlets, nozzles, and regenerators. Component matching and off-design performance. Coursework in thermodynamics and fluid mechanics. Not open to students with credit in AAE 37200. Typically offered Fall.

ME 44000 - Automotive Prime Movers: Green Engines And Clean Fuel

Credit Hours: 3.00. Internal combustion engines (ICE), hybrid engines (HE), fuel-cell engines (FCE), and alternative/renewable fuels. ICEs topics- engines with advanced combustion systems such as clean diesels, direct-injection spark-ignition engines (DISI), and low-temperature combustion (LTC) compression-ignition. HE topics- different components of hybrid engines and the powertrain design. FCE topics- fundamentals of fuel cells and automotive applications. Clean fuel topics- biofuels, hydrogen, and natural gas, as well as, other cleaner fossil fuels for automotive applications. Well-to-wheel energy and cost analysis of prime mover designs/fuels. Typically offered Spring.

ME 44400 - Computer-Aided Design And Prototyping

Credit Hours: 3.00. Introduction to advanced computer-aided design (CAD) for product design, modeling, and prototyping. Individual use and team-based environment to design and prototype a functional and marketable product. Projects include use of the advanced design tools to produce a working prototype that is manufacturable. Application to design, manufacturing, and analysis. Typically offered Fall Spring.

ME 45200 - Machine Design II

Credit Hours: 3.00. Design and analysis of mechanical systems, for fluctuating loading. Fatigue analysis. Application of design fundamentals to mechanical components, and integration of components to form systems. Typically offered Fall Spring.

ME 45500 - Vehicle Design And Fabrication

Credit Hours: 3.00. Open-ended project course to design and build competitive prototype vehicles. Integration of design concept formulation, engineering analysis and testing, and prototype fabrication. Product development activities in a hands-on setting. Design constraints imposed by manufacturing limitations, funding constraints and market competition. Typically offered Fall.

ME 46300 - Engineering Design

Credit Hours: 3.00. Application of the design process to the design of various engineering components and systems. Mathematical modeling in design is emphasized. Design problems from all areas of mechanical engineering are considered. Typically offered Fall Spring Summer.

ME 47300 - Engineering Design Using Modern Materials

Credit Hours: 3.00. Interdisciplinary approach to design with modern materials including metals, ceramics, polymers, and composites. Fundamentals of mechanics of materials, failure theories, and fracture mechanics applied to different materials; basic material properties and design with metals and ceramics; microstructure, chemistry, and bonding in polymers; material properties and design with polymers; composite materials. Typically offered Spring.

ME 47500 - Automatic Control Systems

Credit Hours: 3.00. Controller design in frequency domain with introduction to digital systems and control. Typically offered Fall Spring.

ME 49200 - Technology And Values

Credit Hours: 3.00. The impact of science and technology on personal and societal value systems. The special responsibility of engineers. Practical methods for using human values to guide future technological developments. Societal problems considered: warfare, energy, overpopulation, resource depletion, and environmental degradation. Interdisciplinary approaches stressed. Offered in alternate years. Typically offered Spring.

ME 49700 - Mechanical Engineering Projects

Credit Hours: 1.00 to 6.00. Projects or special topics of contemporary importance or of special interest outside the scope of the standard undergraduate curriculum. Interested students seek a faculty advisor in their area of special interest and together prepare a brief description of the work to be undertaken. Permission of instructor required. Typically offered Fall Spring Summer.

ME 49800 - Research In Mechanical Engineering I

Credit Hours: 3.00. Individual research projects for students with honors classification. Requires prior approval of, and arrangement with, a faculty research advisor. Honors classification. Permission of instructor required. Typically offered Fall Spring Summer.

ME 49900 - Research In Mechanical Engineering II

Credit Hours: 3.00. Continuation of ME 49800. Requires submission of a written thesis, public presentation, and oral defense of the research project. Honors Classification. Permission of instructor required. Typically offered Fall Spring Summer.

ME 50000 - Advanced Thermodynamics

Credit Hours: 3.00. The empirical, physical basis of the laws of thermodynamics. Availability/exergy concepts and applications. Properties and relations between properties in homogeneous and heterogeneous systems. The criteria of equilibrium. Application to a variety of systems and problems, including phase and reaction equilibrium. Offered in alternate years. Typically offered Fall.

ME 50100 - Statistical Thermodynamics

Credit Hours: 3.00. The molecular intepretation of thermodynamic equilibrium. Development of the partition function. Introduction to quantum mechanics and molecular spectroscopy. The Maxwell-Boltzmann formulation of statistical mechanics and applications to ideal gases, solids, radiation, and laser diagnostics. The Gibbs formulation of statistical mechanics and application to real gases. Kinetic theory and applications to transport properties and chemical kinetics. Offered in alternate years. Typically offered Fall.

ME 50300 - Micro-And-Nano-Scale Energy Transfer Processes

Credit Hours: 3.00. Transport of energy in natural and fabricated micro- and nano-scale structures. Physical nature of energy transport by three carriers - electrons, phonons, and photons. Bulk material properties (e.g., thermal/electrical conductivity) are derived from statistical particle transport theories. Effects of spatial confinement on bulk properties are quantified. Contemporary interdisciplinary engineering applications. Typically offered Spring.

ME 50400 - Automotive Control

Credit Hours: 3.00. Basic engine operation; lambda control, speed control, knock control, fuel injection timing control, ignition control of SI engines; driveline modeling, automatic transmission control, clutch phasing control; wheel model, complete vehicle model; observers, friction coefficient estimators, tire contact patch force estimators; anti-lock brake control, traction control, yaw stability control; drive-by-wire systems. The distance offering of this course originates from the IUPUI campus, is offered through streaming video via ProEd, and may be made available at the West Lafayette campus. Typically offered Fall.

ME 50500 - Intermediate Heat Transfer

Credit Hours: 3.00. Heat and mass transfer by diffusion in one-dimensional, two-dimensional, transient, periodic, and phase change systems. Convective heat transfer for external and internal flows. Similarity and integral solution methods. Heat, mass, and momentum analogies. Turbulence. Buoyancy-driven flows. Convection with phase change. Radiation exchange between surfaces and radiation transfer in absorbing-emitting media. Multimode heat transfer problems. Typically offered Fall.

ME 50600 - Two-Phase Flow And Heat Transfer

Credit Hours: 3.00. Basic two-phase flow equaitons, homogeneous model, drift-flux model, flow regimes, pressure drop in two-phase flow. Nucleation and bubble dynamics, pool boiling, subcooled boinling, forced convection boiling, critical heat flux in pool boiling, critical heat flux in forced convection goiling, miminum heat flux, film boiling, post dryout heat transfer. Flow instabilities, choking in two-phase flow, film and dropwise condensation. Applications to heat exchangers. Special boinling and two-phase flow problems. Offered in alternate years. Typically offered Spring.

ME 50700 - Laser Processing

Credit Hours: 3.00. Introduces background knowledge in laser science and laser technology and fundamentals involved in laser processing and manufacturing. The following topics are discussed: laser fundamentals, industrial laser systems and processes, and the laser-induced thermal, thermo-mechanical, and thermo-acoustic effects. The course also discusses emerging areas of laser applications, such as microscale laser processing, ultrafast laser processing, and the related energy transport analyses. Laboratory and video demonstration sessions are used to enhance the overall understanding of the course materials. Offered in alternate years. Typically offered Fall.

ME 50800 - Heat Trans In Biological Systems

Credit Hours: 3.00. Introduction to applications of heat transfer in living systems to students who have general interests in biomedical engineering. Fundamental concepts of biology and engineering involved in these applications are introduced. Regulation of blood flow under external thermal stimuli and its effect on heat transfer are discussed. Clinical applications of heat transfer, including cancer therapy and gene therapy. Prerequisite: first course in fluid or aerodynamics. Offered in alternate years. Typically offered Spring.

ME 50900 - Intermediate Fluid Mechanics

Credit Hours: 3.00. Fluid properties. Basic laws for a control volume. Kinematics of fluid flow. Dynamics of frictionless incompressible flow and basic hydrodynamics. Equations of motion for viscous flow, viscous flow applications, boundary layer theory. Wall turbulence, lift and drag of immersed bodies. Typically offered Fall.

ME 51000 - Gas Dynamics

Credit Hours: 3.00. Flow of compressible fluids. One-dimensional flows including basic concepts, isentropic flow, normal and oblique shock waves, Rayleigh line, Fanno line, and simple waves. Multidimensional flows including general concepts, small perturbation theory for linearized flows and method of characteristics for nonlinear flows. Prerequisite: first course in fluid or aerodynamics. Typically offered Spring.

ME 51100 - Heat Transfer In Electronic Systems

Credit Hours: 3.00. This course covers both traditional and more innovative methods for heat extraction in electronic systems and the effectiveness and applicability of these methods over a wide range of scales. Special emphasis is given to industry-related applications with experts often attending and presenting material as part of class instruction. Typically offered Spring.

ME 51300 - Engineering Acoustics

Credit Hours: 3.00. The simple oscillator. Lumped acoustical elements. Electro-mechanical-acoustical analogies. Wave motion in strings and membranes. Introduction to linear acoustics through derivation of the wave equation and simple solutions. Plane and spherical waves. Acoustic intensity. Plane wave transmission through fluid layers and simple barriers. Sound absorption. Modeling of acoustical sources: monopoles, dipoles, quadrupoles. Mechanisms of sound generation and directionality. Sound propagation in one-dimensional systems (e.g., ducts and mufflers). Introduction to room acoustics. Typically offered Fall.

ME 51400 - Fundamentals Of Wind Energy

Credit Hours: 3.00. Basic operating principles and analysis of performance characteristics of gas turbine engines for aircraft and vehicular propulsion and stationary power. Turbojet, turbofan, turboshaft cycle analysis. Analysis of flow through compressors, turbines, combustors, inlets, nozzles, and regenerators. Component machine and off-design performance. Inspection trip to industrial plan required. Typically offered Spring.

ME 51700 - Micro/Nanoscale Physical Processes

Credit Hours: 3.00. (CHE 51700) Study of physical processes encountered in small scale systems like Micro-Electromechanical Systems (MEMS) and nanotechnology. Introduction of tools for micron to molecular scale analysis of statics, dynamics, electricity and magnetism, surface phenomena, fluid dynamics, heat transfer, and mass transfer. Quantitative analysis of specific MEMS devices using finite element analysis. Typically offered Spring.

ME 51800 - Analysis Of Thermal Systems

Credit Hours: 3.00. Modeling and optimization of thermal systems with a focus on heat-pumping equipment, such as vapor

compression, absorption, and some advanced heat-pumping cycles. Students combine the use of thermodynamics, heat transfer, fluid mechanics, and numerical methods to develop and apply mathematical models for the analysis and optimization of specific equipment. Offered in alternate years. Typically offered Fall.

ME 52200 - Indoor Environmental Analysis And Design

Credit Hours: 3.00. Review of current trend of building and indoor environment design. Theory of thermal comfort, indoor air quality, visual comfort, and acoustic comfort. Introduction of experimental techniques and advanced computer tools for indoor environment analysis and design. Typically offered Spring.

ME 52500 - Combustion

Credit Hours: 3.00. Physical and chemical aspects of basic combustion phenomena. Chemical energetics and equilibrium. Basic chemical kinetics, chain reactions, and explosions. Chain and thermal ignition. Homogeneous combustion models. Detonations and deflagrations. Laminar flame speed and flame extinction. The Shvab-Zeldovich formulation of the multicomponent conservation equations. Diffusion flames and droplet combustion. Introduction to turbulent combustion. Typically offered Spring.

ME 52600 - Spray Applications And Theory

Credit Hours: 3.00. Theory of spray formation and evolution as well as treating a host of spray applications. Topics include drop size distributions, breakup of liquid sheets and ligaments, drop formation and breakup, drop motion and the interaction between a spray and its surroundings, drop evaporation, nozzle internal fluid mechanics, external spray characteristics, nozzle performance, and experimental techniques relevant to these subjects. Applications include: (1) agricultural sprays, (2) consumer products, (3) gas turbine combustion, (4) heat transfer, (5) internal combustion engines, (6) paints and coatings, (7) pharmaceutical and medicinal sprays, and (8) spray drying. Offered in alternate years. Offered in alternate years. Typically offered Fall.

ME 53300 - Turbomachinery II

Credit Hours: 3.00. Aerodynamic analysis and design of axial flow and radial flow gas compressors and gas turbines. Blade element performance (deflection, profile and shock losses, etc.). Meridional flow analysis for general radial equilibrium. Secondary flow and end-wall boundary layer models. Centrifugal compressor modeling. Unsteady flow, rotating stall, and surge. Typically offered Spring.

ME 53800 - Air Breathing Propulsion

Credit Hours: 3.00. (AAE 53800) Analysis of operating characteristics of turbojet, turbofan, turboshaft, afterburning, and ramjet

propulsion systems. Analysis and design of inlet, diffuser, combustor, compressor, turbine, and nozzle. Component matching and off-design performance. Inlet distortion, nozzle-afterbody, and installation losses. Mission analysis. Typically offered Fall.

ME 54000 - Internal Combustion Engines

Credit Hours: 3.00. Spark-ignition and compression-ignition engine processes. Study of the fundamentals of turbulence, boundary, layers, liquid atomization, sprays, combustion, and pollutant formation as applied to engines. Engine after treatment. Modeling of engine flows, sprays, combustion, and pollutants. Offered in alternate years. Typically offered Spring.

ME 54900 - Practical Experience In Vibrations

Credit Hours: 3.00. Theory and application of experimental structural dynamics. Experimental techniques in model analysis, impedance modeling, and basic nonlinear vibrations. Time, frequency, and spatial characteristics of vibrating systems. Virtual and real-time demonstrations and experiments. Vehicle vibrations in ride, machinery diagnostics, and health monitoring of structural materials and components. Typically offered Spring.

ME 55300 - Product And Process Design

Credit Hours: 3.00. Fundamental principles of product and process design to produce a marketable product, develop a preliminary business strategy, and construct an operational prototype. Overview of relevant principles related to product and process design. Market analysis, design parrameters, manufacturing prototype plan, production process plan, and a business strategy developed in teams. Broad overview of the entire product development process, including patents, commercialization of new technologies, and the higherly interdisciplinary nature of product design through industry guest lectures. Impact of information technologies and the Internet on product design, prototyping, marketing, and customization. Product prototype is required. Design and product software information technology service-type concepts. Typically offered Spring.

ME 55400 - Intellectual Property For Engineers

Credit Hours: 1.00. Survey of the law of patents, trade secrets, trademarks, and copyrights, with special emphasis on the process of defining inventions broadly and diversely. Obtaining, registering, licensing, and litigation of intellectual property. Typically offered Spring.

ME 55600 - Lubrication, Friction & Wear

Credit Hours: 3.00. Science, technology, and application of lubricated interacting surfaces in relative motion. Advanced analysis techniques and hands-on exposure to modern experimental methods provide an enhanced understanding of fundamental principles of lubrication, friction, and wear. Basics of design and analysis of machine components operating in the presence of air

and liquid lubricants. Rolling fatigue, friction and wear models, and measurement techniques. Offered in alternate years. Typically offered Spring.

ME 55700 - Design For Manufacturability

Credit Hours: 3.00. Introduction to manufacturing concerns, such as efficient design, producibility, and quality, which must be considered early in the engineering design process. Topics include the product development cycle, manufacturing process selection, tolerancing, quality function deployment (QFD), design for assembly (DFA), quality control techniques, Taguchi's robust design methodology, life cycle engineering, and reliability. Laboratory projects in the area of tolerancing, assembly, and manufacturability are included along with a project from industry in which the students can disassemble, analyze, and redesign a product while obtaining feedback from industry concerning manufacturability. Typically offered Fall.

ME 55900 - Micromechanics Of Materials

Credit Hours: 3.00. Prediction of the macroscopie behavior of materials from their microstructure and the design of new materials. Microstructure-property relationships between the macroscopie material behavior and microscopic structure. Application to traditional structure as well as to new engineering materials. Adapting emerging constitutive relations into structure analyses. Introduction of this new approach to materials, its applications in predictive analysis tools, and its importance in simulation-based engineering. Typically offered Spring.

ME 56000 - Kinematics

Credit Hours: 3.00. Geometry of constrained plane motion with applications to linkage design. Type and number synthesis, size synthesis. Path curvature, inflection circle, cubic of stationary curvature. Finite displacements, three and four separated positions. Graphical, analytical, and computer techniques. Typically offered Fall.

ME 56100 - Optimal Design: Theory With Practice

Credit Hours: 3.00. Optimization as an element of engineering design process. Case studies which demonstrate the theory and application of nonlinear programming as a design tool. Comparative examination of unconstrained algorithms. Development and application of methods for the constrained case. Selected contemporary topics. Typically offered Spring.

ME 56200 - Advanced Dynamics

Credit Hours: 3.00. Dynamics of multi-degrees-of-freedom mechanical systems. Holonomic and nonholonomic constraints. Lagrange's equations of motion. Hamilton's principle for holonomic systems. Kinematics and kinetics of rigid body motion, including momentum and energy methods. Linearized equations of motion. Classification of vibratory systems - gyroscopic,

circulatory forces. Stability of linear systems - divergence and flutter. Applications to gyroscopes, satellite dynamics, etc. Typically offered Spring.

ME 56300 - Mechanical Vibrations

Credit Hours: 3.00. Review of systems with one degree for freedom. LaGrange's equations of motion for multiple degree of freedom systems. Introduction to matrix methods. Transfer functions for harmonic response, impulse response, and step response. Convolution integrals for response to arbitrary inputs. Principle frequencies and modes. Applications to critical speeds, meassuring instruments, isolation, torsional systems. Introduction to nonlinear problems. Typically offered Fall.

ME 56400 - Vibrations Of Discretized Systems

Credit Hours: 3.00. Theory of small oscillations of discrete or discretized systems of high dimensionality. Formulation of equations of motion using Lagrange's equation and the influence coefficients. Finite element reductions of continuous systems. Natural frequencies and modes: numerical methods. Free vibrations and forced vibration characteristics; modal expansion; approximation techniques; damping. Assembly of large systems from subsystems concepts, impedance techniques. Typically offered Spring.

ME 56500 - Vehicle Dynamics

Credit Hours: 3.00. Modeling of wheeled vehicles to predict performance, handling, and ride. Effects of vehicle center of mass, tire characteristics, traction and slip, engine characteristics, and gear ratios on performance. Suspension design. Steady state and transient handling models of four-wheeled vehicles and car-trailer systems to determine oversteer and understeer characteristics, critical speeds, and stability. Multi-degree-of-freedom ride models, including tire and suspension compliance. Computer simulations. Current research topics in vehicle vibration isolation. Typically offered Spring.

ME 56700 - Dynamical Problems In Design

Credit Hours: 3.00. Design of devices required to have specified dynamic characteristics. Modeling of linear and nonlinear systems and determination of their performance under deterministic and random inputs. Analytical and approximate methods, including computer solutions. Individual project involves modeling, analysis, and system simulation of an actual physical system's motion. Typically offered Fall.

ME 56900 - Mechanical Behavior Of Materials

Credit Hours: 3.00. A study of load and environmental conditions that influence the behavior of materials in service. Elastic and

plastic behavior, fracture, fatigue, low and high temperature behavior. Fracture mechanics. Failure analysis case studies emphasis on design. Typically offered Spring.

ME 57000 - Machine Design

Credit Hours: 3.00. Analysis of stresses and deflections due to complicated loading. Investigation of specific design problems through application of theory of elasticity, failure criteria, energy approach, and numerical methods. Individual design project. Typically offered Fall.

ME 57100 - Reliability Based Design

Credit Hours: 3.00. Basic concepts of probability and random variables. Time-dependent reliability models. Strength-based reliability and interference theory. Weakest-link and fail-safe systems. Extremal distributions. Monte Carlo methods. Maintainability and availability. Fault tree analysis. Quality control and reliability. Offered in alternate years. Typically offered Fall.

ME 57200 - Analysis And Design Of Robotic Manipulators

Credit Hours: 3.00. Introduction to the analysis and design of robotic manipulators. Topics include: kinematic configurations, forward and inverse position solution, velocity and acceleration, path planning, workspace analysis, force and torque solutions, rigid body dynamics, motors and actuators, robot design, sensors and controls, computer simulation, and graphical animation. Typically offered Spring.

ME 57300 - Interactive Computer Graphics

Credit Hours: 3.00. (CS 53500) The principles of computer graphics and interactive graphical methods for problem solving. Emphasis placed on both development and use of graphical tools for various display devices. Several classes of graphics hardware considered in detail. Topics include hardcopy plotting, refresh displays, dynamic techniques, three-dimensional transformations and hierarchical modeling, color, modeling of geometry, and hidden surface removal. Projects involve programming of interactive computer graphics applications. Typically offered Fall.

ME 57500 - Theory And Design Of Control Systems

Credit Hours: 3.00. Covers the analysis and design of control systems from both a classical and modern viewpoint, with emphasis on design of controllers. Classical control design is reviewed, including both root locus and Bode domain design methodologies. The state space representation is introduced, along with notions of stability, controllability, and observability. State feedback

controllers for pole placement and state observers are discussed with emphasis in their frequency domain implications. Typically offered Fall.

ME 57600 - Computer Control Of Manufacturing Processes

Credit Hours: 3.00. Fundamental elements for manufacturing process control are presented with advanced control theories, modeling and analysis of actuators, controller architecture, interfacing and programming. Emphasis is on computer integrated manufacturing with computer numerical control of machine tools, automation via programmable logic controllers, motion control, process control examples, and manufacturing process monitoring. Hands-on experience is attained through laboratory experiments with state-of-the-art equipment. Typically offered Spring.

ME 57700 - Human Motion Kinetics

Credit Hours: 3.00. Study of kinetics related to human motion. Review of human anatomy and anthropometric data. Planar and three-dimensional kinematic analysis of gross human motion. Detailed kinematic studies of human joints. Newton-Euler and Lagrangian methods for joint torques. Muscle force and power analysis. Studies on walking, jumping, cycling, and throwing exercises. Typically offered Spring.

ME 57800 - Digital Control

Credit Hours: 3.00. Introduction to, and overview of, the field of digital control. Prior knowledge of continuous control techniques is assumed. Topics include mathematical background from residue theory through integral transforms; sampled data systems, including A/D, D/A, and hold properties, aliasing, and Z transforms. Digital control design via continuous, discrete, and state space design techniques. Implementation considerations, including nonlinear effects. Mechanical engineering examples. Typically offered Spring.

ME 57900 - Fourier Methods In Digital Signal Processing

Credit Hours: 3.00. Fundamentals of signal processing associated with Fourier analyzer systems are presented. Emphasis is on amplitude accuracy and frequency resolution properties necessary for reliable experimental methodologies in system identification, spectrum estimation, and correlation analysis. Deterministic, as well as random, data analyses are presented. Students are required to develop algorithms that significantly expand the utility of Fourier analyzer systems. Typically offered Fall.

ME 58000 - Nonlinear Engineering Systems

Credit Hours: 3.00. Methods of analysis for nonlinear ordinary differential equations arising in engineering systems. Review of

linear systems. Stability concepts. Phase plane methods. Perturbation and averaging methods of analysis. Self-excited and parametrically-excited systems. Relaxation oscillations. Systems with more than one degree of freedom. Typically offered Fall.

ME 58100 - Numerical Methods In Mechanical Engineering

Credit Hours: 3.00. The solution of problems arising in mechanical engineering using numerical methods. Topics include nonlinear algebraic equations, sets of linear algebraic equations, eigenvalue problems, interpolation, curve fitting, ordinary differential equations, and partial differential equations. Applications include fluid mechanics, gas dynamics, heat and mass transfer, thermodynamics, vibrations, automatic control systems, kinematics, and design. Typically offered Fall.

ME 58500 - Instrumentation For Engineering Measurements

Credit Hours: 3.00. Fundamental concepts of static and dynamic measurements are reviewed. Transducers, signal conditioning, data transmission, and digital data acquisition systems are discussed. Emphasis is on applications and dynamic measurements. Offered in alternate years. Typically offered Fall.

ME 58600 - Microprocessors In Electromechanical Systems

Credit Hours: 3.00. Architecture of microcomputers; operating systems, logic functions, logic circuit design; I/O structure and interfacing; assembly language, manual assembly; software and hardware interrupts; data acquisition, serial and parallel communications; the role of high level languages. Laboratory experiments on applications to electrical, mechanical, and thermofluid systems. Typically offered Fall.

ME 58700 - Engineering Optics

Credit Hours: 3.00. Fundamentals of geometrical and physical optics as related to problems in engineering design and research. Characteristics of imaging systems; properties of light sources; optical properties of materials. Diffraction, interference, polarization, and scattering phenomena as related to optical measurement techniques. Introduction to lasers and holography. (Laboratory work can be undertaken for additional credit by special arrangement.). Typically offered Spring.

ME 58800 - Mechatronics - Integrated Design Of Electro-Mechanical Systems

Credit Hours: 3.00. Electronic and interfacing techniques for design and control of electro-mechanical systems. Basic digital and analog design with applications to electro-mechanical interfacing via hands-on laboratory experience. Commonly used actuators and sensors and corresponding interfacing techniques. Realistic and integrated product development experience provided through a comprehensive final project where working prototypes are built to defined specifications. Typically offered Fall.

ME 59200 - Fundamentals Of Particle Image Velocimetry

Credit Hours: 1.00. Measurement of fluids in motion using the particle image velocimetry technique and related techniques through computer programming, laboratory experiments, and independent research in experimental fluids journals. Typically offered Spring.

ME 59500 - Special-Topic Minicourses

Credit Hours: 1.00. A series of one-credit-hour courses on special topics offered as ME 59500, 59500, etc. These special-topic minicourses will provide an opportunity for introducing students to topics of contemporary importance or special interest that fall outside the scope of the curriculum. Information about current offerings may be obtained from the schedule of classes or the mechanical engineering registration deputy. Typically offered Fall Spring.

ME 59700 - Advanced Mechanical Engineering Projects I

Credit Hours: 0.00 to 6.00. Projects or special topics of contemporary importance or of special interest that are outside the scope of the standard graduate curriculum can be studied under the Mechanical Engineering Projects course. Interested students should seek a faculty advisor by meeting with individual faculty members who work in their area of special interest and prepare a brief description of the work to be undertaken in cooperation with their advisor. Permission of instructor required. Typically offered Fall Spring Summer.

ME 60500 - Convection Of Heat And Mass

Credit Hours: 3.00. Heat and mass transfer in moving fluid media; free, forced, and mixed convection for internal and external flows; differential and integral treatments of boundary layer problems; convection analogies for heat, mass, and momentum transfer; combined heat and mass transfer with chemical reactions; special topics and applications to electronic cooling, materials processing, transpiration and film cooling. Prerequisite: ME 31500. Typically offered Spring.

ME 60600 - Radiation Heat Transfer

Credit Hours: 3.00. Thermodynamics and physics of radiation and its interaction with interfaces and matter; radiation characteristics of surfaces and radiation properties of solids, liquids, and gases; analysis of radiation exchange between real and idealized surfaces; fundamentals of radiation transfer in absorbing, emitting, and scattering media; interaction of radiation with conduction and convection; remote temperature sensing and applications to selected problems involving combined energy transfer mechanisms. Offered in alternate years. Prerequisite: ME 31500. Typically offered Fall.

ME 60800 - Numerical Methods In Heat, Mass, And Momentum Transfer

Credit Hours: 3.00. Governing conservation equations and their classification according to numerical properties. Discretization by Taylor series, weighted residual, and control volume methods. Solution of systems of algebraic equations. Discretization and solution of the convection-diffusion equation. Methods of solving the equations governing fluid flow. Mathematical modeling of turbulence, combustion, and radiation. Prerequisite: ME 50500, ME 58100. Typically offered Spring.

ME 61000 - Boundary Layer Theory

Credit Hours: 3.00. Fundamentals of continuum fluid mechanics; Navier-Stokes equations. Laminar flow; boundary-layer concept; similarity solutions; transformation methods; integral and finite difference solution techniques for general pressure gradients. Should be preceded by intermediate fluid mechanics. Typically offered Spring.

ME 61100 - Principles Of Turbulence

Credit Hours: 3.00. Methods of description and basic equations for turbulent flows. Isotropic and homogeneous turbulence, energy spectra, and correlations. Introduction to measurements. Transition theory and experimental evidence. Wall turbulence, engineering calculations of turbulent boundary layers. Free turbulent jets and wakes. Prerequisite: ME 61000. Typically offered Fall.

ME 61200 - Continuum Mechanics

Credit Hours: 3.00. A unified and exact mathematical treatment of the mechanics of solids and fluids. Cartesian tensor algebra and calculus; stress tensor, principle stresses and invariants; material and spatial coordinates, deformation gradient, strain and stretch tensors; balance of mass, momentum, and energy; constitutive equations of elasticity, hyperelasticity, viscous fluids and viscoelasticity. Typically offered Fall.

ME 61300 - Advanced Engineering Acoustics

Credit Hours: 3.00. An extension of ME 51300. Sound transmission between two media. Acoustic resonators and application to muffler theory. Structural radiation and sound. Acoustical measurements and signal processing: sound intensity, surface intensity, coherence and cepstral techniques. Numerical acoustics: finite element analysis, boundary integral equation analysis and statistical energy analysis. Advanced topics. Prerequisite: ME 51300. Typically offered Spring.

ME 61400 - Computational Fluid Dynamics

Credit Hours: 3.00. Application of finite difference methods, finite element methods, and the method of characteristics for the numerical solution of fluid dynamics problems. Incompressible viscous flows: vorticity transport equation, stream function equation, and boundary conditions. Compressible flows: treatment of shocks, implicit and explicit artificial viscosity techniques, and boundary conditions. Computational grids. Prerequisite: ME 50900 or ME 51000 or ME 58100. Typically offered Spring.

ME 61500 - Aeroacoustics

Credit Hours: 3.00. (AAE 61500) Quantitative measures of sound (decibel scales, spectra, energetics of acoustic motions, and measurement techiques). The wave theory of sound (basic equations and properties, sound propagation in homogeneous and inhomogeneous media, one-, two- and three-dimensional sound fields and distributed sources). Effects of source movement. Aerodynamic noise generation - acoustic analogy (Lighthill's equation and fowcs Williams-Hawkings equation). Introduction to Computational Aeroacoustics (CAA). Noise from turbulent shear flows (jet noise, cavity noise, and noise from flow over objects). Noise from turbomachinery, propellers, and rotors. Prerequisite: ME 30900 or ME 51300 or AAE 51100. Typically offered Fall.

ME 62500 - Advanced Combustion

Credit Hours: 3.00. Coupling of the energy, species, and mass conservation equations with the momentum equation. Statistical treatment of turbulence and the problems of interactions of turbulence with chemistry, radiation, and two-phase flows. Critical study of at least 10 seminal and recent contributions in the combustion literature. Offered in alternate years. Prerequisite: ME 52500. Typically offered Fall.

ME 64000 - Structural Acoustics

Credit Hours: 3.00. Waves in fluids and structures, dispersion relations, sound radiation from structures, radiation efficiency, radiation from concentrated forces, effect of fluid loading on wave propagation, transmission of sound through barriers, effect of panel lining, enclosures, acoustically induced vibration of structures and numerical calculation of fluid-structure interaction. Offered in alternate years. Prerequisite: ME 51300, ME 56300. Typically offered Fall.

ME 66400 - Vibrations Of Continuous Systems

Credit Hours: 3.00. Theory of small oscillations of continuous systems. Love's equations for thin shells, reduction to special cases of shallow shells, plates, beams, etc. Initial stresses; influence of shear; thermal excitation. Initial value problems; forced vibrations; structural damping. The dynamic Green's function, impedance concepts; variational approaches. Experimental procedures, scaling, composite, and stiffened shells. Prerequisite: knowledge of one degree of freedom system vibrations. Typically offered Spring.

ME 66700 - Advanced Dynamical Problems In Machine Design

Credit Hours: 3.00. Design of devices dependent upon velocity or acceleration-time relationships; differential equations of motion to obtain design data and operating characteristics; analytical solutions. Prerequisite: a first course in dynamics. Typically offered Spring.

ME 67500 - Multivariable Control System Designs

Credit Hours: 3.00. Fundamentals of the frequency response loop shaping methodology for the analysis and design of robust multivariable control systems will be presented. Emphasis is on suitable extensions of the classical Bode-Nyquist design techniques to systems with not only uncertain parameters but also multiple inputs and outputs. Instrument and environmental signal level constraints on the performance of control systems will be critically evaluated. Students are required to develop ability to handle open-ended design issues involving significant multiobjective performance trade-offs. Prerequisite: ME 57500. Typically offered Spring.

ME 67700 - Nonlinear Feedback Controller Design

Credit Hours: 3.00. Controller design and analysis of nonlinear feedback systems. Topics include the design of linear/nonlinear feedback controllers. Describing Function (DF) techniques for design, Popov and Generalized Circle Criterion for closed loop stability, functional analysis and Volterra series approaches, and introduction to existing nonlinear controller design tools. Offered in alternate years. Prerequisite: ME 67500. Typically offered Spring.

ME 68000 - Bifurcations And Chaos

Credit Hours: 3.00. Basic concepts in stability of systems, nonlinear dynamical systems, and bifurcation theory. Algebraic and geometric techniques for local bifurcation analysis. Models governed by difference, ordinary, and partical differential equations. Examples from mechanical, structural, chemical, and electrical systems. Models of chaotic behavior. Techniques for prediction of chaos. Routes to chaos. Offered in alternate years. Prerequisite: ME 58000. Typically offered Spring.

ME 68100 - Finite And Boundary Element Methods

Credit Hours: 3.00. The solution of problems in mechanical engineering using the generalized numerical techniques; the finite element method and the boundary element method. Topics include reformulation of partial differential equations into appropriate form for each method. The development and implementation of code and solution of problems. Applications include: acoustics, fluid dynamics, heat transfer, design, mechanics and biomechanics. Prerequisite: ME 58100. Typically offered Spring.

ME 68700 - Laser Diagnostics For Reacting Flows

Credit Hours: 3.00. The principles of spectroscopic laser diagnostics including absorption, fluorescence, and Raman scattering techniques. Theory of the interaction of laser radiation with atomic and molecular resonances. Lasers and detectors for optical diagnostics. Offered in alternate years. Prerequisite: ME 50100. Typically offered Fall.

ME 68900 - Adaptive Control

Credit Hours: 3.00. Theory and application of adaptive control of linear systems in both continuous and discrete time domain. Real-time parameter estimation algorithms, direct and indirect adaptive methods, deterministic self-tuning regulators, Lyapunov stability theory, input-output stability, model-reference adaptive control, stability and convergence of adaptive algorithms, robustness, and implementation issues, with laboratory experiments and demonstrations. Offered in alternate years. Prerequisite: ME 57500. Typically offered Spring.

ME 69000 - Individual Study In Mechanical Engineering

Arrange Hours and Credit. Individual study in advanced areas not currently available through formal course offerings within the University. Course plan must be approved by professor in charge prior to registering for the course. Written report and presentation of a departmental seminar based on material studied are required at the end of the semester. Permission of instructor required. Typically offered Fall Spring Summer.

ME 69100 - Mechanical Engineering Graduate Seminar

Credit Hours: 0.00. Acquaint graduate students with a broad spectrum of research in various areas of mechanical engineering. Weekly seminars by invitees/researchers from academia, national labs, or industry. Seminar topics provide a mix of subjects, areas and disciplines, and can involve considerable technical depth, a broad overview and/or historical perspectives. Typically offered Fall.

ME 69600 - Advanced Professional Internship

Credit Hours: 0.00. Advanced professional experience in mechanical engineering. The program is coordinated by the school with cooperation of participating employers. Students submit a summary report. Prerequisite: Master's student standing. Typically offered Fall Spring Summer.

ME 69700 - Advanced Mechanical Engineering Projects II

Credit Hours: 1.00 to 6.00. Projects or special topics of contemporary importance or of special interest that are outside the scope of the standard graduate curriculum can be studied under the Mechanical Engineering Projects course. Interested students should

seek a faculty advisor by meeting with individual faculty members who work in their area of special interest and prepare a brief description of the work to be undertaken in cooperation with their advisor. Prerequisite: Doctoral student standing. Permission of instructor required. Typically offered Fall Spring Summer.

ME 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

ME 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Mechanical Engineering Technology

MET 10200 - Production Design And Specifications

Credit Hours: 3.00. The design, evaluation, and documentation of engineering specifications required of manufacturability and assembly are introduced. Emphasis is on CAD-based details, assemblies, design layouts, equipment installations, and related industrial practices. Typically offered Fall Spring Summer.

MET 11100 - Applied Statics

Credit Hours: 3.00. Force systems, resultants and equilibrium, trusses, frames, beams, and shear and moments in beams are studied. Typically offered Fall Spring Summer.

MET 11300 - Mechanics Applications

Credit Hours: 1.00. Concepts of mechanics are applied to structures, machine components, and frames. Stresses and deformations resulting from axial, shear, torsional, and flexural loads are considered. Kinematics and kinetics of motion are introduced. Typically offered Fall Spring Summer.

MET 14300 - Materials And Processes I

Credit Hours: 3.00. An overview of structures, properties, processing, and applications of metals and ceramics commonly used in industry is presented. Problem solving skills are developed in the areas of materials selection, evaluation, measurement, and testing. Typically offered Summer Fall Spring.

MET 14400 - Materials And Processes II

Credit Hours: 3.00. An overview of structures, properties, processing, and applications of polymers, composites, laminates, biomaterials, green materials, nanomaterials, and pharmaceuticals commonly used in industry is presented. Problem solving skills are developed in the areas of material selection, evaluation, measurement, and testing. This course serves as the gateway for the MET and MFET programs. Typically offered Summer Fall Spring.

MET 16000 - Analytical And Computational Tools In MET

Credit Hours: 3.00. The skills needed to solve technical problems in mechanical engineering technology are developed. Instruction is given in analytical and computational problem-solving techniques. The electronic calculator, the factor-label method of unit conversions, engineering graphs, and the computer are used to solve problems. Computer emphasis is on spreadsheet analysis, graphics, and generation of technical reports through the integrated use of software packages. Credit will not be granted for MET 16000 and MET 16200 or MET 16300. Typically offered Fall Spring.

MET 16200 - Computational Analysis Tools In MET

Credit Hours: 1.00. Instruction is given in analytical and computational problem-solving techniques. The electronic calculator, the factor-label method of unit conversions, and engineering graphs are used to solve technical problems in mechanical engineering technology. Credit will not be granted for both MET 16000 and 16200. Typically offered Fall Spring.

MET 16300 - Computer Application Tools In MET

Credit Hours: 2.00. The computer is used to solve technical problems in mechanical engineering technology. Emphasis is on spreadsheet analysis, graphics, and generation of technical reports through the integrated use of computer software packages. Credit will not be granted for both MET 16000 and 16300. Permission of department required. Typically offered Fall Spring.

MET 21100 - Applied Strength Of Materials

Credit Hours: 4.00. The principles of strength, stiffness, and stability are introduced and applied primarily to mechanical components. Typically offered Fall Spring Summer.

MET 21200 - Applications Of Engineering Mechanics

Credit Hours: 4.00. Applications of engineering mechanics are introduced, based on an elementary expansion of Newtonian physics as applied to static and dynamic force systems. Internal stresses and strains produced by these forces in selected machine elements are considered. Work, energy, and power are discussed. Does not carry credit toward graduation in Mechanical Engineering Technology. Typically offered Fall Spring.

MET 21300 - Dynamics

Credit Hours: 3.00. Kinematics and kinetics principles of rigid-body dynamics are introduced. Emphasis is on the analysis of bodies in plane motion. Typically offered Fall Spring Summer.

MET 21400 - Machine Elements

Credit Hours: 3.00. The methods developed in statics, dynamics, and strength of materials are applied to the selection of basic machine components. The fundamental principles required for the selection of individual elements that compose a machine are developed. Selected course topics are included as computer exercises. Typically offered Fall Spring.

MET 22000 - Heat And Power

Credit Hours: 3.00. Heat/Power is an introduction to the principles of thermodynamics and heat transfer. Basic thermodynamic processes are used to evaluate the performance of energy-based systems such as internal combustion engines, power plants, and refrigeration equipment. Typically offered Fall Spring.

MET 23000 - Fluid Power

Credit Hours: 3.00. This course consists of the study of compressible and incompressible fluid statics and dynamics as applied to hydraulic and pneumatic pumps, motors, transmissions, and controls. Typically offered Fall Spring Summer.

MET 24500 - Manufacturing Systems

Credit Hours: 3.00. This course surveys the manufacturing processes and tools commonly used to convert cast and molded, formed, and joined materials into finished products. It includes the fundamentals of material removal, measurement, statistical

quality control, assembly processes, process planning and optimization, CNC programming and automated manufacturing. Typically offered Summer Fall Spring.

MET 28400 - Introduction To Industrial Controls

Credit Hours: 3.00. This course examines the concepts, devices, and common practices associated with modern industrial control systems. Common industrial control devices are studied.Students learn how to wire, program, and troubleshoot programmable logic controller (PLC) based control systems. PLC applications focus on interfacing and controlling a variety of electromechanical devices such as motors and pneumatic actuators. Industrial safety practices and procedures are emphasized throughout the course. Typically offered Fall Spring Summer.

MET 29000 - Special Topics In MET

Credit Hours: 1.00 to 3.00. Hours, subject matter, and credit to be arranged by faculty. Group instruction in new or specialty areas of Mechanical Engineering Technology is provided by MET faculty, subject to MET curriculum subcommittee approval. Typically offered Fall Spring Summer.

MET 29900 - Mechanical Engineering Technology

Credit Hours: 1.00 to 3.00. Independent project or laboratory work is conducted under the supervision of appropriate MET faculty. Hours and subject matter must be arranged by instructor and approved by MET curriculum subcommittee. Permission of instructor required. Typically offered Fall Spring Summer.

MET 30200 - CAD In The Enterprise

Credit Hours: 3.00. Theory and practice of management, use and integration of computer-aided design systems, and related engineering tools and practices are studied as they are applied in the industrial enterprise. Emphasis is on course projects. Typically offered Summer Fall Spring.

MET 31100 - Experimental Strength Of Materials

Credit Hours: 3.00. Selected advanced topics from the areas of mechanics of materials, structures, stress analysis, and strain measurements are considered. Basic electronic strain gage circuits and instrumentation are presented, with emphasis on transducer applications. Typically offered Spring.

MET 31300 - Applied Fluid Mechanics

Credit Hours: 3.00. The fundamental principles of fluid mechanics are developed, including properties of fluid, pressure, hydrostatics, dynamics of fluid flow, friction losses, and sizing of pipes. Emphasis is on problem solving. Typically offered Fall Spring Summer.

MET 31400 - Applications Of Machine Elements

Credit Hours: 3.00. Machine element topics, including chain drives, spur gears, power screws, bevel gears, ball and roller bearings, journal bearings selection and lubrication, relevant microcomputer software, and other select topics are considered. Typically offered Fall Spring Summer.

MET 31500 - Applied Mechanism Kinematics And Dynamics

Credit Hours: 3.00. Graphical and semigraphical methods are used to determine displacements, velocities, and accelerations in common mechanisms. Cam followers and basic motions; static and dynamic force analysis; static and dynamic shaft balancing; and relevant microcomputer software also are considered. Typically offered Fall Spring Summer.

MET 31700 - Machine Diagnostics

Credit Hours: 3.00. A broad spectrum of equipment behavior is introduced through the study of four major operating parameters: vibration, noise, temperature, and lubrication. Emphasis is placed on measurement and analysis of data using diagnostic instrumentation and techniques found in modern process and manufacturing plants. Typically offered Fall Spring Summer.

MET 32000 - Applied Thermodynamics

Credit Hours: 3.00. Following a review of fundamental concepts, advanced power and refrigeration cycles are analyzed. Applications such as gas mixtures, air-vapor mixtures, and chemical reactions of combustion processes are presented. Typically offered Fall Spring Summer.

MET 33400 - Advanced Fluid Power

Credit Hours: 3.00. Hydraulic and pneumatic circuits and their steady state and time variant behavior as it affects the selection and design of components and systems used in fluid power transmission and motion control are studied. Emphasis is placed on industrial and mobile applications, but the principles also apply to aerospace, marine, and other fluid power systems. Typically offered Fall Spring Summer.

MET 34500 - Welding Processes

Credit Hours: 3.00. Welding processes, equipment, and weldments are studied. An in-depth look is taken into welding processes, welding problems, quality control, inspection methods, welding filler metals, welding equipment, and weldment design. Typically offered Fall Spring.

MET 34600 - Advanced Materials In Manufacturing

Credit Hours: 3.00. Metals, polymers, ceramic, and composite materials are studied. Crystal structure, molecular behavior, and the effects of various processes on material properties are considered. Course emphasizes the development and control of material properties to meet engineering requirements and specifications. Typically offered Summer Fall Spring.

MET 34900 - Stringed Instrument Design And Manufacture

Credit Hours: 3.00. Concepts, knowledge, and skills in experimental mechanics, production processes, and design are integrated to manufacture a working musical instrument. Production concerns such as fixture design, process variability, and validation testing comprise key course elements. Typically offered Fall Spring Summer.

MET 38200 - Controls And Instrumentation For Automation

Credit Hours: 3.00. Study of the procedures and techniques essential to industrial measurement and transmission of data is provided in the areas of microprocessor control, process control, and automated testing. Concepts of hysteresis, repeatability, weighted signals, span, suppression, range, and closed loop control are emphasized. Typically offered Fall Spring Summer.

MET 40000 - Mechanical Design

Credit Hours: 3.00. Theory and practice in mechanical design are presented. Modern design methodologies will be studied. The integrative methods discussed in this course reflect the current industry trend to perform product design and development in cross-functional teams. Emphasis is on multiple open-ended projects. Typically offered Fall Spring Summer.

MET 41100 - Introduction To The Finite Element Method

Credit Hours: 3.00. The finite element method is introduced, with emphasis on modeling and interpretation of results. Linear

static problems are solved using commercial FEA software, and FEA results are verified through laboratory tests and/or theoretical calculations. Topics include trusses, frames, plane stress/strain, torsion, 3D structures, buckling, and natural frequency/mode shape analyses. Typically offered Fall Spring Summer.

MET 42100 - Air Conditioning And Refrigeration

Credit Hours: 3.00. Heat gains and losses, heat-producing equipment, cooling, and refrigeration equipment are studied. System design is presented, including controls and instrumentation for commercial, industrial, and residential systems. Typically offered Fall Spring.

MET 42200 - Power Plants And Energy Conversion

Credit Hours: 3.00. The theories and skills learned from prerequisite coursework are applied to the analysis and design of power plants and their systems and to selected technologies of energy conversion. Industrial procedures and methods are emphasized. Typically offered Fall Spring Summer.

MET 42400 - Green Processes And Sustainability

Credit Hours: 3.00. Green manufacturing and sustainability concepts are covered, including topics such as environmental regulations, recycle/reduce/reuse, energy reduction, and environmental management systems. Elucidating methodologies and strategies normally considered when creating strong sustainability programs in various industries receive special emphasis. Typically offered Fall Spring Summer.

MET 42600 - Internal Combustion Engines

Credit Hours: 3.00. The course deals with the fundamentals of internal combustion engines, with emphasis on performance, efficiency, and emissions. A comprehensive review of engine/vehicle operating systems is conducted. Related topics such as turbocharging, fuel oxygenates, lubrication, and computerized engine management are presented. Typically offered Fall Spring Summer.

MET 43200 - Hydraulic Motion Control Systems

Credit Hours: 3.00. Hydraulic feedback motion control systems, types, and applications are studied. Simulation and performance of closed loop control systems with single and multiple signal paths are emphasized. Dynamic system performance is predicted and evaluated. System parameters including accuracy, response speed, fluid compressibility effects, load disturbances, and nonlinear behavior of the components are studied. Typically offered Fall Spring.

MET 43600 - Pneumatic Motion Control Systems

Credit Hours: 3.00. The application of pneumatic motion control systems to industrial motion control and robotics is studied. Circuit design with control logic of both fluid and electronic types is stressed, as applied to pneumatic point-to-point and proportional controls. Control designs are implemented, tested, and evaluated in the laboratory. Typically offered Fall Spring.

MET 44200 - Plastics Manufacturing Systems

Credit Hours: 3.00. Basic control theory, heat transfer, machine design principles, and basic polymer science are applied to analysis and design of polymer manufacturing systems. Emphasis is placed on thermoplastics processes such as extrusion and injection molding. Projects include design of new machinery, major renovations of existing processes, and automation of processes. Typically offered Summer Fall Spring.

MET 44301 - Joining Processes

Credit Hours: 3.00. Topics cover joining technologies such as fastening, welding, brazing/soldering, adhesive, and diffusion bonding processes of metals, ceramics, plastics, and composites. The materials, processes, destructive and non-destructive evaluation, and design aspects of these technologies as well as current production practices will be presented. Emphasis will be placed on identification and optimization of key processing parameters. Students will be exposed to commonly used technologies, equipment, and methods for joint design, formation, testing, and optimization to better understand key parameters and process variables, and their influence on optimum joint designs. Typically offered Fall Spring Summer.

MET 44400 - Applied Metallurgy

Credit Hours: 3.00. Metals used in common engineering applications are studied to determine how their properties are achieved. Photomicrographic and other methods are employed to investigate the alloying, hotworking, coldworking, and heat treating processes of these metals. Detection, identification, and diagnosis of metal failure are included. Typically offered Fall Spring.

MET 44600 - Micro And Nano Manufacturing

Credit Hours: 3.00. Nanomanufacturing, silicon micromachining and fabrication, laser materials processing of microstructures, abrasive micromachining, mechanical micromaching, micro-scale rapid prototyping and sintering are introduced. Emphasis is on developing an understanding of how MEMS and non-electronic micro/nano devices are manufactured. Typically offered Summer Fall Spring.

MET 45100 - Manufacturing Quality Control

Credit Hours: 3.00. (MFET 45100) Quality control practices used in manufacturing industries; management, statistical control charts, reliability, sampling plans, economics, computer methods, and test equipment are presented and applied. Credit will not be granted for both MET 45100 and MFET 45100. Typically offered Fall Spring Summer.

MET 48200 - Mechatronics

Credit Hours: 3.00. This course covers fundamental concepts and applications of practical mechatronics. Emphasis is placed on product design and systems integration. The course involves the functional relationships between mechanical structure, sensor data, precision actuators, power resources, embedded microcontrollers, control logic, and drives. Basic concepts in mechatronics and common elements of mechatronic systems are introduced, supported by hands-on experience with components and measurement equipment used in the design of mechatronic products. A final team-based project applies this knowledge and skill to design and build a mechatronics system. Typically offered Fall Spring Summer.

MET 48600 - Fundamentals Of Motorsports

Credit Hours: 3.00. Fundamental principles used in motorsports, with emphasis on applications involving high performance auto racing vehicles are presented. Primary course focus is in the areas of vehicle aerodynamics, racing engine performance, vehicle dynamics, race data acquisition and analysis, and in a general introduction to the broad range of technical challenges featured in the racing industry. Typically offered Summer Fall Spring.

MET 49000 - Special Topics In MET

Credit Hours: 1.00 to 3.00. Group instruction in new or specialty areas of mechanical engineering technology is provided by MET faculty, subject to MET curriculum subcommittee approval. Hours, subject matter, and credit to be arranged by faculty. Typically offered Fall Spring Summer.

MET 49900 - Mechanical Engineering Technology

Credit Hours: 1.00 to 6.00. Independent project or study of a special topic is conducted under the supervision of appropriate MET faculty. Hours and subject matter must be arranged with the instructor and approved by the MET curriculum subcommittee before enrolling in the course. Permission of instructor required. Typically offered Fall Spring Summer.

MET 50300 - Applied Optimization

Credit Hours: 3.00. This course will introduce technology graduate students and senior undergraduates to the basic concepts of optimization methods with particular emphasis on applications in product and process design. Unconstrained nonlinear problems will be presented and solved using steepest descent and conjugate directions. Constrained problems will be solved using exterior penalty functions. Permission of department required. Typically offered Fall Spring.

MET 50700 - Organizational Environmental Quality

Credit Hours: 3.00. The principles of organizational environmental quality characterization, regulatory management, and engineering control will be covered. The health effects realized by significant exposures to potential indoor and outdoor organizational environmental pollutants from all media types (water, soil, air, artifact) will be elucidated. A special emphasis will be placed on how to develop a sound foundation for designing appropriate engineering control technologies such as ventilation and filtration. Permission of department required. Typically offered Fall Spring.

MET 52700 - Technology From A Global Perspective

Credit Hours: 3.00. Introduction to the challenges faced by the practicing technologist when working and interacting with international technical personnel, both here and abroad, including history, standards, education, and practice of technology outside the United States. Typically offered Fall.

MET 53000 - Facilities Engineering Technology

Credit Hours: 3.00. A study of the application of the engineering sciences and technology to the solution of problems associated with mechanical and electrical systems in buildings. Emphasizes commercial and industrial facilities. Identifying energy conservation measures for both mechanical and electrical systems and evaluating their economic impact are an important focus of the course. Typically offered Fall Spring Summer.

MET 53500 - Optimization Of Metalcasting Design

Credit Hours: 3.00. The course focuses on optimal design of metalcastings to fit structural requirements (applied loads) and to assure sound manufacturability (castability). Students are expected to learn the general principles of design optimization through hands-on laboratory exercises based on the application of finite element and computational fluid dynamics software. Typically offered Fall Spring Summer.

MET 54600 - Industrial Applications Of Computer Integrated Manufacturing

Credit Hours: 3.00. A study of the development of CIM (computer integrated manufacturing) from the application of basic

automation to a fully integrated system for the operation of the business enterprise. Emphasis is placed on the technology, systems, and human resources, which are integrated to accomplish the objectives of the company. Permission of instructor required. Typically offered Spring.

MET 54900 - Micro And Nanomachining

Credit Hours: 3.00. Micro and nanomachining introduces technology students of many disciplines to discover how machining processes enable the development of MEMS and NEMS products and services. The focus of this course is to develop an understanding of machining processes at the micro and nanoscales. Typically offered Fall Spring.

MET 58100 - Workshop In Mechanical Engineering Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Summer Fall Spring.

MET 59000 - Special Problems In Mechanical Engineering Technology

Credit Hours: 1.00 to 6.00. Independent study of a special problem under the guidance of a member of the staff. Does not substitute for either M.S. thesis or M.S. project credit. Permission of instructor required. Typically offered Summer Fall Spring.

MET 59800 - Directed MS Project

Credit Hours: 1.00 to 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of instructor required. Typically offered Summer Fall Spring.

MET 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer.

Medicinal Chemistry and Molecular Pharmacology

MCMP 20400 - Organic Chemistry I

Credit Hours: 4.00. Organic chemistry; a study of the compounds of carbon on a functional group basis, with particular emphasis on those organic compounds of pharmaceutical and physiological importance; microlaboratory experiments involving the methods of purification, reactions, and synthesis of organic compounds. Typically offered Spring.

MCMP 20500 - Organic Chemistry II

Credit Hours: 4.00. Continuation of MCMP 20400. Typically offered Fall.

MCMP 20800 - Biochemistry For Pharmaceutical Sciences

Credit Hours: 3.00. The overall objectives of this course are to increase students' biomedical understanding and knowledge and their ability to apply that understanding and knowledge. This requires the students in this course to learn and understand the facts, concepts, and formulaic processes, and to become skilled at applying what they have learned. Typically offered Spring.

MCMP 30400 - Biological Chemistry I

Credit Hours: 3.00. The chemistry, properties, and function of biologically active constituents of cells, with emphasis on mammalian biochemistry, catalysis, metabolism of major food constituents, hereditary metabolic diseases, and the methods of biotechnology. Typically offered Fall.

MCMP 30500 - Biological Chemistry II

Credit Hours: 3.00. A continuation of MCMP 30400. Typically offered Spring.

MCMP 31100 - Biometrics And Pharmaceutical Analysis

Credit Hours: 3.00. This is an introduction to biometrics and quantitative chemical and biochemical analyses. Examples from clinical and pharmaceutical applications will be emphasized. Typically offered Fall.

MCMP 40100 - The Nature Of Cancer

Credit Hours: 1.00. An introductory seminar course designed to introduce the subject of cancer to the undergraduate student. The

course features speakers from Purdue University and other academic, governmental, and industrial organizations, presenting each week a different aspect or view of the cancer problem. Typically offered Spring.

MCMP 40700 - Medicinal Chemistry And Molecular Pharmacology I

Credit Hours: 3.00. This course covers chemical and pharmacological principles involved in the therapeutic and adverse actions of drugs that act on the somatic and central nervous systems. This material will be combined with concepts from MCMP 44100 to facilitate an integrated approach to learning the pharmacological actions of specific drugs. Typically offered Fall.

MCMP 40800 - Medicinal Chemistry And Molecular Pharmacology III

Credit Hours: 2.00. This course integrates both the pharmacological and chemical principles governing the actions of drugs targeting the cardiovascular, renal, and blood systems. Topics include drug classes used in the treatment of hypertension, coronary artery disease, heart failure, and cardiac arrhythmias. Typically offered Spring.

MCMP 42200 - Immunology

Credit Hours: 3.00. This course exposes students to the basic principles of immunology, teaches students to use those principles to understand the cause of immunological disease and the basis of immunoprophylaxis and immunotherapy, and provides students with sufficient information to understand the principles and challenges of gene therapy and the application of genomics to future drug development. Typically offered Spring.

MCMP 44000 - Pathophysiology

Credit Hours: 3.00. This course uses the principles of biochemistry, physiology, and cell biology to study the etiology, molecular pathophysiology, and the resultant clinical effects of general pathological processes such as inflammation and neoplasia and the specific disease states of the various organ systems. Typically offered Spring.

MCMP 44100 - Medicinal Chem & Molecular Pharm II(Pharmacodyamics, Endocrine & Paracrine Pharmacology)

Credit Hours: 3.00. This course focuses on the basic pharmacodynamic principles and chemical and pharmacological foundations for therapeutic effects of drugs and natural products that act on endocrine and paracrine systems. These concepts and information are incorporated with material from MCMP 40700 to facilitate the learning of therapeutic and adverse actions of specific drugs. Typically offered Fall.

MCMP 44200 - Medicinai Chemistry And Molecular Pharmacology IV

Credit Hours: 3.00. The focus of this course is to develop a molecular basis for student understanding of the major classes of drugs used in the treatment of infectious diseases and cancer. These principles are applied to the clinical context of diagnosis, therapy selection, and monitoring. Typically offered Spring.

MCMP 49000 - Special Topics

Credit Hours: 1.00 to 3.00. A course for superior students to be used in relation to, and to supplement, an existing course; an in-depth approach to topics of current interest, utilizing the original literature as prime source material. A laboratory project may be included. Permission of instructor required. Typically offered Fall Spring.

MCMP 51400 - Biomolecular Interactions: Theory And Practice

Credit Hours: 1.00 to 4.00. Theory and applications of biophysical and bioanalytical methods for the identification and qualification of biological and pharmaceutical samples. Methods to be discussed include chromatography, electrophoresis, optical spectroscopy, mass spectrometry, electrochemical methods, radiochemical analysis, ultracentrifugation, calorimetry and surface plasmon resonance. Physical measurements, such as binding equilibrium, kinetics and macromolecular structure will be discussed. While fundamentals of each technique will be discussed, a major focus will be on the application and integration of presented methods for the analysis of biological problems. The course will be organized into four general topic areas around the theme of medicinal analysis, and variable credit will be available based on a student's interest in the four topic areas (i.e., 1 credit per topic area). Students should register for 1 credit hour, and the variable credit option will be discussed and determined at the first class period. Permission of instructor required. Typically offered Spring.

MCMP 54400 - Drug Classes And Mechanisms

Credit Hours: 3.00. The course will integrate basic principles of medicinal chemistry and pharmacology to achieve an understanding of drug mechanisms as applied to autonomic/endocrine, cardiovascular/renal, CNS, and chemotherapy/infectious diseases. The course will apply concepts from organic chemistry, biochemistry, anatomy, physiology, and principles of drug action to describe how drugs are used to treat the symptoms and causes of disease. Typically offered Spring.

MCMP 57000 - Basic Principles Of Chemical Action On Biological Systems

Credit Hours: 3.00. Detailed description of modern pharmacology with emphasis on the mechanism of drug action and approaches used to understand their therapeutic and toxic effects. Topics include receptor theory and signal transduction, pharmacokinetics and pharmacogenetics with emphasis on current concepts in molecular pharmacology. Permission of instructor required. Typically offered Fall.

MCMP 59800 - Introduction To Research

Credit Hours: 1.00 to 3.00. Introduction to research in synthetic and analytical medicinal chemistry, pharmacognosy, and natural products under the direction of a member of the graduate faculty. Permission of instructor required. Typically offered Fall Spring Summer.

MCMP 61700 - Molecular Targets: Neuro Function And Dysfunction

Credit Hours: 2.00. The application of basic scientific principles from medicinal chemistry and molecular pharmacology, and new discoveries in biology, to the development of new drugs to treat psychiatric disorders and diseases of the central nervous system. Important examples of drug targets, and small molecules (either currently approved drugs or those under investigation) that target them, are discussed. Classes of drug target examples discussed include: G protein-coupled receptors, neurotransmitter transporter proteins, and ion channels. Processes of neurosecretion and neurodegenerative processes will also be discussed, as well as target validation and examples of the use of genetic models to identify CNS targets. Prerequisites: MCMP 57000. Typically offered Spring. This course is offered in the Spring Semester of the even numbered years.

MCMP 61800 - Molecular Targets: Cancer

Credit Hours 2.00. The application of basic scientific principles from medicinal chemistry and molecular pharmacology, and new discoveries in biology, to the development of new anti-cancer drugs. Important examples of drug targets and small molecules (either currently approved drugs or those under investigation) that target them, are discussed. Classes of drug targets discussed include: kinases, small monomeric G proteins, prenyltransfereses, transcription factors, nuclear receptors, cell cycle proteins, cytoskeletal proteins, and topoisomerases. Prerequisites: MCMP 57000. Typically offered Spring.

MCMP 62500 - Grant Writing

Credit Hours: 1.00. Strategies for preparation of grant proposals; generating ideas for proposals and peer review. Lecture and laboratory periods will alternate each week (i.e., lecture week one, laboratory week two). Permission of department required. Typically offered Fall.

MCMP 69000 - Special Topics In Medicinal Chemistry And Molecular Pharmacology

Credit Hours: 0.00 to 6.00. Special topics, projects, or laboratory exercises in selected areas of medicinal chemistry and molecular pharmacology. Permission of instructor required. Typically offered Fall Spring.

MCMP 69600 - Seminar In Medicinal Chemistry And Molecular Pharmacology

Credit Hours: 0.00 or 1.00. Faculty and student participation in discussion of current research and developments in synthetic medicinal products, quality control, instrumentation, biosynthesis, and structure elucidation of natural products. Typically offered Fall Spring.

MCMP 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

MCMP 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Medieval and Renaissance Studies

MARS 12000 - MARS Explorations

Credit Hours: 1.00. Learning about the Middle Ages and Renaissance by participating in MARS-related events such as museum and library outings, film screenings, play performances, public lectures and workshops. Classes will meet to discuss journal entries discussing the events and related assigned readings. Typically offered Fall Spring.

MARS 22000 - Introduction To Medieval And Renaissance Studies

Credit Hours: 3.00. An introduction to the interdisciplinary study of the Middle Ages and Renaissance. Typically offered Fall Spring.

MARS 42000 - Medieval And Renaissance Studies Seminar

Credit Hours: 3.00. An interdisciplinary seminar in some aspect of medieval and Renaissance studies. Permission of instructor required. Typically offered Fall Spring.

Military Science and Leadership

MSL 10100 - Foundations of Officership

Credit Hours: 1.00 or 2.00. Examines the unique duties and responsibilities of officers. Discuss organization and role of the Army. Review basic life skills pertaining to fitness and communication. Analyze Army values and expected ethical behavior. Typically offered Fall.

MSL 10200 - Basic Leadership

Credit Hours: 1.00 or 2.00. Presents fundamental leadership concepts and doctrine. Practice basic skills that underlie effective problem solving. Apply active listening and feedback skills. Examine factors that influence leader and group effectiveness. Examine the officer experience. Typically offered Spring.

MSL 20100 - Individual Leadership Studies

Credit Hours: 2.00 or 3.00. Develops knowledge of self, self- confidence, and individual leadership skills. Develop problem solving and critical thinking skills. Apply communication, feedback, and conflict resolution skills. Typically offered Fall.

MSL 20200 - Leadership And Teamwork

Credit Hours: 2.00 or 3.00. Focuses on self-development guided by knowledge of self and group processes. Challenges current beliefs, knowledge, and skills. Provides equivalent preparation for the ROTC Advanced Course and the Leader's Training Course. Typically offered Spring.

MSL 30100 - Leadership And Problem Solving

Credit Hours: 3.00 or 4.00. Examines basic skills that underlie effective problem solving. Review the features and execution of the Leadership Development Program. Analyze military missions and plan military operations. Execute squad battle drills. Permission of department required. Typically offered Fall.

MSL 30200 - Leadership And Ethics

Credit Hours: 3.00 or 4.00. Probes leader responsibilities that foster an ethical command climate. Develop cadet leadership competencies. Prepare for success at National Advanced Leadership Camp. Recognize leader responsibility to accommodate

subordinate spiritual needs. Apply principles and techniques of effective written and oral communication. Permission of department required. Typically offered Spring.

MSL 40100 - Leadership And Management

Credit Hours: 3.00 or 4.00. Builds on National Advanced Leadership Camp experience to solve organizational and staff problems. Discuss staff organization, functions, and processes. Examine principles of subordinate motivation and organizational change. Apply leadership and problem solving principles to a complex case study/simulation. Permission of department required. Typically offered Fall.

MSL 40200 - Officership

Credit Hours: 3.00 or 4.00. Designed to explore topics relevant to second lieutenants entering the Army. Describe legal aspects of decision making and leadership. Analyze Army orgnaization for operations from the tactical to strategic level. Assess administrative and logistics management functions. Permission of department required. Typically offered Spring.

MSL 49000 - Directed Studies In Military Science

Credit Hours: 1.00 to 3.00. Individual readings, topics, or projects in military science appropriate for advanced undergraduate students. Permission of instructor required. Typically offered Fall Spring Summer.

Music History and Theory

MUS 25000 - Music Appreciation

Credit Hours: 3.00. The traditions, forms, and styles of classical music. Other types of music may be examined as well. (Students may register through the Continuing Education Student Learning Center at the Tech Statewide locations via distance education.) Typically offered Fall Spring Summer. CTL:IFA 1330 Music Appreciation

MUS 26100 - Fundamentals Of Music

Credit Hours: 3.00. Fundamentals of music notation, ear training, and music reading. Typically offered Fall Spring.

MUS 32400 - Teaching Music In The Elementary School

Credit Hours: 3.00. Develops basic musicianship through singing, playing instruments, reading and writing music, listening and moving to music. Surveys music teaching methods and materials. Includes lesson planning, experiences in teaching, and observation of children in music classes. Typically offered Fall Spring Summer.

MUS 36100 - Music Theory I

Credit Hours: 3.00. Course comprises instruction in melodic and harmonic processes in tonal music; development of analytic, listening and piano techniques with musical equipment. Music reading ability is required, verified through Placement Exam. Typically offered Fall Spring.

MUS 36200 - Music Theory II

Credit Hours: 3.00. A variety of styles and forms of music serve to exemplify melodic and harmonic processes and voice-leading practices in diatonic tonal music. Activities include analytic reading of musical scores, developing musical listening skills, and acquiring functional piano techniques. Typically offered Fall Spring.

MUS 36300 - Music Theory III

Credit Hours: 3.00. Analytic study of art music and popular music representative of diatonic and chromatic tonal processes. Activities include analytic reading of musical scores, developing musical listening skills, and acquiring functional piano techniques. Creative applications are encouraged. Typically offered Fall.

MUS 36400 - Music Theory IV

Credit Hours: 3.00. Introduction to twentieth-century music, emphasizing avant-garde explorations and connections to musical traditions. Analysis and research illuminate extensions of tonality, expanded chromatic vocabulary, new uses of traditional modes, exotic influences, atonality, serialism, chance music, electronic music, computer music, minimalism. Typically offered Spring.

MUS 37400 - Contemporary Music

Credit Hours: 3.00. A study of the music of the 20th century and beyond. Class activities are focused on analysis of music representative of varous genres. Typically offered Fall Spring.

MUS 37500 - Selected Topics In Music

Credit Hours: 3.00. A study of a specific genre in music (symphony, opera, chamber music, etc.) or the works of a single composer. Typically offered Fall Spring.

MUS 37600 - World Music

Credit Hours: 3.00. Exploration of musical traditions around the globe through lectures, readings, recordings, DVDs, and performances. Students will discover how cultural traditions, life rituals, arts, and other traditions influence each region's expression of music. Typically offered Fall.

MUS 37800 - Jazz History

Credit Hours: 3.00. A historical and stylistic study of jazz. Typically offered Fall Spring.

MUS 38100 - Music History I: Antiquity To Mozart

Credit Hours: 3.00. Survey of the development of Western European music history from antiquity to Mozart. Typically offered Fall.

MUS 38200 - Music History II: Beethoven To The Present

Credit Hours: 3.00. Survey of the development of Western European music history from Beethoven to the present. Typically offered Fall Spring.

MUS 49000 - Guided Reading In Music

Credit Hours: 1.00 to 6.00. For students with specialized needs and interests in the field. Permission of instructor required. Typically offered Fall Spring.

MUS 59000 - Special Problems In Music

Credit Hours: 1.00 to 4.00. An individualized and intensive study of any aspect of music required by the student's plan of study. Permission of instructor required. Typically offered Fall Spring.

Natural Resources and Environmental Science

NRES 20000 - Introduction To Environmental Careers

Credit Hours: 1.00. This course offers an introduction to general developments and practices in the environmental arena. A presentation of environmental careers and aspects of those careers that may affect job satisfaction and commitment is the main focus of the course. Included is an overview of coursework that benefits particular careers. The course is designed to introduce students to the specialized environmental areas in which they may choose to work. Typically offered Spring.

NRES 23000 - Survey Of Meteorology

Credit Hours: 3.00. (EAPS 22100) An introductory course for both science and non-science students. A general study of the atmosphere, basic meteorological principles, and weather systems. Relationships of the changing atmosphere to climate, ozone depletion, and other contemporary issues. Typically offered Fall Spring.

NRES 25500 - Soil Science

Credit Hours: 3.00. (AGRY 25500) Differences in soils; soils genesis; physical, chemical, and biological properties of soils; relation of soils to problems of land use and pollution; soil management relative to tillage, erosion, drainage, moisture supply, temperature, aeration, fertility, and plant nutrition. Introduction to fertilizer chemistry and use. Not available to students who have taken AGRY 27000. Typically offered Fall Spring.

NRES 28000 - Hazardous Waste Handling

Credit Hours: 3.00. This course satisfies the OSHA standards for completion of the 40-hour Hazardous Waste Operator/Emergency Response Technician certification, 29CFR1910.120. The course includes a 35 hours laboratory component that presents hands-on field exercises and a supervised environmental project. The environmental project provides the on-the-job experience required by OSHA for full certification. The course provides students with the information they need to protect themselves and others at the job site and gives students experience in making decisions, performing tasks, and using the equipment they will encounter in the environmental workplace. Typically offered Fall Spring.

NRES 29000 - Introduction To Environmental Science

Credit Hours: 3.00. (EAPS 11300, AGRY 29000) An introduction to environmental science, including issues such as air and water pollution, toxic waste disposal, soil erosion, natural hazards, climate change, energy resources, and environmental planning. Includes extensive in-class discussion of case studies. Typically offered Fall.

NRES 30500 - Environmental Decision Making

Credit Hours: 3.00. This course will discuss alternative ways of looking at environmental problems and assist the student with incorporating good science into a decision-making framework. Typically offered Spring.

NRES 38000 - Hazardous Waste Certification Renewal

Credit Hours: 0.00. Meets OSHA requirements for the annual 8 hours Hazardous Waste Operator/Emergency Response Technician refresher course. Developed to update student's knowledge in making decisions, performing tasks, and using the equpiment they will encounter in the environmental work place. Students successfully completing the course objectives will earn the OSHA 8 hours HAZWOPER Annual Renewal certification. Permission of instructor required. Typically offered Fall.

NRES 38500 - Environmental Soil Chemistry

Credit Hours: 4.00. (AGRY 38500) Designed as an upper level introductory course covering environmental soil chemistry concepts in the framework most applicable to inorganic and organic chemical contamination of soil and water resources and intended for students in environmental science fields that may not have a strong chemistry and/or mathematics background. Typically offered Fall.

NRES 40000 - Natural Resources And Environmental Science Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

NRES 41000 - Research In Natural Resources And Environmental Science

Credit Hours: 1.00 to 3.00. Supervised individual research. NRES 41000 provides the opportunity to participate in independent undergraduate research with the goal of learning how to design, execute, and report research. Students will properly and permanently record their information in a timely fashion and learn how to examine, analyze, and interpret their results. One credit hour corresponds to one how of laboratory preparation and three hours of laboratory research. Total credits in NRES 41000 and NRES 41100 may not exceed six credits. Permission of instructor required. Typically offered Fall Spring Summer.

NRES 42000 - Environmental Internship Reporting

Credit Hours: 1.00. Reporting on participation in government, industrial, or other internship program. Permission of department required. Typically offered Fall.

NRES 45000 - Soil Conservation And Water Management

Credit Hours: 3.00. (AGRY 45000) Principles of soil conservation with emphasis on control of soil erosion by wind and water; impact of soil management decisions on environment; soil-water-plant relations, includes agronomic aspects of water management for both irrigation and drainage. Typically offered Fall.

NRES 49700 - Natural Resources And Environmental Science Seminar

Credit Hours: 1.00. Weekly discussion on assigned topics in natural resources and environmental science, employment-related areas, and interviewing skills. Typically offered Fall.

NRES 49800 - Individual Studies In Environmental Science

Credit Hours: 1.00 to 3.00. An opportunity for upper-level undergraduates to focus their interests and knowledge on an environmentally related problem. Arrangements must be made with a Natural Resources and Environmental Science Program faculty member before registration. Permission of instructor required. Typically offered Fall Spring Summer.

Naval Science

NS 11000 - Introduction To Naval Science

Credit Hours: 3.00. An introduction to the Naval Service that emphasizes organizational structure of the DoN and DoD, assigned roles and missions of both the USN and USMC, specific warfare communities/ career paths, basic elements of leadership, and Navy Core Values. Typically offered Fall.

NS 20200 - Naval Lab And Physical Training

Credit Hours: 2.00. This lab is designed to develop students morally, mentally, and physically and to imbue in them the highest ideals of duty, honor, and loyalty. The lab deals with topics of general Navy service training, with an emphasis on leadership and physical fitness development. Typically offered Fall Spring.

NS 21200 - Naval Weapons Systems

Credit Hours: 3.00. This course provides a basic introduction to the principles underlying ballistics, the fire control problem, detection methods, and integrated weapons systems. The major naval weapons and weapons systems are examined by components and then evaluated in light of current threats and missions. Typically offered Fall.

NS 21300 - Sea Power And Maritime Affairs

Credit Hours: 3.00. An analysis through lectures, reading, and student discussion of the relationship of sea power to American history. Classical concepts and contemporary employment of sea power are examined by viewing historic and current naval and maritime developments. Typically offered Spring.

NS 21400 - Fundamentals Of Leadership

Credit Hours: 3.00. An introduction to leadership, leadership theory, management, and communications as they relate to organizational hierarchy. Topics include leadership, management, values, ethics, goal setting, communications, and team interactions. Typically offered Fall.

NS 31000 - Navigation

Credit Hours: 3.00. A comprehensive study of the theory, principles, and procedures of ship navigation, movements, and employment. The course examines celestial navigation, rules of teh nautical road, piloting, practical chartwork, tides, instruments, publications, records, and electronic navigation systems. Typically offered Fall.

NS 31100 - Naval Operations

Credit Hours: 3.00. An operational analysis approach to tactical informations and dispositions, fleet logistics and communications, relative motion and the maneuvering board, and tactical plots stressing force effectiveness and unity. Typically offered Spring.

NS 33000 - Evolution Of Warfare

Credit Hours: 3.00. This course is designed to provide a basic understanding of the art and concepts of warfare and its evolution from a warrior's perspective. This course will trace the evolution of warfare from ancient times through the present. The student will be familiarized with the concept of changing battlefields and forces that lead to changes in tactics and military developments. The student will also learn the basic terms and concepts of warfare. The student will conduct one instructional period in order to practice those skills applicable to NROTC development. During the course students will participate in class discussions designed to develop the application of principles and concepts that will be required on battlefields of today and the future. Typically offered Fall.

NS 35000 - Naval Ship Systems

Credit Hours: 3.00. This course deals with application of thermodynamics and mechanics in the design and operation of major propulsion equipment. Topics on thermodynamics, steam propulsion, nuclear power, gas turbines, internal combustion engines, auxiliary systems, ship construction and stability, engineering documentation, and new developments in naval engineering. Typically offered Spring.

NS 41300 - Naval Leadership, Management, And Ethics

Credit Hours: 3.00. This course deals primarily with concepts of leadership and ethics in Navy and Marine Corps afloat and ashore. Case studies are extensively used to hone ethical decision making skills. Particular emphasis is placed upon the Human Resource Management System in the Navy to include an understanding of drugs and alcohol abuse, intercultural affairs, and minority affairs. Permission of instructor required. Typically offered Fall Spring.

NS 44000 - Amphibious Warfare And Leadership

Credit Hours: 3.00. An in-depth discussion of the concept and history of amphibious warfare; introduction to the psychology of military leadership. Typically offered Fall.

Nuclear Engineering

NUCL 11000 - Introduction To Energy Engineering

Credit Hours: 1.00. This course, designed for first-semester freshmen, reviews and discusses the history of energy use by the world, the relation between energy usage and quality of life, the social impact of energy use, and the environmental constraints on energy usage. In particular, the role that engineering disciplines play in solving energy problems will be discussed. The full

impact that the various energy alternatives have on economic and environmental issues will be reviewed in order to provide a rational basis for energy choices for the future. Typically offered Fall.

NUCL 12000 - Freshman Research Project

Credit Hours: 1.00. In this course, the student performs a small independent project in nuclear engineering under direct faculty supervision. Typically offered Spring.

NUCL 20000 - Introduction to Nuclear Engineering

Credit Hours: 3.00. A course designed to acquaint students with the field of nuclear engineering and design. Concepts of fission, fusion, radioactivity, and neutron physics are introduced. Nodern applications of nuclear technology, including nuclear medicine, food preservation, space reactors and propulsion. Typically offered Fall Spring.

NUCL 20500 - Nuclear Engineering Undergraduate Laboratory I

Credit Hours: 2.00. A laboratory course designed for the study of the properties of radiation, radioactive material, and radiation detectors. The hazards of radiation and safe handling techniques are emphasized. Typically offered Spring.

NUCL 21100 - Fundamentals Of Nuclear Reactors

Credit Hours: 3.00. An introduction to nuclear energy, nuclear reactor principles, and nuclear power plants. Intended primarily for students in the School of Technology. Typically offered Spring.

NUCL 27300 - Mechanics Of Materials

Credit Hours: 3.00. Analysis of stress and strain; equations of equilibrium and compatibility; stress-strain laws; extension, torsion, and bending of bars; membrane theory of pressure vessels; combined loading conditions; transformation of stresses and principal stresses; elastic stability, elected topics. Typically offered Fall Spring Summer.

NUCL 29100 - Industrial Practice I

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

NUCL 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00. Professional experience in Nuclear Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 29200 - Industrial Practice II

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

NUCL 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00. Professional experience in Nuclear Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 29800 - Sophomore Seminar

Credit Hours: 0.00. Career areas in nuclear engineering, job opportunities, areas of related study, topics of current interest, orientation, professional ethics, and responsibility. Typically offered Fall Spring.

NUCL 30000 - Nuclear Structure And Radiation Interactions

Credit Hours: 3.00. Review of atomic properties and introduction to nuclear models. Discussion of radioactive decay and the interaction of nuclear radiation and reaction products with matter. Energetics and cross-sections of nuclear reactions with applications to problems typical of nuclear engineering. Typically offered Fall.

NUCL 30500 - Nuclear Engineering Undergraduate Laboratory II

Credit Hours: 2.00. Continuation of NUCL 20500. Experiments with scintillation detectors, multichannel analyzers, neutron detectors, the subcritical pile, and the reactor will be performed. Measurements will be made to demonstrate neutron activation

analysis techniques, neutron slowing down, neutron flux distributions, and the effects of control rods on neutron fluxes. Typically offered Fall.

NUCL 31000 - Introduction To Neutron Physics

Credit Hours: 3.00. Development of diffusion theory for neutrons. Neutron interactions and development of one-group neutron diffusion theory with point, plane, and fission sources. Application to one- and two-region reactors. Introduction to buckling, multiplication constants, critical size, neutron slowing down, and resonance capture. Applications using two-group theory. Typically offered Spring.

NUCL 32000 - Introduction To Materials For Nuclear Applications

Credit Hours: 3.00. Nuclear environments and materials selection for nuclear applications, bonding, crystal structure and symmetry, defects and irradiation, chemical thermodynamics, phase equilibria, phase transformations, and corrosion in nuclear systems and design. Typically offered Fall.

NUCL 32500 - Nuclear Materials Laboratory

Credit Hours: 3.00. Nuclear materials laboratory that evaluates various characterization techniques and technologies, tensile properties, hardness, fracture toughness, microstructures, X-ray diffraction, electron microscopy, mechanical properties of thin-films, NDE techniques and data acquisition in materials characterization techniques. Typically offered Fall.

NUCL 35000 - Nuclear Thermal-Hydraulics I

Credit Hours: 3.00. The first of an integrated two-course sequence introducing the concepts of nuclear reactor thermal transport and associated hydraulics with applications to design and safety. Macroscopic balances, dimensional analysis, and flow measurement. Fluid behavior, momentum transfer, and applications to reactor systems and design. Typically offered Fall.

NUCL 35100 - Nuclear Thermal-Hydraulics II

Credit Hours: 3.00. Emphasis is given to the fluid transport of heat from reactor fuel elements. Heat transfer in fluids, analogies, and applications to reactor coolant channel analysis. Two-phase flow and convective boiling. Radiative heat transfer. Applications to safety analysis and reactor design. Typically offered Spring.

NUCL 35500 - Nuclear Thermohydraulics Laboratory

Credit Hours: 3.00. Laboratory course corresponding to NUCL 35000 and NUCL 35100. Various fluid flow and heat transfer phenomena applied to nuclear reactor systems and design. Typically offered Spring.

NUCL 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 39300 - Industrial Practice III

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

NUCL 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00. Professional experience in Nuclear Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 39400 - Industrial Practice IV

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

NUCL 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00. Professional experience in Nuclear Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 39500 - Industrial Practice V

Credit Hours: 0.00. Practice in industry and comprehensive written reports of this practice. For cooperative program students only. Typically offered Fall Spring Summer.

NUCL 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00. Professional experience in Nuclear Engineering. Program coordinated by school with cooperation of participating employers. Students submit summary report and company evaluation. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUCL 39699 - Professional Practice Internship

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Permission of department required. Typically offered Fall Spring Summer.

NUCL 39800 - Junior Seminar

Credit Hours: 0.00. Continuation of NUCL 29800. Typically offered Fall Spring.

NUCL 40200 - Engineering Of Nuclear Power Systems

Credit Hours: 3.00. Principles and practice of power plant systems with design applications; thermal cycles, heat transport, mechanical designs, control, safety analysis, shielding analysis, fuel cycles; resources, optimization, options, waste management. Fusion and alternate energy sources. Typically offered Fall.

NUCL 42001 - Radiation Interaction With Materials And Applications

Credit Hours: 3.00. Fundamental of radiation interaction with materials and applications, types of radiation and radiation sources, physical mechanisms of radiation interaction with solids, radiation damage, ion mixing, applications in nuclear fission and fusion reactors, applications in materials synthesis. Typically offered Fall.

NUCL 44900 - Senior Design Proposal

Credit Hours: 1.00. The course outcome is the writing and presentation of a proposal for the senior design project, NUCL 45000. The tasks include the selection of project design topics (various nuclear engineering components and systems designs), the selection of teams, introduction to design process, team management, communication, and engineering ethics, literature and patents survey, initiation of design activities and familiarization with design tools (for example software). Typically offered Fall.

NUCL 45000 - Design In Nuclear Engineering

Credit Hours: 3.00. Application of the design process to the project design topics identified in NUCL 44900. The design process usually includes, but not limited to, mathematical modeling in design, neutronic, thermal-hydraulics and safety studies, risk assessment, economics, policy and regulation, environmental impact. Typically offered Spring.

NUCL 46000 - Introduction To Controlled Thermonuclear Fusion

Credit Hours: 3.00. Energy resources and the potential role of nuclear fusion. Ignition and breakeven conditions for fusion power plants. Particle and energy confinement in linear and toroidal magnetic fields. Review of magnetic and inertial confinement experiments and conceptual reactor configurations. Typically offered Spring.

NUCL 47000 - Fuel Cell Engineering

Credit Hours: 3.00. The principles of electromechanical energy conversion for a single fuel cell, fuel cell stack, process engineering in the fuel and oxidizer supply systems. Principles, components, operation and performance for alkaline, phosphoric acid, solid polymer, molten carbonate and solid oxide fuel cells. Provides broad insight into science, technology, system design, and safety concerns in design and operation of fuel cells. Typically offered Fall.

NUCL 48000 - Nuclear Engineering Technical Communications

Credit Hours: 3.00. This course makes students aware of the importance of communication skills-written, oral, graphical and interpersonal-in a successful nuclear engineering career and gives them the opportunity to develop and practice those skills.

Students will learn how to access, evaluate, use and synthesize relevant technical literature. In addition, through the writing and speaking assignments, students develop team work skills, gain an understanding of professional and ethical responsibilities of engineering, learn to write a simple propose and learn about selected contemporary global economic, social and political issues, particularly with respect to nuclear topics. Typically offered Fall.

NUCL 49500 - Professional Internship

Credit Hours: 0.00. Professional experience in Nuclear Engineering. Program coordinated by school with cooperation of participating employers. Students submit a summary report. Typically offered Summer Fall Spring.

NUCL 49700 - Selected Topics In Nuclear Engineering

Credit Hours: 1.00 to 6.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

NUCL 49800 - Senior Seminar

Credit Hours: 0.00. Lectures to acquaint the senior students with professional ethics, job opportunities, graduate schools, continuing study, and services of professional societies. Typically offered Fall Spring.

NUCL 50100 - Nuclear Engineering Principles

Credit Hours: 3.00. A first course for graduate students desiring a nuclear engineering sequence and an elective for students in science or engineering. The course is structured in four parts: (1) Nuclear structure and radiation, biological effects and medical applications of radiation. (2) Basics of neutron and reactor physics, neutron diffusion and reactor criticality. (3) Nuclear materials and waste. (4) Reactor systems and safety. Typically offered Fall.

NUCL 50300 - Radioactive Waste Management

Credit Hours: 3.00. Will familiarize students with the nature of the risks associated with radioactive waste and the history, regulations, and worldwide status for the safe storage of various types of radioactive waste. The sources, characteristics, and magnitudes of radioactive wastes are described, and the current and proposed engineered waste management systems are examined along with the analysis of their associated risks. Typically offered Spring.

NUCL 50400 - Nuclear Engineering Experiments

Credit Hours: 3.00. A laboratory course that, when coupled with NUCL 50100, produces a sequence that contains both the theoretical and engineering aspects of nuclear engineering. Topics include radiation detection and analysis, neutronics, and nuclear reactor experiments. Typically offered Spring.

NUCL 51000 - Nuclear Reactor Theory I

Credit Hours: 3.00. Methodologies of neutron flux calculations, diffusion and slowing down theory, flux separation, material buckling, resonance absorption, Doppler effect, 2-group and multi-group theories, and reactivity balances for design and operation. Introduction to reactor kinetics, delayed neutrons, point reactor kinetics, transient behavior, load changes, reactivity feedback, and safety implications. Typically offered Fall.

NUCL 51100 - Reactor Theory And Kinetics

Credit Hours: 3.00. Advanced methodologies for neutron flux calculation, nodal methods, introduction to transport theory, transport correction, multigroup theory, and introduction to the generation of group constants. Reactor kinetics, perturbation theory, adjoint fluxes, reactivity calculation from perturbation theory, reactivity coefficients due to Doppler effect, temperature and density changes, void coefficient, and energy and power coefficients. Microkinetics, theory of reactivity measurements, approximate methods: prompt jump approximation, and prompt kinetics. Transients with feedback, safety implications, and spatial kinetics. Typically offered Spring.

NUCL 51200 - Computers In Reactor Analysis

Credit Hours: 3.00. The application of computational methods in reactor systems analysis. Theory behind modern numerical methods (e.g. SOR, Conugate Gradient, etc.) for solving large, sparse systems on linear equations that result from the discretization of elliptical and parabolic partial differential equations. Applications include the multigroup, multi-dimensional neutron transport equation and two-phase flow fluid dynamics. Extensive use of MATLAB, FORTRAN, and UNIX(tm). No written exams, and the majority of problem sets are performed as group projects. Knowledge of FORTRAN required. Typically offered Fall.

NUCL 52000 - Radiation Effects And Reactor Materials

Credit Hours: 3.00. Introduction to radiation effects in solids and a survey of nuclear reactor materials. Radiation interaction mechanisms and effects on properties. Reactor material characteristics, selection criteria, testing, and economic considerations. Typically offered Fall.

NUCL 55100 - Mass, Momentum, And Energy Transfer In Energy Systems

Credit Hours: 3.00. Formulations for analyzing complicated thermal-hydraulic phenomena in energy systems. Derivation of two-phase flow field equations and constitutive relations. Thermal-hydraulic modeling of nuclear reactor systems. Analyses of nuclear reactor safety related phenomena based on conservation principles. Typically offered Fall.

NUCL 55200 - Thermal-Hydraulics And Reactor Safety

Credit Hours: 3.00. Applications of thermal-sciences to nuclear reactor safety design and risk assessment. Emphasis on illustrating the use of basic principles in quantitative safety assessments of practical and current interest. The basic topics revolve around multiphase transients and applications which include study of accident analysis and its applications to licensing for light water reactor systems and for liquid metal fast breeder reactor. Typically offered Spring.

NUCL 55300 - Nano-Macro Scale Applications Of Nuclear Technology

Credit Hours: 3.00. Introduction of the principles of nuclear science and engineering for addressing industrial and scientific issues ranging from sub nano-to-macro scales. Areas to be covered include: propulsion, high-energy density materials, supercooling, medical applications, sonoluminescence, novel detection systems for special nuclear and contraband materials, and advanced nuclear fusion power systems. Typically offered Fall.

NUCL 55500 - Thermal Hydraulics Measurement And Instrumentation

Credit Hours: 3.00. Measurement techniques in fluid flow, heat transfer, and multi-phase flow. The principle and practice of measurement of temperature, flow, level, pressure, and void fraction (in two-phase flow systems) as applied to nuclear reactor systems. Instrument error and measurement errors, and data acquisition system using PC. Hands-on experience in the laboratory with instruments. Typically offered Spring.

NUCL 56000 - Introduction To Fusion Technology

Credit Hours: 3.00. Introduction to electricity and magnetism, magneto-fluid-mechanics and plasma physics. Thermonuclear reactions, power balances, macroscopic and microscopic instabilities. Principles of operation and conceptual design of Tokamaks, Mirror, Theta-Pinch, and Laser-Driven fusion reactors. Typically offered Fall.

NUCL 56300 - Direct Energy Conversion

Credit Hours: 3.00. Review of energy sources and study of the basic processes of direct energy conversion and their applications to energy utilization, based on both conventional and nuclear energy conversion schemes. Conventional schemes include thermoelectric, photovoltaic, thermionic, magnetohydrodynamic generators, fuel cell systems, etc.; and nuclear energy

conversion schemes correspond to nuclear radiation and fusion energy conversion. Permission of instructor required. Typically offered Spring.

NUCL 57000 - Fuzzy Approaches In Engineering

Credit Hours: 3.00. Presentation of the mathematical fundamentals of fuzzy logic theory and a survey of engineering applications. Fuzzy sets; the extension principle; fuzzy numbers; fuzzy relations and composition; linguistic descriptions; implication operators and fuzzy algorithms are formally developed. Applications emphasize the engineering utilization of approximate reasoning to diagnostics, control, safety, and decision-making problems. Typically offered Spring.

NUCL 57500 - Neural Computing in Engineering

Credit Hours: 3.00. Mathematical fundamentals of computing with neural networks. Survey of engineering applications. Computational metaphors from biological neurons. Artificial neural networks modeling of complex, nonlinear and ill-posed problems. Emphasizes engineering utilization of neural computing to diagnostics, control, safety, and decision-making problems. Typically offered Fall.

NUCL 59700 - Nuclear Engineering Projects I

Credit Hours: 1.00 to 6.00. Development of individual research and study projects. Permission of instructor required. Typically offered Fall Spring.

NUCL 61000 - Nuclear Reactor Theory II

Credit Hours: 3.00. This course covers advanced reactor physics topics including the neutron transport theory, slowing down and resonance escape, and generalized perturbation theory. The neutron transport theory is the fundamental theory describing the neutron flux behaviors in nuclear systems. The slowing down and resonance escape calculations are essential for generating the multi-group cross sections required in the whole-core neutron transport calculations. The generalized perturbation theory is a powerful method for determining the changes in response parameters due to the variations in nuclide densities and microscopic cross sections. Prerequisites: NUCL 51000 and advanced engineering mathematics covering complex analysis, partial differential equations, and integral equations.. Typically offered Fall.

NUCL 61200 - Applied Reactor Analysis

Credit Hours: 3.00. Reactor physics analysis of existing reactors and critical experiments through the use of digital computers and reactor programs. One-, two-, and three-dimensional solutions of the diffusion and transport equations. Calculation methods for lifetime effects on excess reactivity, power distribution, breeding ratio, and temperature, void, and Doppler coefficients of

reactivity. Fuel shuffling and safety calculations for fuel handling and storage. Concurrent Prerequisite: NUCL 61000. Typically offered Fall Spring.

NUCL 64000 - Fast Reactor Theory

Credit Hours: 3.00. Course is designed to teach reactor physics specific to fast spectrum reactors and the associated computational methods. Topics include breeding and actinide burning capabilities, core design implications, and reactivity feedback mechanisms. Computational methods will be specific to fast reactor physics analysis and include the fast neutron spectrum calculation, group constant generaton and reactivity feedback calculations for Doppler, thermal expansions, and sodium void. Prerequisites: NUCL 51100 and advanced engineering mathematics covering complex analysis, partial differential equations, and integral equations. Typically offered Fall Spring Summer.

NUCL 65000 - Thermal Hydraulics For Nuclear Reactor Safety

Credit Hours: 3.00. Safety philosophy, levels and goals of safety. Approaches used for nuclear reactor safety for the protection of public health. Design basis accidents. Engineered safeguards and inherent safety features. Fundamentals of safety related thermal-hydraulic phenomena and their integration into a methodology for containment assessment. Prerequisite: ME 50500. Typically offered Spring.

NUCL 65500 - Two-Phase Flow Computational Fluid Dynamics Applications

Credit Hours: 3.00. The course guides the student to two-fluid model solutions using computational fluid dynamics (CFD). Topics include: review of the two-fluid model, review of elliptic and parabolic partial differential equations, description of numerical algorithms, and two-phase flow channel and jet flows. Prerequisite: NUCL 56000. Typically offered Fall.

NUCL 66000 - Magnetic Confinement Fusion

Credit Hours: 3.00. Applications of plasma physics for analysis and design of plasma configurations in fusion reactors. Topics include beam-driven fusion systems, plasma heating and ignition via neutral beams and RF wave heating, plasma waves, kinetic and fluid descriptions of plasmas, and energy transport; blanket neutronics for tritium breeding, energy conversion, and reactor design considerations. Prerequisite: NUCL 56000. Typically offered Spring.

NUCL 66100 - Inertial Confinement Fusion Technology

Credit Hours: 3.00. Inertially confined thermonuclear fusion reactions and energy gains; laser-plasma interactions; hydrodynamic compression; energy transports including electron thermal conduction and radiation transport; beam transport and instabilities;

driver energy deposition and the driver development for lasers, particle beams and accelerators; and target designs. Approval of Instructor required. Prerequisite: NUCL 56000 or equivalent. Typically offered Fall.

NUCL 69600 - Nuclear Engineering Seminar

Credit Hours: 0.00. Discussion by graduate students and invited speakers of their research projects and topics of interest in nuclear engineering. Prerequisite: Master's student standing and Nuclear Engineering majors only. Typically offered Fall Spring.

NUCL 69700 - Nuclear Engineering Projects II

Credit Hours: 1.00 to 6.00. Development of individual research and study projects. Permission of instructor required. Typically offered Fall Spring.

NUCL 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

NUCL 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Nuclear Pharmacy

NUPH 41200 - Diagnostic Imaging I

Credit Hours: 1.00. The overall objective of this course is to introduce the concepts of diagnostic imaging and clinical applications as relevant to the practice of pharmacy. Basic principles applicable to instrumentation, the design of diagnostic imaging drugs, and clinical concepts are emphasized. In addition to specific diagnostic drugs and therapeutic adjuncts used with various imaging modalities, the advantages and limitations of each modality are presented. Typically offered Fall.

NUPH 41300 - Diagnostic Imaging II

Credit Hours: 1.00. Continuation of information on diagnostic imaging modalities as relevant to pharmaceutical care as well as emphasis upon examples of nuclear medicine procedures of specific interest to pharmacy. Fundamental concepts of radiation effects on living systems are applied to medical applications of radioactivity. Typically offered Fall.

NUPH 41400 - Nuclear Pharmacy Laboratory

Credit Hours: 2.00. Instrumentation and procedures basic to radiopharmaceutical preparation and analysis; health physics and regulatory aspects essential to the practice of nuclear pharmacy. Typically offered Spring.

NUPH 41600 - Practicum In Nuclear Pharmacy

Credit Hours: 1.00. A structured, supervised practice experience in nuclear pharmacy. Typically offered Summer.

NUPH 49000 - Special Topics

Credit Hours: 1.00 to 3.00. An honors course for superior students to be used in relation to, and to supplement, an existing course; an in-depth approach to topics of current interest utilizing the original literature as prime source material. A laboratory project may be included. Permission of instructor required. Typically offered Fall Spring.

NUPH 49100 - Introduction To Nuclear Pharmacy

Credit Hours: 1.00. This course will serve as an introduction to nuclear pharmacy practice and serve as the first course in the nuclear pharmacy elective series. Successful completion of the nuclear pharmacy series can be used to meet the 200 hour didactic training requirement set forth by the Nuclear Regulatory Commission (NRC) towards achieving Authorized User status. This course will provide basic information about the profession of nuclear pharmacy, as well as an introduction to radioactive material and radiation safety concepts. The course will conclude with guest lectures from practitioners in several different areas of nuclear pharmacy practice to provide information about the different areas of practice available to nuclear pharmacists. Typically offered Spring.

NUPH 49200 - Basics Of Nuclear Pharmacy Practice

Credit Hours: 1.00. This course emphasizes some of the daily tasks performed by nuclear pharmacist when working in the nuclear pharmacy. Typically offered Fall.

NUPH 49300 - Regulatory Considerations For Nuclear Pharmacy Practice

Credit Hours: 2.00. This is the second course in the nuclear pharmacy series, with an emphasis on the regulatory oversight of nuclear pharmacy practice. While the previous course dealt with radiation safety issues, this course outlines how these safety skills relate to the regulatory requirements set forth by the various regulatory agencies. Typically offered Fall.

NUPH 49400 - Clinical Aspects Of Nuclear Pharmacy Practice

Credit Hours: 2.00. This course will be offered as a short course that will primarily be offered as a lecture format with some interactive discussion and problem solving applications. This course will count towards the 200 hours of didactic training required for Authorized Nuclear Pharmacists (ANP) status. Typically offered Fall Spring.

NUPH 49600 - Case Studies In Clinical Nuclear Medicine

Credit Hours: 1.00 or 2.00. Introduction to the clinical applications of radiopharmaceutical drug products and the associated practice of nuclear medicine, through analysis of a series of current clinical case studies. Factors examined include: patient medical history, with emphasis on recent diagnostic procedures and pharmacotherapy; radiopharmaceutical selection, dosage, and preparation; possible contraindications for the nuclear medicine procedure and associated interventional agents; diagnostic findings; and the impact of study outcome on subsequent patient treatment. Permission of instructor required. Typically offered Fall Spring.

NUPH 55000 - Introduction To Positron Emission Tomography

Credit Hours: 2.00. Introduction to the principles and applications of positron emission tomography (PET). Topics include: instrumentation; radionuclide production; synthesis and applications of 15O, 11C, 13N, and 18F radiopharmaceuticals; quantitative tracer kinetic modeling; and regulatory issues in clinical PET. Typically offered Spring.

NUPH 69000 - Special Problems

Arrange Hours and Credit. Individual investigations in the applications of radionuclides to research and nuclear pharmacy. Hours and credits to be arranged. Permission of instructor required. Typically offered Fall Spring Summer.

NUPH 69600 - Seminar In Nuclear Pharmacy

Credit Hours: 0.00 or 1.00. Selected topics in nuclear pharmacy, radiopharmaceutical chemistry, health physics, and radiation biology, presented by staff, students, and invited speakers. Typically offered Fall Spring.

NUPH 89500 - Clerkship In Nuclear Medicine

Credit Hours: 4.00. Four-week Doctor of Pharmacy clinical rotation designed to develop the student's clinical knowledge and skills with regard to diagnostic and therapeutic nuclear medicine and associated nuclear pharmacy practice. The contributions of nuclear medicine and nuclear pharmacy to patient care will be evaluated through study of clinical cases and outcomes. NUPH 41600 and NUPH 55000 recommended. Permission of instructor required. Typically offered Fall Spring Summer.

Nursing

NUR 10800 - Introduction To Nursing

Credit Hours: 1.00. Introduce students entering the nursing profession to foundations of the baccalaureate nursing curriculum, including concepts, competencies, mandatory requirements and responsibilities within the profession. Students are introduced to the rigor of the curriculum and begin to build a sense of community within the Purdue School of Nursing. Typically offered Fall.

NUR 21400 - Introduction To Pathophysiology

Credit Hours: 3.00. An introduction to pathophysiological alterations in major regulatory mechanisms of the body. Provides a foundation for understanding general nursing practice, various diagnostic procedures, and selected therapeutic regimens. Typically offered Summer Fall Spring.

NUR 21801 - Health Assessment And Essentials Of Nursing Practice I

Credit Hours: 5.00. Focuses on the beginning concepts and principles for the professional nurse while developing fundamental skills in a nursing process framework. Through lecture and clinical learners begin to apply skills in communication and assessment. Emphasis is placed on developing physical examination skills, obtaining health histories and performing client centered safe nursing care to meet basic healthcare needs in diverse populations across the lifespan. Typically offered Fall Spring Summer.

NUR 21901 - Pathopharmacology I

Credit Hours: 3.00. An introduction to the study of underlying changes in primary physiologic regulatory mechanisms affecting homeostasis, metabolic processes, immune response, circulation, renal elimination, fluid/electrolyte and acid/base balance, sensory perception and alteration in comfort and the pharmacotherapies utilized as treatment for alterations and disease states.

This introductory knowledge provides the foundation for the understanding and practice of general nursing. Typically offered Fall Spring Summer.

NUR 22001 - Essentials Of Nursing Practice II

Credit Hours: 5.00. Continues to expand on the professional nursing role supported by fundamental concepts and principles of the nursing process in lecture and clinical settings. Learners apply communication, assessment and nursing skills while caring for the needs of clients in diverse populations across the lifespan. Typically offered Fall Spring Summer.

NUR 22101 - Pathopharmocology II

Credit Hours: 3.00. An introduction to the study of underlying changes in primary physiologic regulatory mechanisms affecting respiratory, hematologic, endocrine, neurologic, neuromuscular, gastrointestinal and reproductive function and the pharmacotherapies utilized as treatment for alterations and disease states. This course builds on the learning objectives from Pathopharmacology I to provide the foundation for the understanding and practice of general nursing. Typically offered Fall Spring Summer.

NUR 22201 - Population Health

Credit Hours: 2.00. A comprehensive introduction to population health concepts and practices through examination of philosophy, purpose, functions, activities and tools. Multiple determinants (genetics, cultural, social, and behavioral factors) that influence population health and illness are explored including the contribution of these factors to health disparities. Population-focused initiatives for health promotion and disease prevention are examined within the context of local to global public health systems. Typically offered Fall Spring Summer.

NUR 22301 - Foundations Of Research And Evidence-Based Practice

Credit Hours: 4.00. Students gain foundational competencies for evidence-based practice (EBP), including computer literacy, information literacy, and professional communication. Students learn the principles of research process and identify strengths and limitations of research articles in relation to EBP in nursing and healthcare. Typically offered Fall Spring Summer.

NUR 31401 - Health Alterations In Adults I

Credit Hours: 6.00. One of two courses focusing on providing nursing care to adults with an emphasis on the application of the nursing process to assist diverse populations reach their optimal level of wellbeing as they experience health care across the delivery system continuum. Emphasis will be on promoting clinical reasoning skills, integrating best practices, and ensuring patient safety. The course concentrates on adults experiencing alterations in tissue integrity related to surgical interventions,

cellular division, reproductive function, elimination, nutrition and sensoryfunction that typically result in hospitalization. Typically offered Fall Spring.

NUR 31501 - Nursing Of Childbearing Families

Credit Hours: 5.00. Promotes the development of nursing skills when caring for families and their newborns during uncomplicated and/or complicated childbearing experiences within a variety of clinical settings. Emphasizes the study and application of the nursing process, integrating evidence based practice while meeting the health and safety needs of diverse childbearing families. Typically offered Fall Spring.

NUR 31601 - Integration Seminar I

Credit Hours: 1.00. In this course, students will be challenged to identify appropriate nursing interventions for patients with a combination of medical and obstetrical diagnoses. Through the course activities the students will be challenged to look at healthcare from a patient perspective. Typically offered Fall Spring.

NUR 31701 - Health Alterations In Adults II

Credit Hours: 6.00. One of two courses focusing on providing nursing care to adults with an emphasis on the application of the nursing process to assist diverse populations reach their optimal level of wellbeing as they experience health care across the delivery system continuum. Emphasis will be on promoting clinical reasoning skills, integrating best practices, and ensuring patient safety. The course concentrates on adults experiencing alterations in health related to oxygenation, circulatory dynamics, endocrine regulation, neurological regulation, immune regulation and musculoskeletal dynamics that typically result in hospitalization. Typically offered Fall Spring.

NUR 31801 - Psychosocial Nursing

Credit Hours: 5.00. Focuses on providing nursing care that supports mental health and the care of persons with mental illness while providing a conceptual integration of the nursing process, theories, and research from the biopsychosocial sciences and humanities. Demonstrates the relevance of psychiatric-mental health nursing concepts to all areas of professional practice. Typically offered Fall Spring.

NUR 31901 - Integration Seminar II

Credit Hours: 1.00. In this course, students will be challenged to identify appropriate nursing interventions for patients with a combination of medical and psychiatric diagnoses. Through the course activities, the students will be challenged to look at healthcare from a patient perspective. Typically offered Fall Spring.

NUR 32800 - Clinical Applications Of Pathophysiology

Credit Hours: 3.00. This course organizes physiological principles into a rationale for commonly encountered signs, symptoms, and therapy of selected disorders and diseases. Students are encouraged to synthesize these principles into a basis for formulating and evaluating the nursing care of clients. Typically offered Fall Spring.

NUR 34800 - Spanish For Health Care Professionals

Credit Hours: 3.00. To improve the ability of health care professionals to communicate with Spanish-speaking clients and families in health care settings. Typically offered Fall.

NUR 38199 - Professional Practice Co-Op I

Credit Hours: 0.00. Program coordinated by Nursing with cooperation of participating employers and the Office of Professional Practice. Students will submit summary reports and company evaluations related to the experience. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUR 38299 - Professional Practice Co-Op II

Credit Hours: 0.00. Program coordinated by Nursing with cooperation of participating employers and the Office of Professional Practice. Students will submit summary reports and company evaluations related to the experience. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUR 38399 - Professional Practice Co-Op III

Credit Hours: 0.00. Program coordinated by Nursing with cooperation of participating employers and the Office of Professional Practice. Students will submit summary reports and company evaluations related to the experience. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUR 39699 - Professional Practice Internship

Credit Hours: 0.00. Program coordinated by Nursing with cooperation of participating employers and the Office of Professional

Practice. Students will submit summary reports and company evaluations related to the experience. Professional Practice students only. Permission of department required. Typically offered Fall Spring Summer.

NUR 39801 - International Special Topics

Credit Hours: 1.00 to 6.00. Course taken during an international experience that is recognized by the University. Permission of department required. Typically offered Fall Spring Summer.

NUR 39900 - Special Topics

Credit Hours: 0.00 to 3.00. Hours, credit, and subject matter to be arranged by faculty. Typically offered Fall Spring.

NUR 40200 - Public Health Nursing

Credit Hours: 3.00. Grounded in the historical tenets of public health nursing, this course builds on the knowledge from nursing and public health science to address the heath promotion and illness prevention of culturally diverse aggregates. Typically offered Fall Spring.

NUR 40300 - Public Health Nursing Clinic

Credit Hours: 2.00. This course is a synthesis of nursing practice and public health science. Health promotion, health maintenance, health teaching and counseling, and coordination of care are utilized in providing population-focused care to individuals, families, and groups in the community. A select caseload of clients, as well as special projects, are assigned to develop student skills in the practice of public health nursing. Typically offered Fall Spring Summer.

NUR 41200 - Pediatric Nursing

Credit Hours: 3.00. A study of the factors influencing health promotion, protection, and maintenance of infants, children, and adolescents. Family theory; growth and development; primary healthcare; and acute, chronic, and terminal conditions are examined. Typically offered Fall Spring.

NUR 41300 - Pediatric Nursing - Clinic

Credit Hours: 2.00. Experience is provided in caring for healthy, at risk, acutely, and chronically ill infants, children, and adolescents and their families. Typically offered Fall Spring.

NUR 41401 - Pediatric Nursing

Credit Hours: 5.00. Explores factors influencing the health and wellness of children and families. Students will apply principles, concepts and research from the health and human sciences to the care of children and families across the health-illness continuum. A structured clinical component focuses on clinical reasoning and evidence based practice. Students will provide family centered care to healthy, at risk and ill children across a variety of clinical settings. Typically offered Fall Spring Summer.

NUR 41501 - Public Health Nursing

Credit Hours: 5.00. Utilize health promotion, maintenance, education and disease prevention in coordinating and providing population-focused care to individuals, families and aggregates in the community. A variety of clinical settings are used to offer students a broad, comprehensive perspective of public health nursing, a field that synthesizes content from nursing, social and public health sciences. Collaboration with the community and implementation of population-focused interventions foster critical thinking and independent decision making in the delivery of nursing care. Typically offered Fall Spring Summer.

NUR 41601 - Management Of Clients With Complex Health Issues

Credit Hours: 2.00. Focuses on nursing care of adults, children, and families with complex healthcare needs. Challenges students to use critical thinking and clinical reasoning to identify, prioritize, and evaluate nursing care interventions for clients with complex healthcare issues. Typically offered Fall Spring Summer.

NUR 41701 - Leadership In Nursing

Credit Hours: 3.00. Studies the components of nursing leadership and management functions with an emphasis on critical thinking, problem solving, communication, and team building within the context of experiential problem-based group projects. This course will provide specific practice and evaluation of strategic and financial planning, conflict management, delegation, and complex change. Competencies to be gained, at a novice level, include professional communication, sound ethical and legal judgments within personal and organizational frameworks, leadership skills in the management and evaluation of others, and an understanding of the drivers of healthcare change and finances. Typically offered Fall Spring Summer.

NUR 41801 - Clinical Capstone And Issues In Professional Practice

Credit Hours: 4.00. Promotes the use of critical thinking, clinical reasoning, and active learning to analyze contemporary issues

related to professional nursing practice. Issues surrounding political action, socio-legal concerns, cultural diversity and ethics in nursing practice are used as a framework. A supportive and structured clinical component in a real-world setting encourages the learner to focus on refining clinical, leadership, and time-management skills in the delivery of care to diverse groups of clients across the lifespan. The clinical component assists the learner to transition from the role of students to novice nurse. Typically offered Fall Spring Summer.

NUR 43700 - Clinical Leadership Development

Credit Hours: 2.00 or 3.00. Senior nursing students in collaboration with nursing faculty refine leadership behaviors in a clinical setting. Typically offered Spring Fall.

NUR 50000 - Theoretical Constructs In Nursing

Credit Hours: 3.00. This course examines the integration of theory/conceptual relationships in the development of nursing knowledge. Students explore ways in which nurses in advanced practice incorporate theoretical knowledge in the implementation of the advanced practice in nursing role. Students analyze the clinical relevance of mid-range and practice theories. Students examine the relationship of theoretical constructs to research and praxis through concept analysis, theory evaluation, and discussion of the application of theory to practice. This course examines ways in which theoretical thought is embedded in evidence-based nursing practice. Typically offered Fall Spring Summer.

NUR 50100 - Foundations Of Advanced Practice In Nursing

Credit Hours: 2.00. This course builds on the knowledge and experiences that students possess when beginning their advanced practice in nursing education. Students explore their assumptions about advanced practice in nursing, its historical context and definitions of the various advanced practice roles, conceptual underpinnings and role competencies. Students develop an appreciation for how evidence based practice influences advanced practice in nursing. They develop skills that include using information communication technologies, identifying problems, posing questions that lead to evidence sources, searching and differentiating among various sources and types of evidence. Typically offered Fall Spring Summer.

NUR 50200 - Pharmacotherapeutics for Advanced Practice Nursing

Credit Hours: 3.00. Course includes pharmacodynamics, pharmacokinetics, and pharmacotherapeutics of broad categories of pharmacologic agents. Students apply these principles and also consider the role of best available evidence and patient preferences as a basis for managing pharmacologic regimens. Students review regulations relevant to prescriptive authority for advanced practice nurses. Typically offered Fall Spring Summer.

NUR 50300 - Advanced Health Assessment

Credit Hours: 3.00 (West Lafayette, Fort Wayne) 4.00 (Calumet) Students develop advanced, evidence-based health assessment skills that build on their current knowledge and abilities. Major concepts of the course include comprehensive and focused history taking and advanced physical assessment. Students relate underlying physiologic mechanisms with normal and abnormal findings from the history and physical assessment. The course provides a basis for designing a culturally sensitive and evidence-based plan of care within the situational context of the individual. Typically offered Fall Spring.

NUR 50500 - Sociocultural Influences On Health

Credit Hours: 2.00 or 3.00. This course examines the influences of cultural and sub-cultural variables on health and health care delivery. Students analyze and apply appropriate theoretical perspectives and current research to design evidence-based strategies that ground clinical decision making in advanced practice nursing. Students use the National Standards on Culturally and Linguistically Appropriate Services (CLAS) as the basis for providing culturally competent care. As students apply principles of culturally competent communication they are encouraged to develop insight and an attitude of resistance to stereotyping. Students gain an understanding of the context of vulnerable and marginalized populations through the analysis of social, cultural, and economic influences that impact health and illness. Typically offered Fall Spring Summer.

NUR 50700 - Physiologic Concepts For Advanced Practice Nursing

Credit Hours: 4.00. Students examine the principles of physiologic function at all levels of organization from cells to organ systems as they affect human function. The course uses homeostasis as a model to account for regulatory and compensatory functions in health. Students develop the necessary theoretical and empirical foundation for subsequent understanding of the diagnosis and management of human responses to disease and non-disease based etiologies. Typically offered Summer Fall Spring.

NUR 51000 - Research And Evidence Based Nursing Practice

Credit Hours: 3.00. This course focuses on both the generation of primary evidence through an in-depth examination of the research process and its critical use in evidence based practice. Students systematically search, appraise and interpret the best available evidence that informs advanced practice nursing and health related disciplines. Typically offered Summer Fall Spring.

NUR 51100 - Health Promotion For Advanced Practice In Nursing

Credit Hours: 2.00 or 3.00. Students analyze health promotion/disease prevention, and health education frameworks combined with best available evidence as a foundation for advanced practice in nursing. Students promote the health of diverse client populations by incorporating the Healthy People goals, clinical practice guidelines, risk assessment, epidemiological data and evidence based screening tools into nursing practice. In collaboration with selected clients and/or families, students implement health coaching/teaching through the integration of family, health promotion and health literacy theories. Typically offered Fall Spring Summer.

NUR 51200 - Clinical Applications In Pharmacotherapeutics

Credit Hours: 1.00. This course applies information from NUR 50200 to the care of clients through the use of case studies. Emphasis is placed on incorporating information from pharmacology, physiology, and physical assessment. Typically offered Summer Fall Spring.

NUR 51300 - Health Promotion In Special Populations

Credit Hours: 3.00. Examination of wellness and health promotion issues unique to three special populations: clients in rural areas, women, and adolescents. Legal and ethical issues related to practice with special populations is addressed. Evidence-based standards will be utilized. Typically offered Summer Fall Spring.

NUR 51400 - Clinical Application In Pharmacotherapeutics For Pediatric Nurse Practitioners

Credit Hours: 1.00. Applies information from NUR 50200, Pharmacotherapeutics in Primary Care, to the care of infants, children, and adolescents through the use of case studies. Emphasis is placed on incorporating information from pharmacology, physiology, and physical assessment. Typically offered Spring.

NUR 51500 - Health Promotion In Pediatric Populations

Credit Hours: 3.00. Examines wellness and health promotion issues unique to children from birth through adolescence. Concepts of growth and development are integrated into health promotion activities. Legal and ethical issues related to practice with children and adolescents are addressed. Evidence-based practice standards will be utilized. . Typically offered Summer.

NUR 52500 - Informatics In Nursing

Credit Hours: 3.00. Integrates nursing science with computer technology and information science to identify, gather, and manage information. Emphasis on technology based health applications with support clinical, administrative, research, and educational decision making enhancing the efficacy of nursing endeavors. Typically offered Summer Fall Spring.

NUR 52800 - Acute Illness: Pediatric Health Practice

Credit Hours: 3.00. A developmentally organized course to provide knowledge and experience to care for acute episodic illnesses of children and adolescents in primary health-care settings. Examines pathophysiological alterations and clinical management.

Students will synthesize knowledge of developmental, physiological, psychological, and sociocultural factors in the assessment and management of acute illness. The focus is on differential diagnosis, clinical management, and child and family education within the context of primary care. Health promotion models, and biopsychosocial, developmental, and cultural theories are integrated throughout the course. Individual, family, and group intervention strategies are addressed. . Typically offered Fall.

NUR 52900 - Acute Illness: Pediatric Health Preceptorship

Credit Hours: 3.00. Assists students to develop and broaden clinical judgment and skills. Content includes the study of primary health care of children and adolescents with acute conditions and the impact of those conditions on family members. The focus is on growth and development, assessment, differential diagnosis, clinical decision making, management, and patient and family education within the context of primary care. Professional issues, collaboration and scope of practice, and advocacy are emphasized. Clinical seminars focus on variations of child health in the context of health promotion and advanced assessment. Typically offered Fall.

NUR 53200 - Acute Illness: Adult Health Practice

Credit Hours: 3.00. Examination of pathophysiological alterations and clinical management of acute conditions in adolescents and adults. Students will synthesize knowledge of physiological, psychological, and sociocultural factors in the assessment and management of acute illness. Focus is on the differential diagnosis, clinical management, patient and family education within the context of primary care. Health promotion models, as well as biopsychosocial and cultural theories are integrated throughout the course. The adult nurse practitioner role is analyzed in the context of caring for persons with acute conditions. Typically offered Summer Fall Spring.

NUR 53300 - Acute Illness: Adult Health Preceptorship

Credit Hours: 3.00. This course assists students to develop and broaden clinical judgment and skills. Content includes the study of primary care of adolescents and adults with acute conditions and the impact of those conditions on family members. Focus is on assessment, deferential diagnosis, clinical decision making and management, as well as patient and family education within the context of primary care. The adult nurse practitioner role is analyzed in the context of caring for persons with acute conditions. Professional issues, collaboration and scope of practice, and advocacy are emphasized. Typically offered Summer Fall Spring.

NUR 54200 - Chronic And Commonly Recurring Conditions: Adult Health Practice

Credit Hours: 3.00. Examination of pathophysiological alterations and clinical management of chronic conditions and illnesses in adolescents and adults. Students will synthesize knowledge of physiological, psychological, and sociocultural factors in the assessment and management of chronic conditions. Focus is on the differential diagnosis, clinical management, and patient and family education within the context of primary care. Chronic illness and health promotion models, as well as biopsychosocial and cultural theories are integrated throughout the course. Individual, family, and group intervention strategies are addressed. The

adult nurse practitioner role is analyzed in the context of caring for persons with acute conditions. Typically offered Summer Fall Spring.

NUR 54300 - Chronic Illness: Adult Preceptorship

Credit Hours: 3.00. This course assists students to develop and broaden clinical judgment and skills. Content includes the study of chronic illness and recurring conditions in adolescents and adults and the impact of those conditions on family members. Focus is on the differential diagnosis, clinical decision making and management, as well as patient and family education within the context of primary care. The adult nurse practitioner role is analyzed in the context of caring for persons with chronic conditions. Professional issues, collaboration, scope of practice and advocacy are emphasized. Typically offered Summer Fall Spring.

NUR 55200 - Chronic Illness And Commonly Recurring Conditions: Pediatric Health Practice

Credit Hours: 3.00. Examines pathophysiological alterations and clinical management of chronic conditions and illnesses in children and adolescents. Students will synthesize knowledge of developmental, physiological, psychological, and sociocultural factors in the assessment and management of chronic conditions. The focus is on the differential diagnosis, clinical management, and child and family education within the context of primary health care. Chronic illness and health promotion models, as well as biopsychosocial, developmental, and cultural theories are integrated throughout the course. Individual, family, and group intervention strategies are addressed. Typically offered Spring.

NUR 55300 - Chronic Illness And Commonly Recurring Conditions: Pediatric Health Preceptorship

Credit Hours: 3.00. Assists students to develop and broaden clinical judgment and skills. Content includes the study of chronic illness and recurring conditions in children and adolescents and the impact of those conditions on family members. The focus is on growth and development, differential diagnosis, clinical decision making and management, and child and family education within the context of primary care. The pediatric nurse practitioner role is analyzed in the context of caring for children with chronic conditions. Professional issues, collaboration, scope of practice, and advocacy are emphasized. . Typically offered Spring.

NUR 56300 - Oncology Screening And Health Promotion

Credit Hours: 3.00. This course examines screening and surveillance for the prevention and control of cancer. Emphasis is placed on gaining theoretical knowledge to support the evaluation of clients with a past, current, or potential diagnosis of cancer. Focus is on the holistic approach to care using state-of-the-art interventions that provide effective risk assessment, disease surveillance, health education and health promotion. Typically offered Summer.

NUR 56400 - Pharmacology For Advanced Practice Oncology Certificate

Credit Hours: 2.00. This course examines the clinical management of oncology care. Emphasis is placed on gaining theoretical knowledge to support oncology patients and their families. Focus is on the holistic approach to care using state-of-the-art interventions that provide effective pain and symptom management. Prerequisites: NUR 50200 or advanced pharmacology at an advanced practice level within the past five years. Typically offered Spring.

NUR 57200 - Acute Oncology Illness

Credit Hours: 3.00. This course examines the clinical management of acute oncology care. Emphasis is placed on gaining theoretical knowledge to support the acute care of oncology patients and their families. Focus is on the holistic approach to care using state-of-the-art interventions that provide effective management of cancer comorbidities. Typically offered Fall.

NUR 57300 - Acute Oncology Illness Preceptorship

Credit Hours: 3.00. This course assists students to develop and broaden clinical judgment skills. Content includes the study of adults with acute oncology conditions and the impact of those conditions on family members. Focus is on the differential diagnosis, clinical decision making, and management, as well as patient and family education within the context of oncology care. Typically offered Fall.

NUR 58200 - Chronic Oncology Conditions And Palliative Care

Credit Hours: 3.00. This course examines the clinical management of chronic and palliative oncology care. Emphasis is placed on gaining theoretical knowledge to support chronic and/or dying patients and their families. Focus is on the holistic approach to care using state-of-the-art interventions that provide effective pain and symptom management. Typically offered Spring.

NUR 58300 - Chronic Oncology/Palliative Care Preceptorship

Credit Hours: 3.00. This course assists students to develop and broaden clinical judgment skills. Content includes the study of adults with chronic oncology conditions and the impact of those conditions on family members. Focus is on the differential diagnosis, clinical decision making and management, as well as patient and family education within the context of oncology care. Typically offered Spring.

NUR 59800 - Master's Capstone

Credit Hours: 1.00 or 3.00. Students apply research principles through problem identification, proposal development,

implementation, and evaluation of a clinical problem. Students synthesize principles of health assessment and advanced practice nursing through a clinical research project. The project may be an evaluation study or part of an ongoing faculty research project. Typically offered Summer Fall Spring.

NUR 59900 - Special Topics/Independent Study In Nursing

Credit Hours: 0.00 to 6.00 (West Lafayette, Calumet) 1.00 to 6.00 (Fort Wayne) Special topics in nursing are critically examined. Hours, credit, and subject matter are determined by the staff. Permission of instructor required. Typically offered Spring Fall Summer.

NUR 61300 - Primary Care Of The Young Family Practicum

Credit Hours: 3.00. Students progress in their ability to master the competencies of the family nurse practitioner, using critical thinking and diagnostic reasoning skills. Students apply knowledge of clinical research, pharmacology, physiology, and conceptual frameworks to the primary care of childbearing and childrearing clients and families. Prerequisite: NUR 50000, NUR 51100. Typically offered Fall Spring Summer.

NUR 62300 - Primary Care Of The Aging Family Practicum

Credit Hours: 3.00. Students progress in their ability to master the competencies of the family nurse practitioner, using critical thinking and diagnostic reasoning skills. Students apply knowledge of clinical research, pharmacology, physiology, and conceptual frameworks to the primary care of middle-aged and older clients and families. Prerequisite: NUR 61300. Typically offered Spring Fall Summer.

NUR 62400 - Evidence-Based Practice

Credit Hours: 3.00. This course focuses on discovery and utilization of evidence-based care to produce the best outcomes for patients. The student develops a problem statement, performs a comprehensive literature search, and critically evaluates the evidence to determine best practice and formulate recommendations. The implementation of evidence-based practice (EBP) practical strategies, and analysis of components of EBP are examined throughout the course. Prerequisite: NUR 51000 and either an undergraduate or graduate statistics course within the last five years. NUR 62600 is recommended. Typically offered Fall Spring.

NUR 62500 - History, Ethics, And Innovations In Health-Care Delivery Systems

Credit Hours: 3.00. Broadens and refines the student's view of the current health-care delivery system by providing an analysis from an historical perspective, of the forces that have shaped the system, including scientific discoveries, technological advances,

social justice issues and the development of health professions and institutions. Nursing knowledge is influenced by these multiple factors; thus, the course provides students with tools to lead others in meeting the many challenges the health-care system brings. Achronological and topical format is used, which investigates policy and societal trends affecting health care, the nursing and medical professions, and professional practice. Changes in the roles of health-care providers and consumers are assessed from economic, social, organizational, political, ethical, legal, and technological perspectives. Typically offered Fall.

NUR 62600 - Applied Biostatistics For Outcome Evaluation

Credit Hours: 3.00. This course applied biostatistical methods commonly used in epidemiologic research to large data sets. Students learn to use statistical software to compute descriptive, bivariate, and multivariate statistics. Students translate statistical findings into conclusions relevant to the delivery of health care. Prerequisites: NUR 51000 and an undergraduate statistics course within the last five years. Typically offered Fall Spring.

NUR 63200 - Health Policy: Local To Global

Credit Hours: 3.00. Provides an overview of policy decisions related to the organization, financing, and delivery of health care in the global community. Social, ethical, cultural, economic, and political issues that affect the delivery of health care and nursing services are critically analyzed. International models for development of health policies will be examined. Roles of health-care providers and consumers of health-care services, as well as government and entrepreneurial interest are examined. Typically offered Spring.

NUR 65500 - Advanced Practice In Nursing Seminar

Credit Hours: 1.00. Students analyze movements and trends that influence advanced practice in nursing. Students dialogue with peers on issues related to advanced practice, nursing as a profession and discipline, healthcare and other related topics of interest. Prerequisite: NUR 60100, NUR 60300, NUR 61300. Typically offered Fall Spring.

NUR 65600 - Healthcare Organization, Policy and Economics

Credit Hours: 3.00. Students use theories to understand the various models that influence health care policy and organize health care delivery. Students investigate the processes of analyzing and forming health policy. The reciprocal relationship between evidence-based practice and health care policy is explored. Students examine health care economics from a micro and macro perspective and their impact on health care delivery systems. Students also explore issues such access to health care, health care quality, and cost. Prerequisite: NUR 50100. Typically offered Fall Spring Summer.

NUR 65700 - FNP Practicum: Clinical Synthesis

Credit Hours: 2.00. This is the final clinical capstone course in a sequence of clinical courses designed to prepare graduate nursing students for FNP practice. Students synthesize and apply theoretical and empirical knowledge in primary-care settings with culturally diverse clients and families. Emphasis is given to the clinical management of a wider spectrum of clients and to the more complex, co-morbid conditions seen in family practice. Prerequisite: NUR 62300, Corequisite: NUR 65500, NUR 65600. Typically offered Summer Fall Spring.

NUR 67300 - DNP Health Policy Residency

Credit Hours: 2.00. This residency course provides an opportunity for students to gain greater understanding of how public policy affects state, national, and international health-care delivery systems and resources. Students will interact with top policy makers at the local, state, national, and/or international level to explore the many forces, including political, economic, social, and technological, that influence current policy and the policy-making process. Prerequisite: NUR 65600. Typically offered Summer Fall Spring.

NUR 67500 - Role Transition And Synthesis

Credit Hours: 2.00. This course provides an integration of core, cognate, and specialty knowledge, with an emphasis on role transition and synthesis. Focuses on internal and external healthcare organizational factors at the local, state, national, and international levels. Seminars explore role issues, licensure, credentialing, finances, legislation, healthcare policy, legal issues, ethics, cultural diversity, evidence-based practice, emerging trends in the management of acute and chronic conditions of adults, and independent and collaborative practice. Prerequisite: NUR 53200, NUR 53300, Corequisite: NUR 54200, NUR 54300, NUR 59800. Typically offered Summer Fall Spring.

NUR 68000 - DNP Cognate Residency: Direct Practice/Systems Management I

Credit Hours: 3.00. This is the first in a series of two courses that applies knowledge and skill to improve healthcare outcomes in systems. The emphasis is the application of engineering principles to health care including human factors, systems analysis and design, and optimal use of information technology and simulation. Residency activities provide students with opportunities to participate in professional service activities, attend institutes and conferences to expand their area of research or clinical interest and/or develop significant scholarly pursuits. The focus is on creating change in the healthcare system through analysis, synthesis, critique, and application of evidence-based practice to support accessible high quality, safe, efficient, and effective health care. Prerequisites: NUR 68700. Typically offered Fall Spring Summer.

NUR 68100 - DNP Cognate Residency: Direct Practice/Systems Management II

Credit Hours: 3.00. This is a second in a series of two courses that applies knowledge and skill to improve healthcare outcomes in systems. The emphasis is the advanced application of engineering principles to health care including human factors, systems analysis and design, and optimal use of information technology and simulation. Students assume a leadership role in the application process utilizing skills acquired in DNP Residency: Direct Practice Management I. Residency activities provide

students with opportunities to participate in professional service activities, attend institutes and conferences to expand their area of research or clinical interest and/or develop significant scholarly pursuits. The focus is on providing leadership in creating change in the healthcare system through analysis, synthesis, critique, and application of evidence-based practice to support accessible high quality, safe, efficient, and effective health care and systematic evaluation of outcomes. Clinical sites for the DNP Residency may include collaboration with experts in local, state, national, and international healthcare agencies. Residency activities are selected by the student under the guidance of the faculty advisor and preceptor, DNP program director, and approved by the director of graduate programs in nursing. Prerequisite: NUR 68700. Typically offered Fall Spring Summer.

NUR 68300 - DNP Cognate Residency: Public Health/Homeland Security Practice I

Credit Hours: 3.00. This is the first in a series of two courses that provides an opportunity to explore a public health topic of interest under the direction of a faculty member. The focus is on implementation of an evidence-based practice model and evaluation of their effectiveness in improving community health outcomes. Residency activities provide opportunities to utilize research and evidence-based practice to expand the knowledge base needed for the development, implementation, and evaluation of programs to meet the public health needs of specific communities with risk assessment analysis. Students will assess, plan, and evaluate the preparedness and response to mass casualty disasters or other public health concerns. Prerequisites: NUR 51000 and NUR 63200. Concurrent Prerequisites: NUR 62400 and NUR 62600. Typically offered Fall Spring Summer.

NUR 68500 - DNP Cognate Residence: Public Health/Homeland Security Practice II

Credit Hours: 3.00. This is the second in a series of two courses that provides an opportunity to further explore a public health topic of interest under the direction of a faculty member. The focus is on implementation of an evidence-based practice model and advanced application of evaluation techniques in establishing their effectiveness in improving community health outcomes. Residency activities provide ongoing opportunities to refine research and evidence-based practice to expand the knowledge base needed for the development, implementation, and evaluation of programs to meet the public health needs of the community and systems of care. Emphasis is on providing leadership in incorporating assessment of health needs of specific communities with risk assessment analysis to implement models to improve community outcomes. Students assume a leadership role as they assess, plan, and evaluate the preparedness and response to mass casualty disasters or other public health concerns. Residency sites may be local, state, national, and/or international settings. Residency activities are selected by the students under the guidance of the faculty advisor and preceptor, DNP program director, and approved by the director of graduate programs in Nursing. Prerequisite: NUR 68300. Typically offered Fall Spring Summer.

NUR 68700 - Doctor Of Nursing Practice (DNP) Practice Inquiry: Evidence-Based Practice I

Credit Hours: 3.00. This course is first of a two part series that provides the opportunity to develop, implement and evaluate an evidence-based inquiry project. Students gain competence in activities aimed at improving the healthcare practice and systems, outcome evaluations, translation of research into practice, participation in interdisciplinary and collaborative research, and dissemination of research results. Total clinic hours 192. Prerequisites: NUR 51000, NUR 62600, NUR 62400 and Cognate Residencies. Typically offered Fall Spring Summer.

NUR 68900 - Doctor Of Nursing Practice (DNP) Practice Inquiry: Evidence-Based Practice II

Credit Hours: 3.00. This course is second in the series that provides the opportunity to develop, implement and evaluate an evidence-based inquiry project. Students gain competence in activities aimed at improving the healthcare practice and systems, outcome evaluations, translation of research into practice, participation in interdisciplinary and collaborative research, and dissemination of research results. Total clinic hours 192. Prerequisites: NUR 68700 and Cognate Residencies. Typically offered Fall Spring Summer.

Nutrition Science

NUTR 10500 - Nutrition In The 21st Century

Credit Hours: 1.00. Analysis of current nutrition controversies and food safety concerns. Not designed to meet CFS nutrition competency. Typically offered Fall.

NUTR 10600 - The Profession Of Dietetics

Credit Hours: 1.00. Semester two offered only through videotapes and e-mail. Overview of the dietetics profession, including standards, ethics, educational and employment opportunities, and professional credentialing. Typically offered Fall Spring.

NUTR 10700 - Introduction To Nutrition Science

Credit Hours: 1.00. An overview of professional opportunities for nutrition scientists. Introduces tolls and resources available for becoming a nutrition scientist. Typically offered in Fall.

NUTR 12500 - Food Safety Certification

Credit Hours: 1.00. Training in ServSafe food safety certification program. Typically offered Fall Spring.

NUTR 20200 - Principles Of Food Preparation And Nutrition

Credit Hours: 4.00. Chemical, physical, microbiological, and nutritional principles of food preparation. Functions and sources of

nutrients, their relationship to a healthy lifestyle and incorporating the benefits into marketing of foodservice. Typically offered Fall Spring.

NUTR 20201 - Experience In Food Preparation

Credit Hours: 1.00. Application of chemical, physical, microbiological, and nutritional principles in food preparation. Typically offered Fall Spring.

NUTR 20500 - Food Science I

Credit Hours: 3.00. Chemical and physical composition of foods: their changes during processing, storage, and preparation. Typically offered Fall Spring.

NUTR 24500 - Rookie Experience In Sports Nutrition

Credit Hours: 1.00. For students without prior experience within the specialty dietetics practice of sports nutrition, this course provides traditional and experience-based learning in a Division I Collegiate sports setting. Guest speakers will present on various aspects of the athletics work setting. Basics of sports nutrition are taught and students must pass an exam to progress to NUTR 34500, Continuing Experience In Sports Nutrition. Written application and interview process required prior to instructor approval. Permission of Instructor required. Typically offered Fall Spring.

NUTR 29700 - Introduction To Honors Research

Credit Hours: 1.00. Introduces students to the design and implementation of an honors research project. Typically offered Fall Spring.

NUTR 30300 - Essentials Of Nutrition

Credit Hours: 3.00. Basic nutrition and its application in meeting nutritional needs of all ages. Typically offered Fall Spring Summer. CTL:IHP 1402 Human Nutrition

NUTR 31500 - Fundamentals Of Nutrition

Credit Hours: 3.00. Basic principles of nutrition and their application in meeting nutritional needs during the life cycle. Typically offered Fall Spring.

NUTR 33000 - Diet Selection And Planning

Credit Hours: 3.00. Diet selection for health maintenance in culturally diverse populations based on current dietary guides with utilization of the computer for diet evaluation. Typically offered Fall.

NUTR 33200 - Nutrition Counseling

Credit Hours: 3.00. Develop communication skills and counseling techniques necessary to elicit nutrition-related behavior changes in individuals. Typically offered Spring.

NUTR 34000 - Field Experience In Nutrition, Fitness And Health

Credit Hours: 1.00 to 3.00. Field experience in NFH-related setting that provides an opportunity for the application of the classroom experience. For NFH majors only. The student secures his/her own field experience, which must be approved by the NFH program coordinator in order to receive academic credit. Typically offered Summer Fall Spring.

NUTR 34500 - Continuing Experience In Sports Nutrition

Credit Hours: 1.00. Traditional and experience-based learning within the specialty dietetics practice of sports nutrition in a Division I Collegiate sports setting. Guest speakers will present on various aspects of the athletics work setting. Students must pass an exam given in NUTR 24500, Rookie Experience In Sports Medicine, to enroll. Permission of Instructor required. Typically offered Fall Spring.

NUTR 35000 - Practicum In Dietetics

Credit Hours: 1.00 to 3.00. Supervised on-the-job experience related to the profession of dietetics in institutions, business, industry, community programs, etc. Student is responsible for arrangement and approval of the experience through the supervising dietitian and the course instructor. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 36500 - Physiology And Nutrition During The Life Cycle

Credit Hours: 3.00. Physiology and Nutrition During the Life Cycle explores the life stages of pregnancy, childhood, adulthood and older adulthood from physiological, social, and behavioral perspectives, focusing on the biological underpinnings of special nutritional needs for each life stage for optimal growth and development, maturation, aging, and overall health and well-being. Typically offered Spring.

NUTR 37500 - Foods And Nutrition Internship

Credit Hours: 1.00 to 4.00. Food science or nutrition professionally related work experience in industry, institutions, or business. Permission of instructor required. Typically offered Summer Fall Spring.

NUTR 39000 - Independent Undergraduate Research

Credit Hours: 1.00 to 3.00. Individual research projects undertaken with faculty supervision. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 39100 - Independent Study

Credit Hours: 1.00 to 3.00. Independent scholarly activity undertaken with faculty supervision. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 39200 - Undergraduate Instruction Nutrition

Credit Hours: 1.00 to 5.00. Problems dealing with various aspects of nutrition. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 39700 - Directed Honors Research

Credit Hours: 1.00 to 3.00. Directed independent honors research for CFS Honors Program students. Students must select a faculty advisor for the course. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 39800 - International Special Topics

Credit Hours: 1.00 to 3.00. Course taken during an international experience that is recognized by the University. Typically offered Fall Spring Summer.

NUTR 40000 - Executive In The Classroom

Credit Hours: 1.00. Lecture and discussion, featuring industrial and business executives in food-related areas. Emphasis is placed on careers in the food industry. Typically offered Fall.

NUTR 41100 - Dietetics Career Planning

Credit Hours: 1.00. Upon completion of this course, students will be prepared to successfully apply and interview for jobs and advanced education. Typically offered Fall.

NUTR 41500 - Practicum In Nutrition, Fitness, And Health

Credit Hours: 2.00. Application of nutrition and exercise knowledge and skills by performing assessments, interpreting data, designing and implementing programs, documenting progress, and counseling of an adult client. Typically offered Fall Spring Summer.

NUTR 42400 - Communication Techniques In Foods And Nutrition

Credit Hours: 3.00. Communication of foods and nutrition information to lay and professional audiences through oral, written, and mass media channels. Typically offered Fall Spring.

NUTR 42600 - Lab In Community Nutrition

Credit Hours: 3.00. Application of previous knowledge and communication skills in nutrition of community settings, such as school nutrition, health facilities, and federal or state nutrition programs. Typically offered Fall.

NUTR 43600 - Nutritional Assessment

Credit Hours: 2.00. Nutrition assessment in humans, including anthropometric, biochemical, clinical, and dietary assessment. Typically offered Fall.

NUTR 43700 - Macronutrient Metabolism In Human Health And Disease

Credit Hours: 3.00. Metabolism of the macronutrients, carbohydrate, lipds and protein in humans integrating physiology, biochemistry, and nutrition with a focus on maintaining optimal health and preventing disease. Typically offered Spring.

NUTR 43800 - Micronutrient And Phytochemical Metabolism In Human Health And Disease

Credit Hours: 3.00. Metabolism of the micronutrients and phytochemicals in humans integrating physiology, biochemistry and nutrition with a focus on maintaining optimal health and preventing disease. Typically offered Fall.

NUTR 44200 - Foodservice Systems Management

Credit Hours: 2.00. Systems approach to foodservice management. Foodservice operations based on nutritional goals of the target market. Food sanitation and safety, management of human resources, and supervision. Emphasis on applications to health-care facilities. Typically offered Spring.

NUTR 44300 - Laboratory In Foodservice Systems Management

Credit Hours: 9.00. Application of previous knowledge and communication skills in foodservice facilities. Laboratory, student's performance will ultimately include responsibilities equivalent to staff relief. Typically offered Fall.

NUTR 45300 - Food Chemistry

Credit Hours: 4.00. Application of fundamental laws and concepts of chemistry, physics, and biology to the properties, composition, and storage of foods. Typically offered Fall Spring.

NUTR 46100 - Laboratory In Medical Nutrition Therapy

Credit Hours: 10.00. Application of previous knowledge and communication skills of medical nutrition therapy in the hospital/pateint care setting to ultimately include responsibilities equivalent to staff relief. Typically offered Spring.

NUTR 46500 - Laboratory In Engagement

Credit Hours: 3.00. Culminating experiences in community nutrition, foodservice, medical nutrition therapy, public health, research and/or nutrition related business. Placements will be arranged based on individual student's preferred track in long-term care facilities, hospitals, public health or community agencies, and/or business and industry. Typically offered Spring.

NUTR 48000 - Medical Nutrition Therapy I

Credit Hours: 3.00. Nutrition assessment in humans and introduction to the nutrition care process. Application of the nutrition care process to various disease states. Typically offered Fall.

NUTR 48100 - Medical Nutrition Therapy II

Credit Hours: 3.00. Application of the Nutrition Care Process in various disease states and conditions to prepare students for supervised practice programs. Typically offered Spring.

NUTR 48800 - Topics In Nutrition, Fitness, And Health

Credit Hours: 3.00. This course critically evaluates the interrelationships between nutrition and exercise and their impact on physical performance and health. Concepts combining nutritional sciences and exercise physiology will be presented. Emerging science and controversies in the current literature will be discussed. Typically offered Fall Spring.

NUTR 49000 - Independent Undergraduate Research

Credit Hours: 1.00 to 4.00. Independent research projects undertaken with faculty supervision. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 49100 - Independent Study

Credit Hours: 1.00 to 4.00. Independent scholarly activity undertaken with faculty supervision. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 49200 - Undergraduate Instruction In Nutrition

Credit Hours: 1.00 to 5.00. Problems dealing with various aspects of nutrition. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 49500 - Undergraduate Seminar In Foods And Nutrition

Credit Hours: 1.00. Instruction and application of concepts for effective oral presentations in the field of nutrition sciences. Typically offered Spring.

NUTR 49700 - Honors Research Project

Credit Hours: 1.00 to 4.00. The completion of the independent honors research project for CFS Honors Program students. Must have an approved Honors Project Proposal. Permission of instructor required. Typically offered Fall Spring Summer.

NUTR 52000 - Medical Nutrition Therapy

Credit Hours: 4.00. Application of nutrition principles in the dietary treatment of certain organic, functional, and metabolic diseases. Typically offered Spring.

NUTR 53000 - Public Health Nutrition

Credit Hours: 2.00. Assessment of nutritional needs of the community and the programs that service these needs. Typically offered Spring.

NUTR 53400 - Human Sensory Systems And Food Evaluation

Credit Hours: 3.00. Overview of human chemosensory (taste, smell, chemesthetic) mechanisms and function, as well as procedural and statistical methods for evaluating the sensory responsiveness of people and the sensory properties of foods. Typically offered Spring.

NUTR 53600 - Current Topics In Food Science

Credit Hours: 3.00. Critical evaluation of recent literature in the field of food science. Typically offered Fall.

NUTR 53800 - Readings In Nutrition

Credit Hours: 1.00 or 2.00. Critical evaluation of the recent literature in the field of nutrition. Typically offered Fall Spring.

NUTR 54000 - Food Regulations

Credit Hours: 1.00. Federal, state, and international regulations pertaining to the quality, wholesomeness, nutrition, and safety of foods; discussion of current topics in food legislation. Typically offered spring semester of odd numbered years.

NUTR 59000 - Special Problems In Nutrition

Credit Hours: 1.00 to 4.00. Individual problems dealing with various aspects of nutrition. Permission of instructor required. Typically offered Fall Summer Spring.

NUTR 59500 - Special Problems In Food Science

Credit Hours: 1.00 to 4.00. Individual research problems dealing with various aspects of research in the food sciences. Permission of instructor required. Typically offered Spring Fall Summer.

NUTR 60100 - Functions Of Nutrients: Vitamins

Credit Hours: 3.00. Readings and discussion with emphasis on molecular aspects and biological functions of vitamins in human nutrition. Prerequisite: NUTR 43500; Corequisite: BCHM 56100. Typically offered Fall.

NUTR 60200 - Functions Of Nutrients: Carbohydrates And Lipids

Credit Hours: 3.00. Integration of biochemical and physiological functions of proteins, lipids, and carbohydrates as related to human nutrition. Prerequisite: BCHM 56100, NUTR 43500; Corequisite: BCHM 56200. Typically offered Spring.

NUTR 60500 - Nutritional Biochemistry And Physiology I

Credit Hours: 4.00. (ANSC 62500) Integration of biochemical and physiological functions of nutrients in humans and animals emphasizing interactions in bone and gut. Prerequisite: BCHM 30700, BCHM 30900, BIOL 20300, BIOL 20400, NUTR 31500. . Typically offered Fall.

NUTR 60600 - Nutritional Biochemistry And Physiology II

Credit Hours: 2.00. (ANSC 62600) Integration of biochemical and physiological functions of nutrients in humans and animals emphasizing post-absorptive use of nutrients as sources of energy and for the synthesis of macromolecules. Offered weeks 1 - 8. Prerequisite: NUTR 60500. Typically offered Spring.

NUTR 60700 - Nutritional Biochemistry And Physiology III

Credit Hours: 2.00. (ANSC 62700) Integration of biochemical and physiological functions of nutrients in humans and animals, emphasizing lipid metabolism and transport in the context of cardiovascular function. Offered weeks 9 - 16. Prerequisite: NUTR 60600. Typically offered Spring.

NUTR 60900 - Food Lipids

Credit Hours: 1.00 to 3.00. (FS 60900) Importance of lipids in the diet and food systems with emphasis on changes occurring during processing, preparation, and storage. Nomenclature, physical attributes, and oxidation of lipids as well as properties and characteristics of antioxidants will be major components of the course. Offered in alternate years. Prerequisite: BCHM 56100; Prerequisite: NUTR 45300 or FS 45300. Typically offered Fall.

NUTR 61000 - Food Proteins

Credit Hours: 3.00. (FS 61000) Chemical and physical properties, distribution and function, and alteration of proteins in food. Protein toxicology and nutritional quality. Offered in alternate years. Prerequisite: BCHM 56100 and (NUTR 45300 or FS 45300). Typically offered Spring.

NUTR 61100 - Food Toxicology

Credit Hours: 3.00. Acute, chronic, and genetic toxicology of naturally occurring food substances and their absorption and distribution through the digestive tract, food carcinogens and their mode of action, intentional food additives, and incidental food additives; foodborne pathogenic bacteria, mechanisms of action; presence and significance of fungi, viruses, and parasites in foods; immunological aspects of foods; food-drug interactions; toxicological aspects of food processing. Offered in alternate years. Prerequisite: BCHM 56200, NUTR 45300. Typically offered Spring.

NUTR 61200 - Obesity: Behavior, Physiology And Policy

Credit Hours: 2.00. The topics in this course provide a firm conceptual foundation for graduate students interested in issues related to obesity. Topics include issues ranging from molecular to policy: there is a strong emphasis on interdisciplinary approaches and critical thinking as it is a goal to integrate the sophisticated analyses of the physiological, nutritional, developmental, genetic, sensory, socio-economic, and experiential determinants of food and fluid intake. In addition, topics in this course such as health implications of obesity, epidemiology of obesity, endocrine, energy metabolism/integration, and neurochemistry will provide the opportunity for greater interdisciplinary collaborations. Typically offered Fall.

NUTR 61500 - Mineral Metabolism

Credit Hours: 3.00. Metabolic functions and bioavailability of minerals in human and animal systems. Should be preceded by BCHM 56100/BCHM 56200. Offered in alternate years. Typically offered Fall.

NUTR 61600 - Special Topics In Ingestive Behavior

Credit Hours: 3.00. (PSY 61401) Explore, in -depth, important and current issues in ingestive behavior: enhance critical thinking skill; and acquire professional skills (e.g., organizational, interpersonal) and develop rapport with scholars in the field. Typically offered in even ending years. Typically offered Spring.

NUTR 61700 - Ingestive Behavior Seminar

Credit Hours: 1.00. (PSY 61801) Fosters an exchange of ideas and promotes greater familiarity among individuals from different laboratories and departments with interests related to ingestive behavior, and gives students opportunities to build their communication skills and lead/mediate discussions at a high scholarly level. Typically offered in alternate years. Typically offered Fall.

NUTR 62200 - Human Nutrition And Atherosclerosis

Credit Hours: 1.00. An in-depth examination of the role of nutrition in atherosclerosis. Offered in alternate years. Prerequisite: NUTR 60100, NUTR 60200. Typically offered Fall.

NUTR 62300 - Human Nutrition And Cancer

Credit Hours: 1.00. An in-depth examination of the role of nutrition in cancer. Offered in alternate years. Prerequisite: NUTR 60100, NUTR 60200. Typically offered Fall.

NUTR 63000 - Carbohydrates

Credit Hours: 3.00. (FS 63000) Carbohydrates with an emphasis on those of low molecular weight in foods. Structures, reactions, and properties of mono- and oligosaccharides. Introduction to polysaccharides and food gums. Offered in alternate years. Prerequisite: 6 credit hours in Organic Chemistry. Typically offered Fall.

NUTR 63100 - Polysaccharide Structure And Function

Credit Hours: 3.00. (FS 63100) Chemical structures, molecular structures, and physical properties of polysaccharides with methods for determining each, and relationships to practical applications. Offered in alternate years. Prerequisite: BCHM 56100; Prerequisite: NUTR 45300 or FS 45300. Typically offered Spring.

NUTR 63400 - Nutrition And Cancer Prevention

Credit Hours: 2.00. An in-depth examination of the role of nutrition in cancer prevention. Typically offered in the spring semester of alternate years.

NUTR 64000 - Human Feeding

Credit Hours: 2.00. Critical review of the genetic, neural, metabolic, endocrine, sensory, cognitive, and cultural determinants of appetite, food selection, and energy balance. Offered in alternate years. Prerequisite: physiology, biochemistry. Masters student standing. Typically offered Fall.

NUTR 69000 - Interdepartmental Nutrition Program Grant Writing

Credit Hours: 1.00. Fulfillment of grant writing requirements for graduate students enrolled in the Interdepartmental Nutrition Program. Prerequisite: Interdepartmental Nutrition Program graduate students status. Permission of instructor required. Typically offered Summer Fall Spring.

NUTR 69400 - Introductory Foods And Nutrition Seminar

Credit Hours: 1.00. Instruction and application of concepts for effective oral and written professional presentations in the field of nutrition science. Typically offered Spring.

NUTR 69500 - Seminar

Credit Hours: 0.00 or 1.00. Provides graduate students an opportunity to further develop and strengthen their skills in organization, preparation, and presentation of scientific information relevant to nutrition and/or foods to an informed audience of students and faculty, as well as constructively evaluate their peers' presentations. Typically offered Fall Spring.

NUTR 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

NUTR 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Organizational Behavior and Human Resources

OBHR 10100 - Introduction Career Development

Credit Hours: 1.00. Introduction Career Development. Typically offered Fall Spring Summer.

OBHR 23000 - Teamwork

Credit Hours: 2.00. Coupled with an immersion in a team-learning environment, students will be exposed to topics and exercises relating to the nature of teams, team and member assessments, goal setting, communications and meetings, conflict and resolution, and feedback tools. Students will benefit by first-hand experience in an environment that stresses team performance while requiring and providing the students with the ability to enforce individual accountability. The course is designed so that attendance on the first day is mandatory to maintain enrollment in the class. Permission of department required. Typically offered Fall Spring.

OBHR 29000 - Sophomore Level Problems In Organizational Behavior

Credit Hours: 1.00 to 4.00. Arrange with instructor before enrolling. Investigation in a specific organizational behavior/human resource management field. Typically offered Summer Fall Spring.

OBHR 30000 - Management Of Human Resources

Credit Hours: 3.00. Survey of theory and techniques used in human resource management within organizations. Emphasis is placed on legal concerns, human resource staffing and development, reward systems, and the role of unions in American society. Techniques studied include job analysis, the use of various recruitment and selection procedures, compensation, administration, and collective bargaining. No credit for students in the School of Management. Typically offered Fall Spring Summer.

OBHR 33000 - Introduction To Organizational Behavior

Credit Hours: 3.00. This course investigates the impact that individuals, groups, and organizational structure have on behavior within organizations for the purpose of applying such knowledge toward improving an organization's effectiveness. Attention is given to such topics as motivation, leadership, group processes, organizational structure, technological innovation, and conflict management. Emphasis is placed on developing management skills and application of organizational behavior theories. Typically offered Fall Spring.

OBHR 39000 - Junior Level Problems In Organizational Behavior

Credit Hours: 1.00 to 4.00. Arrange with instructor before enrolling. Investigation into a specific topic area of organizational behavior/human resource management. Permission of instructor required. Typically offered Fall Spring Summer.

OBHR 42800 - Human Resources Management

Credit Hours: 3.00. Survey of the techniques and practices used in human resource management. Emphasis is on legal requirements, cost/benefit considerations, and strategic needs in managing human resources. Topics include recruitment, selection and placement, compensation, work design, and reactions to work. Specific techniques reviewed include assessment centers, incentive plans, structured interviewing, and autonomous work groups. Current issues and managerial decision making are emphasized. Typically offered Summer Fall Spring.

OBHR 42900 - Labor Relations

Credit Hours: 3.00. The course focuses on employee-employer relations. Attention is given to topics in legal aspects of union

organizing and collective bargaining, labor unions history and structure in the United States, labor management negotiations, dispute resolution procedures, international labor relations, and labor-management cooperation. Typically offered Summer Fall Spring.

OBHR 43000 - Labor Relations

Credit Hours: 3.00. This course examines the role of unions in American society. Topics discussed include labor management relations, why workers join unions, dispute resolution, and cooperative labor-management programs. No credit for students in the School of Management. Typically offered Fall Spring Summer.

OBHR 43100 - Human Resources Management

Credit Hours: 3.00. Survey of the theory and techniques used in the administration of the personnel function in the modern enterprise. Emphasis is placed on the meaning of work in industrialized societies, motivation and leadership of employees, manpower planning and development, reward systems, the minority worker, and the development of managerial skills. Techniques studied include the use of assessment centers, selection tests, wage and salary administration, job analysis, and man-power forecasting. No credit for students in the School of Management. Typically offered Fall Spring Summer.

OBHR 43200 - Manpower Resources

Credit Hours: 3.00. Allocation of manpower resources in an industrialized economy with emphasis on public and private policy issues. Typically offered Spring.

OBHR 44000 - Social Response Of Business

Credit Hours: 3.00. The course surveys areas of social choice faced by organizations. Students have the opportunity to clarify their own positions regarding appropriate organizational responses to such social problems as pollution, civil rights, consumerism, individual privacy, and business-government relations. Teaching techniques include case discussions, films, guest speakers, and student presentations. Typically offered Spring.

OBHR 44100 - Introduction To Organizational Change And Development

Credit Hours: 3.00. This course orients the student to planned approaches to adaptation and change in organizations. It is based upon applied behavioral science research and concepts which address themselves to "real life" change problems; models of the change-process, change strategies, the change agent, the critical study of organizational change efforts. This course will aid the student in understanding the dynamics of organizational behavior. Typically offered Fall Spring.

OBHR 44200 - Introduction To Administrative Decision Making

Credit Hours: 3.00. An introductory course in organizational leadership which focuses on critical skills which a manager needs to work effectively with others. Topics covered include planning, interpersonal style, effective feedback, group decision making, and inter-group relations. The course will consist of both formal instruction and experiential learning. Typically offered Fall.

OBHR 47000 - The Management Of Advanced Manufacturing Organizations

Credit Hours: 3.00. This course provides a framework for effectively managing employees in advanced manufacturing organizations. Emphasis is given to (a) understanding the relationship between technology, work system design, employee behavior, and manufacturing effectiveness, and (b) the processes involved in initiating and implementing changes in management policies, products, and technologies. Typically offered Fall Spring.

OBHR 49000 - Problems In Organizational Behavior

Credit Hours: 1.00 to 4.00. Supervised readings and reports in various subjects. Arrange with instructor before enrolling. Permission of instructor required. Typically offered Fall Spring Summer.

OBHR 56000 - Mentoring and Socialization

Credit Hours: 2.00. Students learn about the employee socialization process through case studies, discussion, and presentations. In addition, students receive practical experience through participation in a mentoring program for new students. Class discussions and presentations evolve from students' mentoring experiences, and guest speakers provide real-world perspective on new employee programs. The course helps students develop skills in mediation, leadership, conflict management, and communication. Typically offered Fall.

OBHR 59000 - Problems In Organizational Behavior And Human Resource Management

Credit Hours: 1.00 to 4.00. Advanced study and investigation in a field of organizational behavior and human resource management under the guidance of staff. Permission of instructor required. Typically offered Fall Spring Summer.

OBHR 60500 - Research Methods I

Credit Hours: 3.00. An introduction to research methods. This seminar examines the use of research methods to develop empirical tests for theoretical and practical issues. It includes readings and discussions on the philosophy of science, reliability, validity, research design, threats to research, ethics, and other issues in research methodology. Students formulate hypotheses and an original research design to test their hypotheses. Typically offered Spring.

OBHR 60600 - Research Practicum

Credit Hours: 2.00 or 3.00. Independent empirical research in organizational behavior and human resource management, including the submission of a written report. Prerequisite: OBHR 60500. Permission of instructor required. Typically offered Fall Spring Summer.

OBHR 63100 - Human Resource Systems

Credit Hours: 3.00. An overview of selected human resource activities/systems for the future human resource professional. Emphasis will be placed on building skills in areas that will provide a foundation for future coursework in human resources management. Topics covered include planning and forecasting human resource needs, job analysis, design and evaluation of training systems, design of performance appraisal systems, and safety and health in the workplace. Typically offered Spring Fall.

OBHR 63300 - Human Resource Management

Credit Hours: 2.00 (West Lafayette) 3.00 (Calumet, North Central) Introduction to human resource management for general managers. Emphasis is on the impact of human resource components (e.g., staffing, rewards, labor relations) on the performance of the firm. Case analyses and computerized databases are used to illustrate major components of human resource decision making. Not open to students with credit in MGMT 63100/OBHR 63100. Prerequisite: Master's student standing and Management majors only. Typically offered Fall Spring.

OBHR 64000 - Industrial Relations I

Credit Hours: 2.00. An in-depth examination of human resource management in the context of union-management relations. Emphasis is on understanding how and why unions form, the legal context, and changing competitive environment for labor management relations. Covers the dynamics of the collective bargaining process, including the determinants of bargaining power, preparation of labor contract demands, and negotiation tactics. The course culminates with an extended mock negotiation exercise. Typically offered Fall Spring.

OBHR 64100 - Industrial Relations II

Credit Hours: 2.00. An examination of union-management relations topics that build on material addressed in OBHR 64000. Topics include causes of strikes, impasse resolution techniques, grievance and arbitration procedures, public sector labor relations, labor-management cooperation, and international labor-management relations. Emphasis is on how changes in the competitive environment have created the need for changes in the traditional union-management relationship. Films, cases, exercises, and guest speakers are utilized. Prerequisite: OBHR 64000. Typically offered Fall Spring.

OBHR 64200 - Compensation And Reward Systems

Credit Hours: 3.00. The first course in a two-course master's-level sequence focusing on the use of rewards to achieve organizational objectives. Special emphasis is given to compensation as a particularly salient reward. Designed for HR professionals, the course examines the relationship between rewards and organizational characteristics to achieve effective reward practices. Lectures, discussions, case studies, and guest speakers are used to build competence in job evaluation, skill-based pay, and setting pay levels. Prerequisite: OBHR 63100 or OBHR 63300, MGMT 67100 or STAT 51200. Typically offered Fall Spring.

OBHR 64300 - Compensation And Reward Systems II

Credit Hours: 2.00. Continuation of OBHR 64200. The second course in a two-course master's-level sequence that focuses on the use of rewards to achieve organizational objectives. Included are the use of rewards to attract, retain, and motivate employee behaviors in cost effective methods. Includes pay for performance programs, employee benefits, job design, promotion, recognition, and other rewards. Lectures, discussions, case studies, and guest speakers are used to build professional competence in these areas. Prerequisite: OBHR 63100, OBHR 64200 or OBHR 63300, MGMT 67100 or STAT 51200. Typically offered Fall Spring.

OBHR 64400 - Staffing Tools

Credit Hours: 2.00. Provides an in-depth analysis of the methods used in staffing and selection processes. Methods used to evaluate individuals as well as methods used to evaluate selection and promotion tools will be studied. Emphasis on the processes of designing, administering, revising, and evaluating selection programs that comply with government regulation as well as add value to the organization. This course is designed for the future HR professional. Concurrent Prerequisite: OBHR 63100 or OBHR 63300, MGMT 67100 or STAT 51200. Typically offered Fall Spring.

OBHR 64500 - Staffing Systems

Credit Hours: 2.00. Examines all aspects of the staffing process beginning with applicant recruitment and ending with termination and outplacement. Emphasis on building skills that the general manager will need to evaluate, design, and implement these activities. Designed for the future manager, as well as the future HR professional. Topics will be addressed from an individual perspective, as well as an organizational perspective. Prerequisite: OBHR 63100 or OBHR 63300. Typically offered Fall Spring.

OBHR 64600 - Human Resource Information Systems I

Credit Hours: 2.00. Designed to gain an understanding of and appreciation for the use of information systems as a tool for managing human resources. The course will introduce and master, and then apply to HR problems, a set of topical hardware and software solutions. The class project, an HRIS consulting assignment with a major corporation, will commence. Prerequisite: OBHR 63100 or OBHR 63300. Typically offered Fall Spring.

OBHR 64700 - Teams, Technology And Human Capital

Credit Hours: 2.00. Human capital-people and their collective knowledge, skills and abilities-is the lifeblood of organizations. Today's managers must be equipped to leverage technology effectively, which requires an understanding of how technology alters the social dynamics of work. Drawing on an interdisciplinary, socio-technical framework, this course develops an understanding of the interplay between information and communication technologies and human capital, and applies this knowledge to timely work topics, including change management, knowledge management, virtual and alternative work structures, ethics and fairness, distance leadership and control, security, privacy, and trust. Prerequisite: Master's student standing and Management majors only. Typically offered Fall Spring.

OBHR 65000 - International Human Resource Management

Credit Hours: 2.00. Explores the international dimensions of human resource management. Focuses on the human resource policies and practices that are adhered to in various regions of the world. The process of expatriating and repatriating managers to and from the U.S. is examined. International issues faced by a manager working for a multinational organization in the U.S. are studied. Prerequisite: OBHR 63100 or OBHR 63300. Typically offered Fall Spring.

OBHR 66200 - Leadership

Credit Hours: 1.00 to 3.00. Examines organizational leadership responsibilities, forms of leadership, the acquisition, use, and consequences of power, critical leader skills, and how corporate environments shape leadership. Emphasis on self-discovery and development of managerial leadership knowledge and skills. Typically offered Fall Spring.

OBHR 66900 - Negotiations In Organizations

Credit Hours: 1.00 to 3.00. Decision making examines organizational context, stages, creativity, biases, and group processes. Negotiations examine strategies for preparing and conducting negotiations. The principal focus is on individual and interpersonal aspects of each. Permission of department required. Typically offered Fall Spring.

OBHR 68100 - Managing Behavior In Organizations

Credit Hours: 2.00 to 4.00. Individual and group behavior are the central components of the study of behavior in organizations. Focus is on the managerial application of knowledge to issues such as motivation, group processes, leadership, organizational design structure, and others. The course employs cases, exercises, discussions, and lectures. Prerequisite: Master's student standing and Management majors only. Typically offered Fall Spring.

OBHR 68300 - Individual Behavior In Organizations

Credit Hours: 1.00 to 3.00. This seminar provides an analysis of theory and research on individual and group behavior in organizations. Readings and discussion focus on motivation, attitudes and job satisfaction, employee participation and turnover, stress, leadership, group processes, and other issues. Typically offered Fall.

OBHR 68400 - Research In Human Resource Management

Credit Hours: 1.00 to 3.00. Focuses on research methods, theories, and issues in HR management. A doctoral-level course designed for students interested in a research and teaching career in HR or organizational behavior. Objectives are to learn the primary theories and theoretical issues in each major area in HR, to learn the primary research methods and methodological issues, to attain a comprehensive reading list of the literature, to learn about publishing and the article review process, and to develop ideas for potential research projects. Typically offered Fall Spring.

OBHR 69000 - Advanced Problems In Organizational Behavior And Human Resource Management

Credit Hours: 2.00 to 4.00. Advanced investigation in a specific organizational behavior or human resource field at the graduate level. Typically offered Fall Spring Summer.

OBHR 69100 - Special Problems In Organizational Behavior And Human Resource Management

Credit Hours: 1.00 to 4.00. Advanced investigation in a specific management field at the graduate level. For students in the master's programs in management who are registered in the master's program summer session. Prerequisite: Master's student standing and Management majors only. Permission of instructor required. Typically offered Summer.

OBHR 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Organizational Leadership and Supervision

OLS 10000 - Introduction To Organizational Leadership

Credit Hours: 1.00. Transitional course to orient the Organizational Leadership and Supervision freshman to the department and Purdue. Typically offered Fall Spring Summer.

OLS 25200 - Human Relations In Organizations

Credit Hours: 3.00. A survey of the concepts that provide a foundation for the understanding of individual and group behavior in organizations. Special emphasis on typical interpersonal and leadership relationships. Typically offered Fall Spring Summer.

OLS 27400 - Applied Leadership

Credit Hours: 3.00. Introduction to applied leadership in the context of organizational functions, structures, and operation. Typically offered Fall Spring Summer.

OLS 28400 - Leadership Principles

Credit Hours: 3.00. Mastery of the basic knowledge managers need to effectively lead individual employees. Includes primary measures of performance success, leadership strategies, core leadership actions, and a comprehensive theory that explains how the strategies and actions cause positive attitudes and increased performance. Typically offered Summer Fall Spring.

OLS 29900 - Organizational Leadership And Supervision

Credit Hours: 1.00 to 3.00. Variable topics in organizational leadership. Typically offered Fall Spring Summer.

OLS 32500 - Meeting Management

Credit Hours: 3.00. An applications-oriented course in presenting technical information and conducting problem-solving and decision making meetings. Special emphasis on leading and facilitating interactive meetings, as well as structuring information for effective presentations. Typically offered Summer Fall Spring.

OLS 33100 - Occupational Safety And Health

Credit Hours: 3.00. A presentation of the aspects of occupational safety and health that are essential to the organizational leaders. Special emphasis is placed on developing an understanding of the economic, legal, and social factors related to providing a safe and healthy work environment. Typically offered Spring Fall Summer.

OLS 34500 - Critical Thinking In Organizations

Credit Hours: 3.00. This course focuses on systems thinking and the understanding of research design and measurement theory used in solving organizational and human resource development problems. The emphasis is on applied methodology rather than on statistical issues, with the intent of the student becoming an effective consumer of information. The students will learn how to report findings in a practical and influential manner. Includes the importance of knowledge management issues in organizations. Typically offered Summer Fall Spring.

OLS 34600 - Critical Thinking And Ethics

Credit Hours: 3.00. A course in complex problem solving and creative thinking with an emphasis on the ethical impacts of these solutions. Typically offered Fall Spring Summer.

OLS 35000 - Creativity In Business And Industry

Credit Hours: 3.00. A study of the ways an individual can become more creative and how they can develop an environment which encourages creativity from employees. Typically offered Fall Spring Summer.

OLS 35100 - Innovation And Entrepreneurship

Credit Hours: 3.00. An in-depth study of innovation in existing organizations, as well as entrepreneurship in start-up businesses, franchises, family-owned firms, and other business formats. Typically offered Fall Spring Summer.

OLS 36200 - Cooperative Education Program

Credit Hours: 2.00. Supervised work experience directed toward professional development in supervisory or related leadership positions. Rotational work-study periods planned and coordinated by department staff in conjunction with the student and the employing organization. Permission of instructor required. Typically offered Fall Spring Summer.

OLS 36400 - Professional Development Program

Credit Hours: 3.00. A survey course covering many professional and personal facets relative to entering the work force upon graduation. Major areas addressed include resume preparation, interviewing techniques, development of job-search plans, social skills, and analysis of career fields and opportunities. Typically offered Fall Spring Summer.

OLS 37500 - Training Methods

Credit Hours: 3.00. Principles, practices, and methods of employee training. Introduction to systematic training program design, development, and evaluation. Emphasis is on the supervisor as a trainer. Typically offered Fall Spring Summer.

OLS 37600 - Human Resource Issues

Credit Hours: 3.00. Analysis and discussion of case problems concerning typical leadership and personnel situations that impact upon the supervisor/manager. Emphasis directed toward development of attitude, philosophy, analytical ability, and problem-solving skills within the working environment. Typically offered Fall Spring Summer.

OLS 37800 - Labor And Management Relations

Credit Hours: 3.00. An introduction to, and overview of, the fundamental concepts of labor relations, collective bargaining, and dispute resolution procedures. An international comparative analysis is used to assess some of the legal, economic, and political structures of labor relations. Typically offered Fall Spring Summer.

OLS 38400 - Leadership Process

Credit Hours: 3.00. An in-depth study of a sequence of manager actions that influence employees to achieve desired performance results. How these manager actions are transformed by employees into desired performance is also covered. Typically offered Fall Spring Summer.

OLS 38600 - Leadership For Organizational Change And Innovation

Credit Hours: 3.00. Introduction to and overview of fundamental concepts of leading organizational change and innovation. Typically offered Summer Fall Spring.

OLS 38800 - Leadership Through Teams

Credit Hours: 3.00. The group process, team development and exploration of dynamics that impact group and team performance. Typically offered Summer Fall Spring.

OLS 39900 - Special Topics

Credit Hours: 1.00 to 6.00. Hours and subject matter to be arranged by staff. Typically offered Fall Spring Summer.

OLS 44000 - Leading With Integrity

Credit Hours: 3.00. An investigation of ethical problems in business practice. Topics include personal morality in profit-oriented enterprise; codes of ethics; obligations to employees and other stakeholders; truth in advertising; whistle-blowing and company loyalty; regulation, self and government; the logic and future of capitalism. Emphasis on business law and legal impacts on ethical decision making. Typically offered Summer Fall Spring.

OLS 45000 - Project Management For Organizational And Human Resource Development

Credit Hours: 3.00. An introduction to project management concepts and practices in the context of human resource development projects. Typically offered Summer Fall Spring.

OLS 45400 - Gender And Diversity In Management

Credit Hours: 3.00. The work force of the future will represent multiple differences including gender, race, culture, ethnicity, physical abilities, and age. Following this broad-based perspective of diversity, this course will focus on using knowledge of diversity to develop the leadership potential of individuals in organizations. Typically offered Summer Fall Spring.

OLS 45600 - Leadership In A Global Environment

Credit Hours: 3.00. Exploration of leadership strategies for organizations engaged in international business. Includes

understanding of cultural differences and diverse business practices, and challenges of competing in a global marketplace. Typically offered Summer Fall Spring.

OLS 46700 - Service Learning

Credit Hours: 3.00. Service learning is a reflective experience in which students are actively engaged in the community and integrate that experience into the classroom. Permission of instructor required. Typically offered Summer Fall Spring.

OLS 47400 - Conference Leadership

Credit Hours: 3.00. Understanding the role of facilitating group discussion in business and industry conferences. Special emphasis on developing group facilitation skills. Typically offered Summer Fall Spring.

OLS 47600 - Compensation Planning And Management

Credit Hours: 3.00. Planning and implementation of a total compensation system, including job analysis, job evaluation, salary survey and analysis, benefits and development of a structured pay system. Includes behavioral implications and legal compliance issues. Typically offered Fall Spring.

OLS 47700 - Conflict Management

Credit Hours: 3.00. A study of the methods for dealing with innerpersonal, interpersonal, and political disputes by means generally outside the traditional court system. Students will investigate the theoretical and practical aspects of conflict assessment, negotiation, problem solving, mediation, and arbitration. Typically offered Summer Fall Spring.

OLS 47900 - Staffing Organizations

Credit Hours: 3.00. An applications-oriented study of key concepts in staffing organizations, including principles and issues in conducting job analysis; preparing job descriptions/specifications; and screening/selecting employees. Special emphasis on the design, validation, and operation of high-volume staffing systems. Typically offered Summer Fall Spring.

OLS 48400 - Leadership Strategies For Quality And Productivity

Credit Hours: 3.00. A study of how organizational leaders create an environment conducive to high levels of employee self-

motivation, quality, and productivity (TQM). Actual case situations are used to illustrate the application of course content. Typically offered Fall Spring Summer.

OLS 48500 - Leadership For Team Development

Credit Hours: 3.00. An in-depth study of self-directed work teams and team processes in the work setting, with a view to understanding team functions under varying task conditions. Especially emphasized will be the leadership of teams for effective performance and maximum member satisfaction. This course deals extensively with maintenance and task behaviors of team members. Typically offered Summer Fall Spring.

OLS 48600 - Management Of Change

Credit Hours: 3.00. A survey of the concepts that provide a foundation for the understanding of leadership and its relationship to the management of organizational change, with special emphasis on managing the human side of quality improvement. Typically offered Summer Fall Spring.

OLS 48700 - Leadership Philosophy

Credit Hours: 3.00. A review of current managerial, education, and development theories and practices; discussions of fundamental social, economic, and political changes affecting business and the art of managing; implications of these changes for individual development and continued growth. Typically offered Fall Spring Summer.

OLS 48800 - Leadership For Lean Enterprise

Credit Hours: 3.00. A study of how organizational leaders create an environment conducive to lean enterprise. Actual case studies of leadership techniques are used to illustrate the application of course content. Typically offered Summer Fall Spring.

OLS 49100 - Internship Program

Credit Hours: 3.00 (West Lafayette and Tech Statewide locations) 1.00 to 3.00 (Calumet and North Central campuses). A practicum designed to combine University study with work experience directly related to the student's plan of study. Permission of department required. Typically offered Summer Fall Spring.

OLS 49101 - Internship Experiences

Credit Hours: 2.00. A practicum designed to combine University study with work experience directly related to the student's plan of study. Includes a design of an optimal interning experience as well as a written final paper and oral presentation covering the student's internship experience. Permission of department required. Typically offered Fall Spring Summer.

OLS 49200 - Individual Research Problems

Credit Hours: 1.00 to 3.00. Supervised individual research on appropriate topics. Hours and subject matter to be arranged by staff. Permission of instructor required. Typically offered Summer Fall Spring.

OLS 49900 - Special Topics In Organizational Leadership And Supervision

Credit Hours: 1.00 to 3.00. Hours and subject matter to be arranged by staff. Permission of instructor required. Typically offered Fall Spring Summer.

OLS 57400 - Managerial Training And Development

Credit Hours: 3.00. Review of current managerial education and development theories and practices; discussion of fundamental social, economic, and political changes affecting business and the work of managing; implications of these changes for individual manager development and continued growth. Typically offered Fall Spring Summer.

OLS 57600 - Advanced Topics In Human Resource Management

Credit Hours: 3.00. Current topics and issues in the legal, behavioral, and technical environment of human-resources management. Topics may include employment practices, labor-management relations, wage and salary administration, treatment of employees on the job, or productivity-improvement programs. Employs seminar format with emphasis on applications research. Course may be offered in traditional, distance, or blended format. Typically offered Fall Spring.

OLS 57700 - Organization And Administration Of Training And Development

Credit Hours: 3.00. The function and management of training and development in the world of work. Typically offered Fall Spring Summer.

OLS 57800 - Leadership In International Human Resources

Credit Hours: 3.00. Explores issues and practices in technologically-driven international organizations pertaining to the six major HR functions (recruitment and selection, performance management, training and development, organizational development, compensation and benefits, and labor-employee relations). These are considered in the context of technologically-driven multinational organizations with the United States being the foundation for comparison. The course is strategic in focus. A "best practices" approach, utilizing the case method, is emphasized. Typically offered Spring.

OLS 57900 - Emerging World-Class Leadership Strategies

Credit Hours: 3.00. Exposes graduate students to the theoretical foundation and empirical research associated with emerging strategies and theories in the study of world-class leadership. The structure of the course is four fold: the discovery of critical leadership skills and behaviors, discovery of critical world-class leadership strategies, encouragement of self analysis, discovery of leadership strengths, and conducting research on leadership issues. Permission of instructor required. Typically offered Fall.

OLS 58000 - Interpersonal Skills For Leaders

Credit Hours: 3.00. Development and improvement of interpersonal and group dynamic skills for effective leadership in organizations. Emphasis on action learning and real-world application of skills. Course may be offered in traditional, distance, or blended format. Open to all graduate students with special consideration given to senior OLS students with 3.0 GPA and School of Technology graduate students. Typically offered Summer Fall Spring.

OLS 58100 - Workshop In Organizational Leadership And Supervision

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Course may be offered in traditional, distance, or blended format. Course format may vary, depending upon topic of course. Typically offered Summer Fall Spring.

OLS 58200 - Leadership And Organizational Change

Credit Hours: 3.00. Explores issues in leadership and organizational change. Included are change theories, utilizing resistance to change, contemporary approaches to change, the future workplace, and researching best practices in organizational change. Typically offered Fall Spring.

OLS 58300 - Coaching And Mentoring In Organizations

Credit Hours: 3.00. This course explores issues and practices in technologically-driven organizations pertaining to the roles and functions that coaching and mentoring play in employee development. A "best practices" approach, utilizing the case method, is

emphasized. Presented from the point of view of a human resource manager/leader, the focus of the course is on identifying coaching opportunities, enhancing communication skills, developing and implementing coaching and mentoring strategies, and evaluating the outcomes of these strategies. Attention is directed to facilitating personal coaching mentoring skills. Course may be offered in traditional, distance, or blended format. Permission of department required. Typically offered Spring.

OLS 58900 - Leadership And Ethics

Credit Hours: 3.00. An examination of ethical, legal and policy issues facing business and technology leaders. Topics include ethical decision making, corporate social responsibility, codes of ethics, public policies and government regulations, international business practices, technology innovation, risk management in a global environment, and specific areas of law- employment, health and safety, environment, contract, warranties and liabilities, intellectual property, technology law, and international laws and regulations. Graduate student standing or senior status with consent of instructor. Graduate students without an OLS background may be required to take some leveling course. Typically offered Fall Spring Summer.

OLS 59000 - Individual Research Problems In Supervision And Personnel

Credit Hours: 1.00 to 6.00. Opportunity to study specific problems in the field of supervision and personnel under the guidance of a qualified faculty member within the department. Does not include thesis work. Permission of instructor required. Typically offered Fall Spring Summer.

OLS 59800 - Directed MS Project

Credit Hours: 1.00 to 3.00. A formal investigation of a particular problem under the guidance of the advisory committee. Not applicable to a thesis option plan of study. Enrollment during at least two consecutive terms for a total of three credits is required. Permission of instructor required. Typically offered Summer Fall Spring.

OLS 62300 - Contemporary Organizational Leadership And Supervision Problems

Credit Hours: 3.00. Theory and practice in the development of comprehensive solutions to problems in industrial, technical, and human resource development environments. Solutions based on emerging procedures will be emphasized. Permission of instructor required. Typically offered Summer Fall Spring.

OLS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Pharmacy

PHRM 10000 - Pharmacy Orientation I

Credit Hours: 1.00. This first semester pre-pharmacy course is designed to provide the pre-pharmacy student with an introduction to the profession of pharmacy and to Purdue University College of Pharmacy. The topics presented in this course will allow the pre-pharmacy students to develop informed perspectives on: pharmacy summer employment opportunities for students; pharmacy career opportunities; current pharmacy practice trends; the importance of professionalism, values, and ethics as it pertains to the profession; resume and cover letter development; the College's curriculum, admissions process, and course registration process. Typically offered Fall.

PHRM 20000 - Pharmacy Orientation II

Credit Hours: 1.00. A second orientation course to provide students interested in pre-pharmacy an introduction to the profession of pharmacy and to the Purdue University College of Pharmacy. Topics include personal development, academic program and career planning, pharmacy career opportunities, professionalism and ethics, and the Pharm.D. curriculum and the pharmacy admissions process. The course builds on PHRM 10000, but students are not required to have taken that course in order to enroll in this course. Typically offered Fall.

PHRM 31600 - Drug Abuse/Addiction Education

Credit Hours: 1.00. An overview of alcoholism and other chemical addictions. Students are given the information and experience necessary to present a five-hour drug abuse education program to the public and specifically middle school students. Course is taught by undergraduate pharmacy students with oversight by staff. Typically offered Spring.

PHRM 38199 - Industrial Practice I

Credit Hours: 1.00. Professional practice of pharmaceutical sciences in industry. Comprehensive written report of this experience required. For cooperative program students only enrolled in the College of Pharmacy. Permission of Department required. Typically offered Fall Spring Summer.

PHRM 38299 - Industrial Practice II

Credit Hours: 1.00. Professional practice of pharmaceutical sciences in industry. Comprehensive written report of this experience

required. For cooperative program students only enrolled in the College of Pharmacy. Permission of Department required. Typically offered Fall Spring Summer.

PHRM 38399 - Industrial Practice III

Credit Hours: 1.00. Professional practice of pharmaceutical sciences in industry. Comprehensive written report of this experience required. For cooperative program students only enrolled in the College of Pharmacy. Permission of Department required. Typically offered Fall Spring Summer.

PHRM 40100 - Integrated Laboratory III

Credit Hours: 1.00. Continuation of PHRM 30200 with emphasis upon modules that provide laboratory practice experience designed to integrate basic science concepts and practice applications. Small group problem-solving methodology will be utilized as appropriate. Typically offered Fall.

PHRM 40200 - Integrated Laboratory IV

Credit Hours: 1.00. Continuation of PHRM 40100 with emphasis upon modules that provide laboratory practice experience designed to integrate basic science concepts and practice applications. Small group problem-solving methodology will be utilized as appropriate. Typically offered Spring.

PHRM 40300 - Integrated Laboratory V

Credit Hours: 1.00. Continuation of PHRM 40200 with emphasis upon modules that provide laboratory exercises, patient care discussions, and patient-assessment skill development designed to integrate basic science concepts and patient care applications. Small group problem-solving methodology will be utilized as appropriate. Typically offered Fall.

PHRM 40400 - Integrated Laboratory VI

Credit Hours: 1.00. Continuation of PHRM 40300 with emphasis upon modules that provide laboratory exercises, patient care discussions, and patient-assessment skill development designed to integrate basic science concepts and patient care applications. Small group problem-solving methodology will be utilized as appropriate. Typically offered Spring.

PHRM 42500 - Dean's Executive Pharmacy Forum

Credit Hours: 1.00. This course introduces students to emerging trends and career opportunities in pharmacy and the pharmaceutical sciences through exposure to leaders in professional and corporate environments. Typically offered Spring.

PHRM 46000 - Drug Discovery And Development I

Credit Hours: 3.00. Focuses on the strategies, current methods and technologies used in early stage pre-clinical research to disover, validate and select lead drug candidates. Typically offered Fall.

PHRM 46100 - Drug Discovery And Development II

Credit Hours: 3.00. The course focuses on the process of drug development from pre-formulation to unit operations. The emphasis is on the scientific principles behind every step in moving from a drug molecule to its products. Typically offered Spring.

PHRM 49000 - Special Topics

Credit Hours: 0.00 to 3.00. Subject matter and method of approach individually directed by instructor. Permission of instructor required. Typically offered Fall Spring Summer.

PHRM 49500 - Pharmaceutical Research Special Topics

Credit Hours: 1.00 to 3.00. Undergraduate research in the pharmaceutical sciences. Research subject matter and method of approach are individually directed by the instructor. Permission of Instructor required. Typically offered Fall Spring Summer.

PHRM 82000 - Professional Program Laboratory I

Credit Hours: 1.00. Experiments, computer simulations, case studies, and problem sets that actively involve the student in problem-solving, applying and interrelating important concepts from the core courses taught that semester. Typically offered Fall.

PHRM 82100 - Professional Program Laboratory II

Credit Hours: 1.00. Continuation of PHRM 82000 with emphasis upon modules that provide laboratory practice experience

designed to integrate basic science concepts and practice applications. Small group problem-solving methodology will be utilized as appropriate. Typically offered Spring.

PHRM 82200 - Pharmacy Skills And Patient Counseling

Credit Hours: 1.00. Pharmacy Skills and Patient Counseling is a one credit hour, required first professional year experiential course combining practical experience in the Purdue University Pharmacy with small group discussion. Students are monitored by faculty instructors, staff pharmacists and Advanced Pharmacy Practice Experience (APPE) students on an academic rotation to meet learning objectives. Typically offered Fall Spring.

PHRM 82400 - Principles Of Pathophysiology And Drug Action

Credit Hours: 3.00. This course introduces the basic principles of pathophysiology, pharmacodynamics, toxicology and medicinal chemistry necessary to understand the therapeutic use and adverse actions of drugs. The course will integrate and apply concepts of science courses, including organic chemistry, biochemistry, anatomy and physiology into an understanding of the basic fundamentals of disease processes, toxicology and drug actions. Thus, this course will provide students with the basic background necessary to understand and apply pharmacotherapeutics to the practice of pharmacy. Prerequisite: MCMP 20400, MCMP 20500, MCMP 20800, and BIOL 20300, BIOL 20400 or BIOL 30100, BIOL 30200. Departmental permission required. Typically offered Fall.

PHRM 82500 - Integrated Pharmacotherapy I

Credit Hours: 6.00. This course will serve as an integrated approach to the physiology/pathophysiology, medicinal chemistry, pharmacology, pharmacokinetics/ pharmaceutics, and pharmacotherapeutics of the following topics: fluids/electrolyte pharmacotherapy, renal diseases, acid/base disorders, clinical nutrition, autonomic nervous system (ANS), pulmonary diseases, hematology, immunology, and rheumatology. The emphasis of this course is knowledge and skill development. Also in the process of completing the objectives, attitudes toward the role of the pharmacist and patient-related issues will be imparted. Typically offered Spring.

PHRM 82600 - Introduction To Patient Centered Care

Credit Hours: 4.00. The introductory course teaches students the key communication principles and skills necessary to deliver patient care and interact with other health care professionals. This includes performing basic physical assessments, evaluating patient comprehension, and improving personal communication skills. Typically offered Fall.

PHRM 82700 - Public Health Pharmacy

Credit Hours: 3.00. The course is designed to provide the pharmacy student with a comprehensive overview of key public health and wellness principles and related to self-care and nonprescription products as they impinge upon the ability of patients to assume active roles and function effectively on their own behalf in health promotion and disease prevention, detection, and treatment. Typically offered Spring.

PHRM 82800 - Dosage Forms I

Credit Hours: 3.00. The purpose of Dosage Forms I is to provide a foundation in the basic concepts of pharmaceutics that are the foundation of drug delivery. The course begins by presenting the molecular basis for aqueous and lipid solubility of drugs, pharmacokinetic principles that are related to dosage forms, mechanisms by which excipients or manufacturing processes affect bioavailability, and chemical kinetics applied to the shelf-life of dosage forms. The pharmaceutics principles are then applied to successively more complex liquid dosage forms: solution, emulsion, and suspension. The excipients that are required to prepare the dosage forms: buffers, preservatives, emulsifiers, suspending agents, wetting agents, etc. and the method of preparing each dosage form in both a compounding and manufacturing setting are covered. Typically offered Fall.

PHRM 82900 - Dosage Forms II

Credit Hours: 2.00. Education in the use of dosage forms to deliver drugs. Collaboration with peers and other members of the health care team regarding the proper use of the various dosage forms so that the desired therapeutic objective is achieved. Typically offered Spring.

PHRM 83000 - Introduction To Pharmacy Law And Ethics

Credit Hours: 1.00. Elements of law necessary for full understanding of outside experience in early years. Application of modern ethics principles, including autonomy, veracity, justice, and confidentiality, to practice-related scenarios. Decision making required. Law includes legal categories of drugs, Practitioners and their scope of responsibility, basics of prescription validation, exposure to complex rules from Board of Pharmacy. Topics include: Brief history of pharmacy law, Basics of dispensing laws and rules, Controlled substances, Prescription legality, completeness, appropriateness, Professional standards/pharmacist, Medical specialty and Scope of Practice, HIPAA- Institutional Rule (Indiana Rule 28.1). Typically offered Fall.

PHRM 83100 - Health Care Systems

Credit Hours: 2.00. This course is envisioned as a primarily didactic course whose main purpose is to provide students with an introduction to the structures and functions of the United States Health Care System. It is also designed to provide the student an opportunity to compare and contrast the methods used in other countries to address the needs of society for provision of health care to its members. Typically offered Spring.

PHRM 83200 - Principles Of Diagnosis Labs And Monitoring

Credit Hours: 1.00. This course will serve as an introduction to the role of diagnostics in the clinical continuum of patient care. Since most therapeutic decisions are based in part on information obtained through utilization of diagnostic testing, it is important for pharmacists to have an understanding of these tests as the pertain to diagnosis. As they progress in their training, students will be required to evaluate and interpret diagnostic tests to help monitor and fine tune drug therapy. This course will provide an introduction to diagnostic testing as a whole, with an introduction to differential diagnosis and the selection of diagnostic tests. The students will also have the opportunity to learn about different types of testing (lab, imaging, etc.) and how to critically judge information provided by various tests. Finally, the students will be introduced to several common laboratory tests that have wide application in the diagnosis and treatment of many different disease states. This course will provide a background introduction to these tests, allowing the students to gain understanding of how the test is performed, how the results are interpreted and how to identify potential problems with the laboratory data, allowing a strong foundation as they move into subsequent integrated pharmacotherapeutic (IP) modules. Typically offered Fall.

PHRM 83400 - Pharmaceutical Calculations

Credit Hours: 1.00. Mastery of pharmaceutical calculation skills is vital and PHRM 83400 prepares students to apply calculation problem solving skills to clinical practice. PHRM 83400 prepares students to perform pharmaceutical calculations necessary for prescription/drug order preparation, compounding dosage forms, and medication dosage calculations based on patient specific factors. Pharmacists must perform error-free pharmaceutical calculations. Correct calculations contribute as much to pharmaceutical care as the newest methods/guidelines for diagnosis, treatment, and prevention. The development of problem solving skills with pharmaceutical calculations is an important component of this course. In addition, practice ad repetition of problems is necessary to develop confidence as well as accuracy. Appropriate documentation of work/set up and numerical answers (including units) is required. Approaches to minimize errors and maximize accuracy with pharmaceutical calculations are emphasized. Typically offered Fall.

PHRM 83600 - Biochemistry For Pharmaceutical Sciences II

Credit Hours: 2.00. This course provides instruction in biochemistry that builds on basic knowledge by presenting content on advanced aspects of human biochemistry for students in pharmaceutical sciences. The content emphasizes the integration of biochemical knowledge and the application of biochemical understanding to medically relevant situations including disease etiology, medical diagnosis, disease research, drug discovery, drug and toxin mechanisms of action, and mechanism of drug metabolism. Typically offered Fall.

PHRM 84000 - Professional Program Laboratory III

Credit Hours: 1.00. Experiments, simulations, case studies, and problem sets that actively involve the student in problem-solving, applying and interrelating important concepts from the core courses taught that semester. Typically offered Fall.

PHRM 84100 - Professional Program Laboratory IV

Credit Hours: 1.00. Experiments, simulations, case studies, and problem sets that actively involve the student in problem-solving, applying and interrelating important concepts form the core courses taught that semester. Typically offered Spring.

PHRM 84200 - Community Pharmacy IPPE

Credit Hours: 4.00. A 4-credit hour required experiential course in the second year of the professional Doctor of Pharmacy program. Students learn community pharmacy operations and patient counseling skills. Typically offered Fall Spring Summer.

PHRM 84400 - Integrated Pharmacotherapy II

Credit Hours: 6.00. This course will provide an integrated approach to instruct the students in physiology, pathophysiology, pharmacology, medicinal chemistry, and therapeutics relevant to diseases of the endocrine and cardiovascular systems. When applicable, special emphasis will be placed on presenting the interrelationships between deficits in endocrine function and cardiovascular disease. In addition, students will study and critique current therapeutic approaches and opinions in the application of replacement therapy with natural, synthetic, or recombinant hormone preparations. Typically offered Fall.

PHRM 84500 - Integrated Pharmacotherapy III

Credit Hours: 6.00. This course will develop knowledge and skills regarding the physiology/ pathophysiology, medicinal chemistry, pharmacology, pharmacokinetics/pharmaceutics, and pharmacotherapy of specific cardiovascular diseases, neurology diseases, and psychiatric disorders. Typically offered Spring.

PHRM 84600 - Principles Of Pharmacokinetics

Credit Hours: 3.00. This course introduces the theory and concepts of pharmacokinetics and biopharmaceutics. It provides the student with a foundation for more advanced therapeutic concepts in subsequent courses. The learner will develop expertise in quantifying drug absorption, distribution and elimination from concentration vs. time data or urinary drug excretion vs. time data to estimate primary pharmacokinetic parameters. Use of these parameters is required to design and modify individual drug-dosing regimens. Typically offered Fall.

PHRM 84700 - Principles Of Pharmacogenomics

Credit Hours: 2.00. Personalized treatment has been expected to sustainability reform the pharmacotherapy in next decades. There has been increased application of pharmacogenomics knowledge in clinical practice right now. Therefore, it is an urgent need to integrate the pharmacogenomic knowledge into the pharmacist education and training program to meet the immediate requirements in the current and future clinical practice. This course is designed to introduce new knowledge about the theory and

concepts of pharmacogenomics and personalized medicine to professional pharmacy students for meeting the requirement for their Pharm D degree. Typically offered Spring.

PHRM 84800 - Principles Of Drug Information And Literature Evaluation

Credit Hours: 3.00. This course is designed to provide students with the fundamental skills needed for the provision of drug information in pharmacy practice. Emphasis is placed on the evaluation, interpretation, and practical implications of primary medical literature on the delivery of pharmaceutical care. Four recently published clinical trials will be reviewed and discussed throughout the semester to illustrate contemporary issues in the interpretation of biomedical research. Typically offered Fall.

PHRM 84900 - Population Health Management

Credit Hours: 2.00. This two-credit hour course aims to provide students with the core knowledge and basic skills used in managing the health of populations. Core content will include managed care principles, pharmacist involvement in managed care, and program designs. The course will also provide instruction in the topic areas of pharmacoepidemiology and pharmacoeconomics. Typically offered Spring.

PHRM 85000 - Immunization Certification

Credit Hours: 1.00. The purpose of the course is to provide immunization training certification for students in the Doctor of Pharmacy program. Certification is awarded based on completion of the Pharmacy-Based Immunization Delivery program content that is provided through the American Pharmacists Association (AphA). All students will be expected to have completed immunization training as a graduation requirement. Typically offered Fall Spring Summer.

PHRM 86000 - Professional Program Laboratory V

Credit hours: 1.00. This course is an interdisciplinary laboratory course that presents a practical application of scientific and clinical knowledge in the context of patient-centered pharmaceutical care. Typically offered Fall.

PHRM 86200 - Institutional Pharmacy Introductory Pharmacy Practice Experience

Credit Hours: 4.00. A 4-credit hour required experiential course in the third year of the professional Doctor of Pharmacy program. Students learn basic institutional pharmacy operations and sterile product compounding. Typically offered Fall Spring Summer.

PHRM 86400 - Integrated Pharmacotherapy IV

Credit Hours: 6.00. This course will develop knowledge and skills regarding the physiology, pathophysiology, medicinal chemistry, pharmacology, pharmacokinetics, pharmaceutics, and pharmacotherapeutics of oncology and hematologic malignancies, hepatic disorders, gastrointestinal disorders, and women's and men's health. This knowledge will be utilized in subsequent integrated pharmacotherapy modules, skills labs and practice experience that follow. Typically offered Fall.

PHRM 86600 - Biotech/Advanced Parenternal Dosage Forms

Credit Hours: 2.00. This course covers the different types of parenteral products derived from biotechnology. The lectures encompass the origin, chemical characteristics and therapeutic use of biopharmaceuticals. This course builds on the concepts and skills gained by the student from taking Dosage Forms II (PHRM 82900) and Professional Program Laboratory II (PHRM 82100). Typically offered Fall.

PHRM 86800 - Patient Safety And Informatics

Credit Hours: 3.00. This course provides core knowledge and skills needed by pharmacists to promote patient safety and use the tools of healthcare informatics; understand the landscape, epidemiology and culture of patient safety data privacy and security. Case studies will address disclosure of medication errors and reporting adverse events. Informatics tools such as computer order entry, electronic medical record systems, health information exchanges, and decision support will be explained. The use of informatics tools to promote patient safety will be emphasized. Typically offered Fall.

PHRM 87000 - Health Policy Applications

Credit Hours: 1.00. This course will explore policy issues that influence health care. The course will provide students opportunities to apply material from prior courses in Health Systems, Population Health Management, and Public Health is it relates to the impact of health policy. Students will gain an understanding of how policy development must address competing interests and goals, and how policy can influence the scope of pharmacist's professional roles. Timely materials on current policy, current policy debates, and professional advocacy will be discussed. Typically offered Fall.

PHRM 88000 - Advanced Pharmacy Practice Experience

Credit Hours: 4.00. This final year begins in May and continues through the following April. The 40 weeks of rotation are broken down as follows: 4 weeks Hospital Operations 2, 4 weeks Community Pharmacy Operations 2, 8 weeks Ambulatory rotations, 8 weeks inpatient rotations, and 16 weeks General Electives (4 of which must be additional patient care rotation). Typically offered Fall Spring Summer.

Pharmacy Administration

PHAD 45200 - Social Aspects Of Pharmacy Practice

Credit Hours: 2.00. A survey of selected social and behavioral models and related issues that affect the contemporary practice of pharmacy. Special emphasis is given to the interdependent roles of the patient, the pharmacist, and the physician. Typically offered Spring.

PHAD 46400 - Management Of Professional Practice

Credit Hours: 3.00. An overview of the principles and practices of administration, operation, and communication applicable to the practice of pharmacy in community and institutional environments. Typically offered Spring.

PHAD 46800 - Community Pharmacy Management

Credit Hours: 3.00. Principles, practices, and case studies related to the organization, operation, and control of community pharmacies. Typically offered Fall.

PHAD 47200 - Jurisprudence

Credit Hours: 2.00. Legal principles and laws that affect the practice of pharmacy in community and institutional environments. Typically offered Spring.

PHAD 48200 - Marketing Pharmaceutical Products

Credit Hours: 2.00. Examination of the channels of distribution for pharmaceutical products, including research-intensive and generic manufacturers, drug wholesalers, independent and chain community pharmacies, non-pharmacy retailers, prescription benefit managers, and third-party payers. Areas of special emphasis include new product development, product distribution, advertising and promotion, Rx-to-OTC switching, and product pricing and payment policies. Typically offered Fall.

PHAD 49000 - Special Topics

Credit Hours: 1.00 to 3.00. An honors course for superior students to be used in relation to, and to supplement, an existing course; an in-depth approach to topics of current interest utilizing the original literature as prime source material. A laboratory project may be included. Permission of instructor required. Typically offered Fall Spring.

PHAD 50100 - Food And Drug Law I

Credit Hours: 3.00. A systematic study of the structure and function of the major federal (USA) laws and regulations governing the manufacturing, distribution, and marketing of foods, drugs, cosmetics, and devices. Permission of instructor required. Typically offered Fall Spring.

PHAD 50200 - Food And Drug Law II

Credit Hours: 3.00. Detailed study of statutes and regulations applied to discovery, development, and marketing pharmaceutical and devices in the United States. . Typically offered Spring.

PHAD 55600 - Healthcare Economics And Public Policy

Credit Hours: 3.00. Principles and theories of healthcare economics applied in analysis of the U.S. healthcare system. Perspectives are presented on the differential roles of economic analysis and policy analysis. Topics include medical care as an input to health, pharmaceutical service market, adequacy of health manpower supply, health associations and demand for legislation. Healthcare reform, the pharmaceutical industry, and social values that guide policy are explored. Typically offered Spring.

PHAD 69000 - Special Problems

Credit Hours: 1.00 to 3.00. Individual investigations in pharmacy marketing, retailing, and management. Permission of instructor required. Typically offered Fall.

PHAD 69600 - Seminar In Pharmacy Administration

Credit Hours: 1.00. Selected topics on current research, teaching methods, and contemporary problems in management and marketing. Typically offered Fall Spring.

PHAD 86300 - Marketing Professional Services

Credit Hours: 2.00. Application of marketing principles, strategies, and techniques in developing, implementing, marketing, and

evaluating professional pharmacy services. Special emphasis is placed on the creation of innovative services that target unmet patient needs. Typically offered Spring.

Pharmacy Practice

PHPR 20200 - Introductory Pharmacology

Credit Hours: 3.00. An introduction to the pharmacological basis of therapeutics for nursing students. Typically offered Fall.

PHPR 31300 - Introduction To Pharmacy And Pharmaceutical Care

Credit Hours: 2.00. This first professional year course is designed to provide the entering pharmacy student an introduction to the profession of pharmacy and the concept of pharmaceutical care, integrated with career preparation, prescription dispensing and compounding, and effective pharmacist-patient communications. The purpose of this course is to introduce pharmacy students to the profession of pharmacy by developing informed perspectives on: 1. the professional role of the pharmacist in providing pharmaceutical care to patients in any health care setting, 2. important concepts in the career preparation of health care professionals that are essential to being capable of providing pharmaceutical care, 3. components of pharmaceutical care services related to individualizing dosage forms and counseling for unique patient needs, 4. the necessity to development a basic framework or approach to problem-solve situations in pharmacy practice. Upon completion of this course students will: 1. demonstrate evolving skills in pharmaceutical care, patient communication, adherence monitoring, and professionalism, 2. demonstrate prescription service abilities including receiving, preparing and dispensing prescriptions, 3. demonstrate basic counseling abilities used by pharmacists to encourage effective pharmaceutical care, 4. evidence knowledge and use of medical terminology and abbreviations. Typically offered Fall.

PHPR 31800 - Service Learning I

Credit Hours: 2.00. Through weekly visits, students develop a caregiving relationship with a homebound client that also contributes to the case management monitoring process of the partner agency. Learning is facilitated through reflection activities, including a personal journal, weekly reflection sessions with other student participants, articles with brief reflective writing assignments, and a brief final report. Learning objectives include an appreciation for the impact of a caring relationship, social support, aging, health care problems, medications, and health system changes on a person's health and well-being. Typically offered Fall Spring.

PHPR 41800 - Service Learning II

Credit Hours: 2.00. Students engage in patient care service experiences in conjunction with a community health or social service agency and learn through reflection activities as in Service Learning I. Learning objectives include practicing professional abilities essential to pharmaceutical care and gaining enhanced understanding of the individuality of patient needs. Typically offered Fall Spring.

PHPR 42100 - Professional Service Experience

Credit Hours: 0.00. This course is the first part of an experiential course series designed to provide DP-A students experience in a client-based community healthcare setting. Students keep journals, write reflections, and compare/contrast their experiences with other students in a small group setting. Emphasis is placed on communication skills and professional development. Typically offered Fall Spring.

PHPR 42300 - Practice Skills Experience

Credit Hours: 0.00. This course is the second part of an experiential course series designed to provide DP-B students with 80 hours of experience in a pharmacy setting, working in direct contact with a pharmacy practitioner. Students complete a reflective worksheet and participate in a panel discussion comparing and contrasting experiences with other students. Emphasis is placed on skill development and the pharmacy practitioner's role. Typically offered Fall Spring.

PHPR 42400 - The Shadowing Experience

Credit Hours: 0.00. The Shadowing Experience is the third and final component of the Introductory Pharmacy Practice Experience Sequence. It is a zero-credit-hour experiential course, which includes two 4-hour shadowing experiences in two different pharmacy settings plus submission of career options worksheets and IPPE forms. The goals are to further an interest in career path exploration, prepare for clerkship rotations and to define a personal career plan. Typically offered Spring.

PHPR 42600 - Professional Service Experience

Credit Hours: 1.00. A one credit hour required experiential course in the first year of the professional pharmacy program. Students partner with community healthcare providers to learn collaboration and patient care skills. Students begin experience hours in the fall semester and continue through the spring when they are registered and evaluated. Typically offered Spring.

PHPR 42700 - Pharmacy Leadership Seminar

Credit Hours: 2.00. This course is specifically designed to mentor enthusiastic leaders and enhance their ability to become an effective leader in the practice of pharmacy. The objective of this course is not to build a leader, rather to augment the characteristics the particular leader possesses. Students have the opportunity to partake in a variety of activities including the development of a proposal with implementation plan to address a current school-wide issue. A variety of outside speakers share their leadership experiences with the class. The course has a maximum enrollment and requires instructor approval to enroll. Students interested in enrolling in the course must submit a course application packet. Students are assessed on written reflections, oral presentation, written reports, and a group project. Typically offered Spring.

PHPR 42800 - Community Practice Skills Experience

Credit Hours: 3.00. A three credit hour experiential course in the second professional year of the pharmacy program. Students learn community pharmacy operations. Students begin accumulating experience hours in the summer preceding their second year and continue until 120 hours are completed. Students are registered and evaluated in the spring semester. Typically offered Spring.

PHPR 42900 - Self Care Pharmacy Practice

Credit Hours: 2.00. This course is specifically designed to provide students with guided experience in the application of knowledge acquired during previous professional course work to the solution of simulated problems which occur in self-care pharmacy practice. Students will be introduced to the appropriate selection and use of non-prescription medications and devices for the treatment of minor health complaints by patients. Active learning methods are employed to involve students directly in the actual application of this process to simulated practice problems. Typically offered Fall.

PHPR 43200 - Ethics In Pharmacy Practice

Credit Hours: 1.00. Application of ethics principles using a problem-solving framework to analyze ethical dilemmas in pharmacy practice. Typically offered Spring.

PHPR 43400 - Institutional Pharmacy Introductory Pharmacy Practice Experience

Credit Hours: 4.00. A 4-credit hour required experiential course in the third year of the professional Doctor of Pharmacy program. Students learn basic institutional pharmacy operations and sterile product compounding. Typically offered Fall.

PHPR 44700 - Tobacco Dependence And Treatment For Health Care Professionals

Credit Hours: 1.00. This course provides comprehensive training on issues of tobacco use, dependence, and treatment. The course will focus on enabling students in health care disciplines to provide tobacco cessation treatment to patients. The course reviews and expands on any previous tobacco-related coursework. However, previous course work in tobacco cessation is not required. The course is designed as an online, asynchronous, during a semester length time period with students completing a series of modules independently and asynchronously. Outside readings are required. Students are evaluated through completion of various assignments within each module. Typically offered Fall.

PHPR 45000 - Introduction To Institutional Pharmacy Practice

Credit Hours: 1.00. An overview of the delivery of pharmaceuticals and the provision of clinical and administrative services to patients in institutional settings is presented along with the various roles pharmacists play both within the pharmacy department and the institution. Course content focuses on the provision of services and career development rather than on drug therapy. The course features a series of presentations by practitioners from a variety of practice settings. Enrollment is limited to Doctor of Pharmacy students (068) DP -B or DP-C status or by consent of course coordinator. Typically offered Fall.

PHPR 45100 - Issues In Pharmacy

Credit Hours: 1.00. Readings and discussions on current issues and problems affecting professional practice and the distribution of drugs and health services. Typically offered Fall.

PHPR 45500 - Medicare In Pharmacy Practice

Credit Hours: 1.00. Elective course providing an in-depth review of Medicare and related topics beyond that covered in the core curriculum. A service-learning component involving hands-on experience with Medicare beneficiaries is part of the course requirements. Typically offered Fall.

PHPR 46400 - History Of Pharmacy

Credit Hours: 2.00. A survey of the history of the profession from earliest times to the present day. Typically offered Spring.

PHPR 46800 - Patient Services Experience

Credit Hours: 1.00. Experiences in providing patient services in the Purdue University Pharmacy. Typically offered Fall Spring Summer.

PHPR 47000 - Nonprescription Drugs

Credit Hours: 3.00. A consideration of nonprescription drugs, health-care devices, and accessories to prepare the student to deal authoritatively with the self-medicating public. Typically offered Spring.

PHPR 48000 - Self-Care Pharmacy Practice I

Credit Hours: 1.00. This course is specifically designed to provide students with guided experience in the application of knowledge acquired during previous professional course work to the solution of simulated problems which occur in self-care pharmacy practice. Specifically, the course is designed to introduce students to the appropriate selection and use of nonprescription medications and devices for the treatment of minor health complaints by patients. A principle theme throughout the course is that the solution of all self-care problems (i.e., regardless of the context in which they occur) involves the application of the same basic problem solving process. Course activities, readings and homework assignments will provide students with illustration of how the problem solving process can be applied to specific self-care situations that arise in practice. Active learning methods will be employed to involve students directly in the actual application of this process to simulated practice problems. Topics: Colds, Coughs, Allergies. Typically offered Fall.

PHPR 48300 - Self-Care Pharmacy Practice III

Credit Hours: 1.00. This course is specifically designed to provide students with guided experience in the application of knowledge acquired during previous professional course work to the solution of simulated problems which occur in self-care pharmacy practice. Specifically, the course is designed to introduce students to the appropriate selection and use of nonprescription medications and devices for the treatment of minor health complaints by patients. A principle theme throughout the course is that the solution of all self-care problems (i.e., regardless of the context in which they occur) involves the application of the same basic problem solving process. Course activities, readings and homework assignments will provide students with illustration of how the problem solving process can be applied to specific self-care situations that arise in practice. Active learning methods will be employed to involve students directly in the actual application of this process to simulated practice problems. Topics: Dermatology. Typically offered Fall.

PHPR 48600 - Beyond Ecstacy: A Guide To Street Drugs

Credit Hours: 1.00. The goal of the course is to augment the students' knowledge about commonly used street drugs including: pharmacology and mechanisms of action; interactions and adverse effects; law enforcement and policing; available support and treatment for addiction, abuse, and misuse; and the role of pharmacists. Typically offered Fall Spring.

PHPR 48700 - Dietary Supplements

Credit Hours: 1.00. This course is intended to expose students in health care fields to dietary supplement use. Typically offered Fall.

PHPR 48800 - Interdisciplinary Case Discussions In Health Care

Credit Hours: 1.00. The goal of this course is to facilitate communication among future healthcare professionals with the intent of strengthening their future interdisciplinary relationships. Typically offered Fall Spring.

PHPR 49000 - Special Topics

Credit Hours: 1.00 to 3.00. An honors course to be used to relate to, and supplement, an existing course. Subject matter and method of approach individually directed by instructor. Permission of instructor required. Typically offered Fall Spring.

PHPR 49800 - Hospital Pharmacy Operations I

Credit Hours: 4.00. Four weeks of supervised, objective-based, on-site experience in selected Indiana pharmacies in health care institutions serving primarily institutionalized patients. Depending on the experience site assignment, most students will be participating in locations away from the West Lafayette Campus, requiring relocation to that area. Completion of non-experiential pharmacy curriculum is required. Typically offered Summer Fall Spring.

PHPR 49900 - Community Pharmacy Operations I

Credit Hours: 4.00. Four weeks of supervised, objective-based, on-site experience in selected Indiana community pharmacies and health care entities serving primarily ambulatory patients. Depending on the experience site assignment, most students will be participating in locations away from the West Lafayette Campus, requiring relocation to that area. Completion of non-experiential pharmacy curriculum. Typically offered Fall Spring Summer.

PHPR 59000 - Special Topics In Pharmacy Practice

Credit Hours: 1.00 to 3.00. Special topics in selected areas of pharmacy practice. Permission of instructor required. Typically offered Fall Spring.

PHPR 59800 - Introduction To Research

Credit Hours: 1.00 to 3.00. Qualified students will undertake a project in an area of pharmacy practice, clinical pharmacy, or pharmacy administration under a member of the graduate faculty. Permission of instructor required. Typically offered Fall Spring Summer.

PHPR 66400 - Research Techniques And Proposal Development

Credit Hours: 2.00. A consideration of current trends in pharmacy practice, clinical pharmacy, and pharmacy administration relating to healthcare services and systems. Offered in alternate years. Typically offered Fall.

PHPR 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

PHPR 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Philosophy

PHIL 11000 - Introduction To Philosophy

Credit Hours: 3.00. The basic problems and types of philosophy, with special emphasis on the problems of knowledge and the nature of reality. Typically offered Summer Fall Spring. CTL:ISH 1050 Introduction To Philosophy

PHIL 11100 - Ethics

Credit Hours: 3.00. A study of the nature of moral value and obligation. Topics such as the following will be considered: different conceptions of the good life and standards of right conduct; the relation of nonmoral and moral goodness; determinism, free will, and the problem of moral responsibility; the political and social dimensions of ethics; the principles and methods of moral judgment. Readings will be drawn both from contemporary sources and from the works of such philosophers as Plato, Aristotle, Aquinas, Butler, Hume, Kant, and J. S. Mill. Typically offered Summer Fall Spring. CTL:ISH 1051 Ethics

PHIL 11400 - Global Moral Issues

Credit Hours: 3.00. A systematic and representative examination of significant contemporary moral problems with a focus on global issues such as international justice, poverty and foreign aid, nationalism and patriotism, just war, population and the environment, human rights, gender equality, and national self-determination. Typically offered Fall Spring Summer.

PHIL 12000 - Critical Thinking

Credit Hours: 3.00. This course is designed to develop reasoning skills and analytic abilities, based on an understanding of the rules or forms as well as the content of good reasoning. This course will cover moral and scientific reasoning, in addition to

ordinary problem solving. This course is intended primarily for students with nontechnical backgrounds. Typically offered Summer Fall Spring.

PHIL 15000 - Principles Of Logic

Credit Hours: 3.00. A first course in formal deductive logic; mechanical and other procedures for distinguishing good arguments from bad. Truth-tables and proofs for sentential (Boolean) connectives, followed by quantificational logic with relations. Although metatheoretic topics are treated, the emphasis is on methods. Typically offered Summer Fall Spring.

PHIL 20600 - Philosophy Of Religion

Credit Hours: 3.00. The course encourages critical reflection on traditional and contemporary views about God and other religious ideas. Topics include arguments for God's existence, the problem of evil, understanding the divine attributes, miracles, religious pluralism, and life after death. Typically offered Summer Fall Spring. CTL:ISH 1052 Philosophy Of Religion

PHIL 21900 - Introduction To Existentialism

Credit Hours: 3.00. A survey of both the philosophical and more literary writings of the existentialist movement. Readings will be chosen from among the following writers: Kierkegaard, Nietzsche, Dostoevsky, Kafka, Marcel, Heidegger, Camus, Sartre, Jaspers, de Beauvoir, Ortega, and Merleau-Ponty. Typically offered Summer Fall Spring.

PHIL 22100 - Introduction To Philosophy Of Science

Credit Hours: 3.00. An introduction to the scope and methods of science and to theories of its historical development. Topics include scientific revolutions, theories of scientific method, the nature of scientific discovery, explanation, and the role of values in scientific change. Typically offered Fall Spring.

PHIL 22500 - Philosophy And Gender

Credit Hours: 3.00. An examination of the beliefs, assumptions, and values found in traditional and contemporary philosophical analyses of women. A range of feminist approaches to knowledge, values, and social issues will be introduced. Typically offered Fall Spring.

PHIL 23000 - Religions Of The East

Credit Hours: 3.00. (REL 23000) A study of the history, teachings, and present institutions of the religions of India, Southeast Asia, China, and Japan. This will include Hinduism, Jainism, Sikhism, Buddhism, Confucianism, Taoism, Shintoism, and Zoroastrianism. Typically offered Fall Spring Summer.

PHIL 23100 - Religions Of The West

Credit Hours: 3.00. (REL 23100) A comparative study of the origins, institutions, and theologies of the three major Western religions, Judaism, Christianity, and Islam. Typically offered Fall Spring Summer.

PHIL 24000 - Social And Political Philosophy

Credit Hours: 3.00. A study of some major social and political philosophers from Plato to contemporary authors. Issues such as justice, rights and freedom, community, and the "globalized" future will be considered. Typically offered Fall Spring.

PHIL 24200 - Philosophy, Culture, And The African American Experience

Credit Hours: 3.00. The purpose of this course is to consider African American based or inspired conceptions of Western philosophy and new visions of what it is to do philosophy sensitive to culturally rooted diversity. Typically offered Fall Spring.

PHIL 26000 - Philosophy And Law

Credit Hours: 3.00. A discussion of philosophical issues in the law: a critical examination of such basic concepts in law as property, civil liberty, punishment, right, contract, crime and responsibility; and a survey of some main philosophical theories about the nature and justification of legal systems. Readings will be drawn from both law and philosophy. Typically offered Fall Spring.

PHIL 27000 - Biomedical Ethics

Credit Hours: 3.00. An examination of the moral problems raised by developments in medicine and the biomedical sciences. Topics include abortion, reproductive technologies, euthanasia and physician-assisted suicide, experiments involving human subjects, and health care delivery. Typically offered Fall Spring.

PHIL 27500 - The Philosophy Of Art

Credit Hours: 3.00. A survey of the principal theories concerning the nature, function, and value of the arts from classical times to the present. Typically offered Fall Spring.

PHIL 28000 - Ethics And Animals

Credit Hours: 3.00. An exploration through the study of major historical and contemporary philosophical writings of basic moral issues as they apply to our treatment of animals. Rational understanding of the general philosophical problems raised by practices such as experimentation on animals or meat-eating will be emphasized. Typically offered Fall Spring.

PHIL 29000 - Environmental Ethics

Credit Hours: 3.00. An introduction to philosophical issues surrounding debates about the environment and our treatment of it. Topics may include endangered species, "deep ecology," the scope and limits of cost-benefit analyses, and duties to future generations. Typically offered Fall Spring.

PHIL 29300 - Selected Topics In Philosophy

Credit Hours: 1.00 to 3.00. A critical examination of some special topic or topics in philosophy. Details concerning topics selected for treatment in a given semester may be obtained in advance from the Department of Philosophy. Sections of this course may sometimes be initiated by students upon petition to the department. Typically offered Fall Spring.

PHIL 30100 - History Of Ancient Philosophy

Credit Hours: 3.00. A survey of Greek philosophy from its beginning in the Milesian school through the Presocratics to Plato and Aristotle. Typically offered Fall Spring.

PHIL 30200 - History Of Medieval Philosophy

Credit Hours: 3.00. A survey of the main trends and figures of medieval philosophy, with an emphasis on metaphysics, epistemology, and ethics. Readings (in English translation) may include Augustine, Boethius, Avicenna, Anselm, Abelard, Maimonides, Aquinas, Scotus, Ockham and Suarez. Typically offered Fall Spring.

PHIL 30300 - History Of Modern Philosophy

Credit Hours: 3.00. Concentrates on the major philosophical writers from the Renaissance to the beginning of the nineteenth century: Descartes, Hobbes, Spinoza, Locke, Leibniz, Berkeley, Hume, Kant. Some in other areas, e.g., Galileo, Newton, Calvin, are also considered. Typically offered Fall Spring.

PHIL 30400 - Nineteenth-Century Philosophy

Credit Hours: 3.00. A study of the major movements and directions of nineteenth-century philosophy, including such figures as Hegel, Comte, Mach, Schopenhauer, Nietzsche, Mill, Royce and Peirce. Typically offered Fall Spring.

PHIL 30600 - Twentieth-Century Philosophy

Credit Hours: 3.00. A critical examination of the main currents of contemporary philosophical thought, such as pragmatism, analytic philosophy, phenomenology, and existentialism, and other recent developments. The course will cover selected works of such philosophers as Russell, Wittgenstein, Peirce, Whitehead, Heidegger, and Sartre. Typically offered Fall Spring.

PHIL 31900 - Classic And Contemporary Marxism

Credit Hours: 3.00. A systematic exposition and analysis of principal elements in the philosophy of Marx, followed by a survey of some important twentieth-century writers in the Marxian tradition (e.g., Lenin, Lukacs, Marcuse, the Yugoslav Praxis group, etc.). Typically offered Fall Spring.

PHIL 35000 - Philosophy And Probability

Credit Hours: 3.00. This course introduces the student to mathematical probability and its philosophical applications. Topics may include theories of probability, Hume's problem of induction, Goodman's paradox, and the foundations of scientific reasoning. Typically offered Spring Fall.

PHIL 40200 - Studies In Medieval Christian Thought

Credit Hours: 3.00. A survey of medieval (and patristic) philosophical theology. Issues include the nature and existence of God, religious language, and doctrines such as the Trinity, Incarnation, and Atonement. Readings (in English translation) will include, among others, Augustine, Boethius, Anselm, and Aquinas. Typically offered Fall Spring.

PHIL 40600 - Intermediate Philosophy Of Religion

Credit Hours: 3.00. An intensive study of some important problems such as the existence of God, the problem of evil, immortality, or the nature of religion. Or the religious philosophy of some significant thinkers such as Buber, Berdyaev, Tillich, Barth, Maritain, or Chardin may form the content of the course. Subject matter may vary. Typically offered Fall Spring.

PHIL 41100 - Modern Ethical Theories

Credit Hours: 3.00. An examination of the major controversies in the history of modern ethics, including: the place of reason in ethics, the basis of moral obligation, and the relation between science and morals. Typically offered Fall Spring.

PHIL 42100 - Philosophy Of Science

Credit Hours: 3.00. An examination of central issues in philosophy of science. Topics include theories of explanation, confirmation, reduction, laws, the status of theoretical entities, and the epistemological foundations of scientific theories. Typically offered Fall Spring.

PHIL 42400 - Recent Ethical Theory

Credit Hours: 3.00. A philosophical examination of significant issues in recent ethical theory and metaethics, such as the nature of value, obligation, virtue, rationality, moral knowledge, the status of ethical sentences, practical applications, and the relationship between ethics and science or religion. Typically offered Fall Spring.

PHIL 42500 - Metaphysics

Credit Hours: 3.00. A concentrated investigation of some of the basic problems concerning essence, existence, time, space, substance, causality, permanence, and change. Readings and discussions will center on representative metaphysical thinkers. Typically offered Fall Spring.

PHIL 43000 - Modern Religious Thought

Credit Hours: 3.00. A study of important philosophical and theological issues that arose in the modern period. Possible topics include the role of religion in the modern secular state, religious toleration and civic equality, and the historicism of Scripture. Typically offered Fall.

PHIL 43100 - Contemporary Religious Thought

Credit Hours: 3.00. An exploration of the work of major nineteenth and twentieth-century philosophers of religion and theologians such as Kierkegaard, Hegel, Schleiermacher, Barth, Rahner, and others. Typically offered Fall Spring.

PHIL 43200 - Theory Of Knowledge

Credit Hours: 3.00. An analysis of selected texts on knowledge and rationality. Topics such as the following will be considered: foundationalism, coherentism, internalism, externalism, skepticism, contextualism, empiricism, rationalism, analyses of epistemic concepts, and the Gettier problem. Typically offered Fall Spring.

PHIL 43500 - Philosophy Of Mind

Credit Hours: 3.00. An examination of some central issues in the philosophy of mind. Attention is given to such topics as the knowledge of other minds, the relation between mind and body, the nature of persons, and the analysis of certain relevant concepts such as action, emotion, and perception. Readings are selected primarily from the writings of contemporary philosophers. Typically offered Fall Spring.

PHIL 45000 - Metalogic

Credit Hours: 3.00. An introduction to metatheoretic studies of formal axiomatic systems. Basic set theory is developed for use as a tool in studying the propositional calculus. Further topics include many-valued logics and metatheory for modal or predicate logic. Typically offered Fall Spring.

PHIL 46500 - Philosophy Of Language

Credit Hours: 3.00. An examination of some of the central issues in the philosophy of language, such as meaning, reference, truth, propositions, and speech acts. Typically offered Fall Spring.

PHIL 49000 - Advanced Topics In Philosophy

Credit Hours: 3.00. An advanced study of a significant topic in philosophy. Typically offered Fall Spring.

PHIL 50100 - Studies In Greek Philosophy

Credit Hours: 3.00. The subject-matter will alternate between the intensive study of some fairly specific topic in Greek philosophy (e.g., Plato's theory of knowledge, Aristotle's ethics, etc.) and a general study of either the philosophy of Plato or the philosophy of Aristotle. Typically offered Fall Spring.

PHIL 50200 - Studies In Medieval Philosophy

Credit Hours: 3.00. An intensive study of some central topics in the thought of major medieval philosophers. Subject matter will vary. Philosophers most often studied are Augustine, Thomas Aquinas, Duns Scotus, and Ockham. Typically offered Fall Spring.

PHIL 50300 - Studies In Early Modern Philosophy

Credit Hours: 3.00. A detailed study of either: 1) one or more central philosophical themes or 2) one or more major figures (typically, but not restricted to, Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and/or Kant) in the early modern period. Offered in alternate years. Typically offered Fall Spring.

PHIL 50500 - Islamic And Jewish Philosophy And The Classical Tradition

Credit Hours: 3.00. A study of representative texts and issues in medieval Islamic and Jewish philosophy. Possible topics include the commensurability of philosophy and (revealed) law, the creation or eternity of the world, the nature of prophecy, the human good, the nature of God, and divine language. Typically offered Fall Spring.

PHIL 50600 - Advanced Philosophy Of Religion

Credit Hours: 3.00. A detailed critical investigation of some central problems in a philosophical approach to religion. Readings will be selected from leading representatives of traditional theism and various contemporary schools. The thought of the representative thinkers will be analyzed, discussed, and critically evaluated. The problems discussed will be selected from the existence of God, the problem of evil, freedom and determinism, the problem of immortality, and the nature of religious language. Variable content. Typically offered Fall.

PHIL 50700 - Recent American Philosophy

Credit Hours: 3.00. A detailed examination of the central doctrines of one or more of the following six American philosophers: Peirce, James, Royce, Santayana, Dewey, and Whitehead. Typically offered Fall Spring.

PHIL 51000 - Phenomenology

Credit Hours: 3.00. A detailed, critical examination of some major issue(s) in phenomenology. Attention will be given to either the historical development or contemporary relevance of phenomenological philosophy. Readings will be drawn from the works of Husserl, Heidegger, Merleau-Ponty, and others. Typically offered Fall.

PHIL 51400 - Twentieth-Century Analytical Philosophy I

Credit Hours: 3.00. The origins of contemporary philosophical analysis. An examination of the most important philosophical writings of Gottlob Frege and Bertrand Russell, as well as the Tractatus Logico-Philosophicus of Ludwig Wittgenstein. Need not be followed by PHIL 51500. Typically offered Fall.

PHIL 51500 - Twentieth-Century Analytical Philosophy II

Credit Hours: 3.00. The development of philosophical analysis through logical positivism and the various forms of linguistic philosophy. An examination of some of the important writings of Moore, Ayer, Ryle, Wisdom, Austin, and the later Wittgenstein. Need not be preceded by PHIL 51400. Typically offered Spring.

PHIL 52000 - Existentialism

Credit Hours: 3.00. A detailed exploration and examination of the existentialist movement in modern thought, including its historical roots, its philosophical formulations, and its influence and expression in and relation to art, literature, psychology, social criticism, and religion. Readings will be from at least some of the major existentialists: Kierkegaard, Nietzsche, Jaspers, Heidegger, and Sartre. In addition, texts from existentialist thinkers in other areas will be used. Typically offered Fall Spring.

PHIL 52400 - Contemporary Ethical Theory

Credit Hours: 3.00. A critical review of twentieth-century developments in ethical and value theory, with particular reference to the dispute between utilitarianism and deontological theories, and to the problem of justification. Typically offered Fall Spring.

PHIL 52500 - Studies In Metaphysics

Credit Hours: 3.00. An intensive and critical examination of one or more of the basic problems of ontology and cosmology, such as substance, existence, causality, change, time, space, teleology, freedom, and universals. Variable content. Typically offered Fall Spring.

PHIL 53000 - Deconstructionist And Postmodernist Philosophy

Credit Hours: 3.00. An examination of the main currents of deconstructionist and postmodernist thought in the latter part of the twentieth century. Texts to be studied will be selected from the writings of Heidegger, Derrida, Foucault, Kristeva, Irigaray, Deleuze, Guattari, Lyotard, Baudrillard, and Rorty. Typically offered Fall Spring.

PHIL 53200 - Studies In Theory Of Knowledge

Credit Hours: 3.00. An intensive examination of selected problems concerning the nature of human knowledge, its scope and limits, its relation to sense-perception and memory. Variable content. Typically offered Fall Spring.

PHIL 53500 - Studies In Philosophy Of Mind

Credit Hours: 3.00. An intensive study of select topics in the philosophy of mind such as the explanation of human behavior, knowledge of other minds, the relation between mind and body, and the nature of persons. Variable content. Typically offered Fall Spring.

PHIL 54000 - Studies In Social And Political Philosophy

Credit Hours: 3.00. A detailed study of one or more important concepts in social or political philosophy, such as natural rights, revolution, law, freedom, justice, or political obligation. Variable content. Typically offered Fall Spring.

PHIL 54200 - Rationality And Relativism: African American Perspectives

Credit Hours: 3.00. Examines philosophical issues of relativism and rationalism. Considers arguments by particular African American authors concerning relativist or rationalist approaches to the nature of social entities. Typically offered Fall Spring.

PHIL 54500 - Recent Analytic Philosophy

Credit Hours: 3.00. A survey of contemporary developments in analytic philosophy, with emphasis on major issues relevant to the philosophy of language, epistemology, and metaphysics. The course will cover such figures as W.V.O. Quine and Saul Kripke, and such problems as analyticity and necessity, ontological relativity, and the definition of knowledge. Typically offered Fall Spring.

PHIL 55000 - Advanced Symbolic Logic

Credit Hours: 3.00. A study of the properties of formal systems, including consistency and completeness theorems for the propositional calculus, the first order predicate calculus, and various modal logics, as well as a brief consideration of Godel's incompleteness theorem. Students who have taken MA 58500 should not take this course; PHIL 65000 is more appropriate. Typically offered Spring.

PHIL 55100 - Philosophy Of The Natural Sciences

Credit Hours: 3.00. A survey of issues and theories in contemporary philosophy of science. Variable content. Typically offered Fall.

PHIL 55200 - Philosophy Of The Social Sciences

Credit Hours: 3.00. An exploration of the nature of the concepts in the social sciences, and a study of the ways in which they have been and are employed. Typically offered Spring.

PHIL 55500 - Critical Theory

Credit Hours: 3.00. An analysis of either the historical development or the contemporary relevance of critical theory. Primary texts may be selected from the "old" Frankfurt School (Horkheimer, Adorno, Marcuse, Benjamin, Fromm) or from "new" critical theory (Habermas, Wellmer, Honneth, Benhabib, and others). Typically offered Fall Spring.

PHIL 56000 - Studies In Eastern Philosophy

Credit Hours: 3.00. One of the traditional areas of Eastern philosophy (Indian, Buddhist, Chinese) will be selected for an intensive historical study. Readings will be from English translations of the writings of representative Eastern philosophers. Variable content. Typically offered Fall Spring.

PHIL 57500 - Problems In Esthetics

Credit Hours: 3.00. An intensive examination of some of the characteristic questions of contemporary esthetic theory. Variable content. Typically offered Spring.

PHIL 57600 - Philosophy And Literary Theory

Credit Hours: 3.00. (ENGL 57600) Explores the interchanges between philosophy and literary theory that animate such areas as hermeneutics, phenomenology, existentialism, Marxism, feminism, African-American studies, postmodern theory, and cultural studies. Typically offered Fall Spring.

PHIL 58000 - Proseminar In Philosophy

Credit Hours: 3.00. Designed primarily for majors in philosophy who have already successfully completed six hours in philosophy. Other students may be admitted to the course with the special consent of the instructor in charge. Topic to be selected by the department. Typically offered Fall Spring.

PHIL 59000 - Directed Reading In Philosophy

Credit Hours: 1.00 to 3.00. A reading course directed by the instructor in whose particular field of specialization the content of the reading falls. Approval of each reading project must be secured from the department. Permission of instructor required. Typically offered Fall Spring.

PHIL 60100 - Special Topics In Ancient Philosophy

Credit Hours: 3.00. A detailed critical analysis of special problems or texts in ancient philosophy. Prerequisite: PHIL 50100. Typically offered Fall Spring.

PHIL 61000 - Seminar In Recent Continental Philosophy

Credit Hours: 3.00. An intensive, critical examination of some of the current modes of thought in recent continental philosophy, including phenomenology, critical theory, hermeneutics, deconstruction, and postmodernism. Selected writings from representative figures. Topics and texts will vary from semester to semester. Prerequisite: PHIL 51000 or PHIL 52000. Typically offered Spring.

PHIL 62400 - Seminar In Ethics

Credit Hours: 3.00. An intensive study of some persistent problems of ethics, metaethics, and theory of action such as: intrinsic

goods, ends and means, the concepts of utility, justice, and duty; facts and values, justification, ethical relativism, free will and blame-worthiness, belief, and action. Emphasis will be on contemporary discussions. Variable subject matter. Prerequisite: PHIL 52400. Typically offered Spring.

PHIL 66500 - Philosophy Of Language

Credit Hours: 3.00. An introduction to some of the main concepts and problems in the philosophy of language, such as meaning, reference, and private languages, through readings in the chief contributors to the field. Prerequisite: 6 credit hours in Philospohy. Typically offered Fall.

PHIL 67200 - Philosophy Of Logic

Credit Hours: 3.00. A study of some of the more fundamental logical and philosophical concepts. Topics may include: the analysis of singular and general propositions, the sense-reference distinction, predication, singular terms, assertion, intentional contexts, and truth. Prerequisite: PHIL 45000 or PHIL 55000 or PHIL 65000. Typically offered Spring.

PHIL 68000 - Seminar In Philosophy

Credit Hours: 3.00. An intensive course for graduate students majoring or minoring in philosophy. The content of the seminar will be determined in accordance with the needs and interests of the students. Prerequisite: 6 credit hours at the graduate level in Philosophy. Typically offered Fall Spring.

PHIL 68300 - Studies In Continental Rationalism

Credit Hours: 3.00. An intensive study of Descartes, Spinoza, or Leibniz, or of certain themes and ideas that played an important role in the development of their philosophies. Variable subject matter. Prerequisite: PHIL 30300. Typically offered Fall Spring.

PHIL 68400 - Studies In British Empiricism

Credit Hours: 3.00. An intensive study of Locke, Berkeley, or Hume, or of certain themes and ideas that played an important role in the development of their philosophies. Variable subject matter. Prerequisite: PHIL 30300. Typically offered Fall Spring.

PHIL 68500 - The Philosophy Of Kant

Credit Hours: 3.00. This course will be concerned with the critical philosophy as a whole. Primary emphasis, however, will be on the theories of knowledge and metaphysics as developed in the Critique of Pure Reason. Lesser attention will be paid to Kant's ethics and the principles of judgment as time permits. Prerequisite: PHIL 30300. Typically offered Spring.

PHIL 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

PHIL 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Physical Education Skills

PES 11100 - Lifetime Fitness

Credit Hours: 2.00. Provides students opportunities to assess levels of physical fitness, develop an exercise plan, and experience activities designed to improve cardiovascular condition, strength, and flexibility. Presents current findings and provides laboratory experiences regarding techniques of initiation, maintaining, and evaluating personal fitness. For non-H&K majors only. Typically offered Fall Spring.

PES 11200 - Aquatic Movement Forms

Credit Hours: 1.00. Instruction and practice in aquatic movement forms. Students select from the activities listed in the current schedule of classes. Following is a partial list of activities: beginning swimming; intermediate swimming; advanced swimming; synchronized swimming. Typically offered Fall Spring Summer.

PES 11400 - Exercise And Conditioning

Credit Hours: 1.00. Instruction and practice in various types of exercise programs. Students select from the activities listed in the current schedule of classes. Following is a partial list of activities: body conditioning; exercise and fitness; exercise to music; jogging and running; swimnastics; relaxation techniques; weight training; exercise and principles of weight control. Typically offered Fall Spring.

PES 11500 - Individual And Dual Movement Forms I

Credit Hours: 1.00. Instruction and practice in individual and dual movement forms conducted in an indoor setting. Students select from the activities listed in the current schedule of classes. Following is a partial list of activities: badminton; billiards; bowling; fencing; judo; karate; beginning gymnastics; intermediate gymnastics; squash; racquetball; yoga; kung fu; personal defense. Special fee required. Typically offered Fall Spring Summer.

PES 11600 - Individualized And Dual Movement Forms II

Credit Hours: 1.00. Instruction and practice in individual and dual movement forms conducted mainly in outdoor settings. Students select from the activities listed in the current schedule of classes. Following is a partial list of activities: beginning golf; intermediate golf; advanced golf; bicycling; beginning tennis; intermediate tennis; advanced tennis; track and field. Special fee required. Typically offered Fall Spring Summer.

PES 11700 - Team Movement Forms

Credit Hours: 1.00. Instruction and practice in team movement forms. Students select from the activities listed in the current schedule of classes. Following is a partial list of activities: basketball; field hockey; lacrosse; softball; soccer; power volleyball I; power volleyball II. Typically offered Fall Spring Summer.

PES 11800 - Horseback Riding

Credit Hours: 1.00. Instruction and practice in hunter seat equitation. Class meets off campus, and students are expected to provide their own transportation. Following is a partial list of offerings: beginning; intermediate; advanced; combined training. Typically offered Fall Spring.

PES 12000 - Officiating

Credit Hours: 1.00. Theory and practice in officiating movement forms. Students select from the activities listed in the current schedule of classes. Following is a partial list of activities: basketball; field hockey; gymnastics; swimming; softball; volleyball; track and field. Typically offered Fall Spring.

PES 13000 - Lifeguard Training

Credit Hours: 1.00. Knowledge, skill practice, and evaluation of rescue techniques leading toward Red Cross lifeguarding certification. Typically offered Fall Spring Summer.

PES 13200 - Water Safety Instructor Course

Credit Hours: 2.00. Knowledge, practice, and evaluation of swimming and rescue skills. Teaching techniques leading to Red Cross W.S.I. certification. Possession of a current Red Cross Instructor Candidate Training Certificate. Typically offered Fall Spring Summer.

Physics

PHYS 14900 - Mechanics, Heat, And Wave Motion

Credit Hours: 3.00. Designed primarily for engineering students in need of preparation for PHYS 15200. Basic concepts of kinematics, dynamics, mechanical energy, heat energy, and wave motion. Not available for credit toward graduation in the School of Science or the Schools of Engineering. Typically offered Fall Spring.

PHYS 15200 - Mechanics

Credit Hours: 4.00. (West Lafayette, Calumet, North Central, IUPUI) 5.00 (Fort Wayne) Statics, uniform and accelerated motion; Newton's laws; circular motion; energy, momentum, and conservation principles; dynamics of rotation; gravitation and planetary motion; hydrostatics and hydrodynamics; simple harmonic motion; wave motion and sound. Typically offered Fall Spring Summer.

PHYS 16200 - Particle Kinematics and Conservation Laws

Credit Hours: 4.00. Particle kinematics, Newton's laws of particle dynamics, work and energy, energy and momentum conservation, particle collisions. Typically offered Fall.

PHYS 16300 - Mechanics, Heat, And Kinetic Theory

Credit Hours: 5.00. Rotational kinematics, rotational dynamics, conservation of angular momentum, gravitation, fluid statics and dynamics, oscillations and waves, heat and the first law of thermodynamics, introduction to special relativity. Typically offered Spring.

PHYS 17200 - Modern Mechanics

Credit Hours: 4.00. Introductory calculus-based physics course using fundamental interactions between atoms to describe Newtonian mechanics, conservation laws, energy quantization, entropy, the kinetic theory of gases, and related topics in mechanics and thermodynamics. Emphasis is on using only a few fundamental principles to describe physical phenomena extending from nuclei to galaxies. 3-D graphical simulations and numerical problem solving by computer are employed by the student from the very beginning. Typically offered Summer Fall Spring. CTL:IPS 1753 Calculus-based Physics I

PHYS 18300 - Professional Practice I

Credit Hours: 0.00. Course shall include supervised experience and/or training as a professional physicist. Must be accepted for the program by cooperative program coordinator. For cooperative education students only. Typically offered Fall Spring Summer.

PHYS 18400 - Professional Practice II

Credit Hours: 0.00. Course shall include supervised experience and/or training as a professional physicist. Typically offered Fall Spring Summer.

PHYS 19000 - Special Assignments

Credit Hours:1.00 to 4.00. Readings, discussions, written reports, or laboratory work selected for enrichment in special areas of physics. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 21400 - The Nature Of Physics

Credit Hours: 3.00. Development of basic concepts and theories in physics; a terminal survey course designed for non-science majors. Typically offered Fall Spring. CTL:IPS 1750 Survey Of Physical Science

PHYS 21500 - Physics For Elementary Education

Credit Hours: 2.00. The curriculum draws heavily on Project 2061 Benchmarks and NRC Science Education Standards for content and nature of science materials and focuses on middle school learning goals (especially those with strands at elementary

level). Each learning goal was expanded to finer-grained target ideas creating more steps to make concepts more understandable and explicit. Activities were designed to enable students to develop deep conceptual understanding of each target area and the structure and sequence were guided by research on student learning. In this class social interactions are used to clarify ideas and to encourage peer teaching. The students' understandings are based on prior knowledge. The class is based on a constructivist framework where new understandings are scaffolded from partial to incomplete understandings, and those are refined over time. Typically offered Fall Spring.

PHYS 21600 - Introduction To Science-Based Dating

Credit Hours: 3.00. An introduction to age determination techniques used in archaeology and the earth sciences. Various techniques currently in use, and their impact on our understanding of the past, will be described qualitatively. Topics covered include dating by use of Carbon 14, thermoluminescence, tree rings, and fission tracks, and surface exposure dating by use of cosmogenic nuclides. Typically offered Spring.

PHYS 21700 - Introduction To Current Physics And Forefront Research

Credit Hours: 1.00. This course introduces new physics majors to current physics and the research areas of the department. There are multiple sections with each section having eight or less students meeting with a Professor. The course is part seminar, part interactive discussion and questions and answers and part laboratory visits to research areas. Topics cover a wide range including the evolution of the Universe, astrophysics, elementary particle physics, nuclear physics, geophysical dating, nanoscience and imaging. Topics evolve to match current physics and the interests of the students. Typically offered Fall.

PHYS 21800 - General Physics

Credit Hours: 4.00. Mechanics, heat, and sound, primarily for technology students. Typically offered Summer Fall Spring.

PHYS 21900 - General Physics II

Credit Hours: 4.00. Electricity, light, and modern physics, primarily for technology students. Typically offered Summer Fall Spring.

PHYS 22000 - General Physics

Credit Hours: 4.00. Mechanics, heat, and sound, for students not specializing in physics. Typically offered Fall Spring Summer. CTL:IPS 1751 Algebra-based Physics I

PHYS 22100 - General Physics

Credit Hours: 4.00. Electricity, light, and modern physics, for students not specializing in physics. Typically offered Fall Spring Summer. CTL:IPS 1752 Algebra-based Physics II

PHYS 22200 - Mechanics Laboratory

Credit Hours: 1.00. Selected experiments in mechanics, thermodynamics, and fluid mechanics such as those dealing with kinematics, dynamics, waves, oscillations, work, energy, and fluids. Permission of department required. Typically offered Fall Spring Summer.

PHYS 23300 - Physics For Life Sciences I

Credit Hours: 4.00. Physics For Life Sciences I builds upon prerequisite knowledge in college level biology, chemistry, and mathematics to present introductory physics that will be useful for applying physical principles, insights, and problem solving approaches for students with life science majors. Content will feature the Newtonian framework with emphasis on friction, drag and viscosity, random motion and diffusion, fluid flow, the Coulomb force, molecular forces and bonding, momentum, conservation of energy, entropy, and the first and second laws of thermodynamics. Typically offered Fall Spring Summer.

PHYS 23500 - Seminar In Careers In Physics

Credit Hours: 1.00. Course is designed to help physics majors evaluate different career options. Permission of instructor required. Typically offered Fall Spring.

PHYS 24100 - Electricity And Optics

Credit Hours: 3.00. Electrostatics, current electricity, electromagnetism, magnetic properties of matter. Electromagnetic waves, geometrical and physical optics. Typically offered Summer Fall Spring.

PHYS 24200 - Introduction To Heat And Thermal Physics

Credit Hours: 1.00. A general introduction to thermodynamics for students in science and engineering who have a basic calculus and mechanics background. Typically offered Summer Fall Spring.

PHYS 25200 - Electricity And Optics Laboratory

Credit Hours: 1.00. Selected experiments in electric fields, magnetic fields, steady-state and transient d.c. circuits, thermodynamics, and optics. Typically offered Fall Spring Summer.

PHYS 26100 - Electricity And Optics

Credit Hours: 4.00. Electricity and magnetism with emphasis on fields; geometrical and physical optics. Typically offered Fall Spring Summer.

PHYS 27000 - Special Topics In Physics

Credit Hours: 1.00 to 5.00. Specialized topics in physics. Permission of department required. Typically offered Fall Spring Summer.

PHYS 27100 - Electricity And Magnetism

Credit Hours: 5.00. Electrostatics; current density; resistance; direct current circuit theory, Kirchhoff's laws; RC and RL circuits; magnetostatics; electromagnetic induction; magnetic properties of materials; generation of electromagnetic waves. Typically offered Fall.

PHYS 27101 - Electricity And Magnetism Laboratory

Credit Hours: 1.00. Selected experiments in electric fields, magnetic fields, steady-state and transient d.c. circuits. Typically offered Fall.

PHYS 27200 - Electric And Magnetic Interactions

Credit Hours: 4.00. Calculus-based physics course using concepts of electric and magnetic fields and an atomic description of matter to describe polarization, fields produced by charge distributions, potential, electrical circuits, magnetic forces, induction, and related topics, leading to Maxwell's equations and electromagnetic radiation and an introduction to waves and interference. 3-D graphical simulations and numerical problem solving by computer are employed throughout. Typically offered Fall Spring.

PHYS 28400 - Professional Practice III

Credit Hours: 0.00. Course shall include supervised experience and/or training as a professional physicist. Typically offered Fall Spring Summer.

PHYS 29000 - Special Assignments

Credit Hours: 0.00 to 3.00. Readings, discussions, written reports, or laboratory work selected for enrichment in special areas of physics. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 29500 - Outreach Assistance As Service Learning

Credit Hours: 1.00 to 3.00. Physics 29500 is a service learning class available to students willing and able to deliver physics lessons to K-12 classrooms and to other public events. Students are required to prepare and rehearse labs/activities so they are able to offer professional presentations. Students are also required to maintain a reflection journal, where they record notes about their experiences. Although efforts are made to work around students' schedules, students should have at least on open morning or afternoon each week (preferably 2-3) that allows them to visit an assigned site on a regular, consistent basis. One credit is equivalent to 32 hours of involvement in preparation and/or delivery of activities, and journaling time. Prerequisites: desire, commitment, dependability responsibility. Typically offered Fall Spring.

PHYS 30600 - Mathematical Methods Of Physics I

Credit Hours: 3.00. Discussion of wide-ranging physics problems from mechanics, E&M, thermal, and modern physics with emphasis on reviews and introductions of mathematical methods and techniques that are essential in such discussion. Relevant mathematical methods include one-and multi-variable calculus, complex numbers and functions of a complex variable, and vector calculus. Intended primarily for sophomore physics majors. Typically offered Fall Spring.

PHYS 30700 - Mathematical Methods Of Physics II

Credit Hours: 3.00. Discussion of wide-ranging physics problems from mechanics, E&M, thermal, and modern physics with emphasis on reviews and introductions of mathematical methods and techniques that are essential in such discussion. Relevant mathematical methods include vectors, matrices and normal modes as well as ordinary and partial differential equations. Intended primarily for sophomore physics majors. Typically offered Fall Spring.

PHYS 31000 - Intermediate Mechanics

Credit Hours: 4.00. For students familiar with calculus. Elements of vector algebra; statics of particles and rigid bodies; theory of couples; principle of virtual work; kinematics; dynamics of particles and rigid bodies; work, power, and energy. Typically offered Fall.

PHYS 31700 - Special Nuclear Materials

Credit Hours: 3.00. This Great Issues course addresses the impact of science and technology of the special nuclear materials (so designated by congress as they could be used to make nuclear weapons as well as to produce low-cost electric power) on society and the ethical issues that arise. The course is designed to be a dynamic, interactive learning experience, and topics covered range from the technical issues involved in searching, transporting, and safely utilizing these materials to social and economic impact of these activities, and to the ethical and philosophical issues presented by the flow of modernity. Typically offered Fall Spring.

PHYS 32200 - Intermediate Optics

Credit Hours: 3.00. Wave optics and properties of light, including reflection, refraction interference. Fraunhofer and Fresnel diffraction dispersion, polarization, double refraction, introduction to lasers and holography. Typically offered Fall.

PHYS 33000 - Intermediate Electricity And Magnetism

Credit Hours: 3.00. Electrostatics; electric currents; magnetostatics; electromagnetic induction; Maxwell's equation; electromagnetic waves. Typically offered Fall Spring.

PHYS 34000 - Modern Physics Laboratory

Credit Hours: 1.00. Laboratory experiments to accompany PHYS 34200 or PHYS 34400. Typically offered Fall Spring.

PHYS 34200 - Modern Physics

Credit Hours: 3.00. A survey of basic concepts and phenomena in atomic, nuclear, and solid-state physics. Typically offered Fall.

PHYS 34400 - Modern Physics

Credit Hours: 4.00. Survey of modern physics primarily intended for physics majors. Special relativity; particle properties of

electromagnetic radiation; wave properties of particles; uncertainty principle; atomic spectra and X-rays; nuclear structure; elementary particles; statistical distribution laws; physics of atoms, molecules and condensed matter such as solids. Typically offered Fall Spring.

PHYS 35000 - Intermediate Laboratory I

Credit Hours: 2.00. Geometrical optics, lenses, microscopes, telescopes, aberrations, illuminations; Schlieren, Moire, and Foucault testing; interference and diffraction dispersive instruments, emission and absorption spectroscopy; Fourier transforms and spatial filtering, polarized light, and holography. Many experiments use lasers, photodiodes, chart recorders, computers, and analog to digital conversion. Typically offered Fall.

PHYS 36000 - Quantum Mechanics

Credit Hours: 3.00. Historical development of quantum mechanics, wave packets, uncertainty principle, Schrdinger equation, operators, the hydrogen atom, electron spin, angular momentum, perturbation theory, and other selected topics. Typically offered Spring.

PHYS 38199 - Professional Practice I

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Typically offered: Summer, Fall, Spring.

PHYS 38299 - Professional Practice II

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Typically offered: Summer, Fall, Spring.

PHYS 38399 - Professional Practice III

Credit Hours: 0.00. To obtain professional practice with qualified employers within industry, government, or small business. Typically offered: Summer, Fall, Spring.

PHYS 38600 - Professional Practice IV

Credit Hours: 0.00. Course shall include supervised experience and/or training as a professional physicist. Typically offered Fall Spring Summer.

PHYS 39000 - Special Assignments

Credit Hours:1.00 to 4.00. Readings, discussions, written reports, or laboratory work selected for enrichment in special areas of physics. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 41000 - Physical Mechanics I Honors

Credit Hours: 3.00. Newtonian, Lagrangian, and Hamiltonian mechanics. Emphasis on point mass mechanics. Free, driven, and damped harmonic motion, central force problem. Typically offered Fall.

PHYS 41100 - Physical Mechanics II Honors

Credit Hours: 2.00. Continuation of mechanics in PHYS 41000. Coupled systems, general theory of small oscillations, the vibrating string, perturbation theory. Rigid body motion. Motion of charged particles in electromagnetic fields. Elements of continuum mechanics. Typically offered Fall Spring.

PHYS 41600 - Thermal And Statistical Physics Honors

Credit Hours: 4.00. Thermal equilibrium; first, second, and third laws; entropy; probability and statistics; canonical ensembles; chemical potential and Grand Canonical Ensemble; classical and quantum ideal gases; chemical reactions; phase equilibria; critical phenomena. Typically offered Fall.

PHYS 42200 - Waves And Oscillations

Credit Hours: 3.00. Physics of waves and oscillations including sound, elastic waves, and electromagnetic waves such as light. Topics range from the theory of simple harmonic oscillators, transverse modes of a continuous string, and physical optics including interference, Fresnel and Fraunhofer diffraction, and resolution, to diffraction of X-rays and electrons by crystals. Optionally includes topics such as nonlinear waves and surface waves. Typically offered Fall Spring.

PHYS 43000 - Electricity And Magnetism I Honors

Credit Hours: 3.00. Electrostatics, solutions of Poisson's equation in spherical and cylindrical coordinates, macroscopic and microscopic theory of dielectrics, electrostatic energy, conduction; magnetostatics, electromagnetic induction, and magnetic properties of matter. Typically offered Fall.

PHYS 43100 - Electricity And Magnetism II Honors

Credit Hours: 2.00. A continuation of PHYS 43000. Magnetic energy; applications of Maxwell's equations to a.c. circuits, filters, transmission lines, waveguides, and antennae; Lienard-Wiechert potentials. Typically offered Fall Spring.

PHYS 45000 - Intermediate Laboratory

Credit Hours: 2.00. Laboratory primarily intended for junior year physics majors. Assorted experiments in optics and other fields using lasers, photodiodes, computers, and other modern technology. Typically offered Fall Spring.

PHYS 45200 - Intermediate Modern Physics Laboratory III Honors

Credit Hours: 2.00. Material of PHYS 352 covered in greater depth for honors physics majors. Permission of department required. Typically offered Spring.

PHYS 46000 - Quantum Mechanics I Honors

Credit Hours: 3.00. Limits of classical physics, wave packets. Bohr model, atomic systems, Schrodinger equation, eigen-functions, one-dimensional potentials, wave mechanics general structure, multiparticle systems, Pauli principle, operator methods. Typically offered Spring.

PHYS 46100 - Quantum Mechanics II Honors

Credit Hours: 3.00. Angular momenta, radial equation, operators, matrices, spin, time-independent perturbation theory, electron-electromagnetic field interaction, hydrogen atom, structure of atoms, molecules, radiation; selected topics in radiative transitions, collision theory, solids, nuclei, elementary particles and their symmetries. Typically offered Fall Spring.

PHYS 47000 - Special Topics In Physics

Credit Hours: 1.00 to 5.00. Topics vary. Permission of department required. Typically offered Fall Spring Summer.

PHYS 48700 - Professional Practice V

Credit Hours: 0.00. Course shall include supervised experience and/or training as a professional physicist. Typically offered Fall Spring Summer.

PHYS 49000 - Special Assignments

Credit Hours: 1.00 to 3.00. Reading, laboratory work, or research in special areas of physics. Intended for upperclass students. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 51000 - Physical Mechanics

Credit Hours: 3.00. Mechanics of particles, rigid bodies, and vibrating systems. Typically offered Fall.

PHYS 51500 - Thermal And Statistical Physics

Credit Hours: 3.00. Equilibrium states, the concept of heat, and the laws of thermodynamics; the existence and properties of the entropy; different thermodynamic potentials and their uses; phase diagrams; introduction to statistical mechanics and its relation to thermodynamics; treatment of ideal gases. Typically offered Fall Spring.

PHYS 52100 - Survey Of Classical Physics

Credit Hours: 3.00. This course is intended for first-year graduate students in the Department of Physics. It provides an intensive problem solving environment encompassing a broad survey of major topics in classical mechanics, electromagnetism, and thermal physics. The primary objective is to prepare beginning graduate students for continuing on to higher level of work in the physics graduate program. Typically offered Fall.

PHYS 52200 - Coherent Optics And Quantum Electronics

Credit Hours: 3.00. Recent experimental and theoretical developments in optics emphasizing concepts of coherence. Fourier

optics, and the quantum theory of radiation. Applications to lasers and masers, nonlinear optics, holography, and quantum electronics. Typically offered Spring.

PHYS 52600 - Physics Of Quantum Computing And Quantum Information

Credit Hours: 3.00. An introduction to the physics of quantum information science. Starting with the concepts of quantum superposition, it defines and describes qubits (quantum bits) and their manipulation by quantum logic gates. The topics of quantum entanglement and the EPR paradox are introduced, and their importance for quantum teleportation, communication, and quantum cryptography are covered. Quantum computing is described in terms of quantum circuits of logic gates, and also in terms of quantum algorithms, such as Deutche¿s algorithm, the quantum Fourier transform, Shor's prime factoring algorithm, and Grover's search algorithm. The final topic is quantum decoherence and the limits it places on practical implementations of quantum computing. Typically offered Fall Spring.

PHYS 53000 - Electricity And Magnetism

Credit Hours: 3.00. Electrostatic problems; theory of dielectrics; theory of electric conduction; electromagnetic effects due to steady and changing currents; magnetic properties of matter; Maxwell's equations; electromagnetic radiation. Typically offered Fall.

PHYS 53600 - Electronic Techniques For Research

Credit Hours: 4.00. A summary of principles of modern electronics currentl used in research Coursework will include broad coverage of the field and selected topics in electronics instrumentation. Typically offered Spring.

PHYS 54500 - Solid-State Physics

Credit Hours: 3.00. Crystal structure; lattice vibrations and electronic band structure of crystals; electrical, optical, and thermal properties of solids; transport and other nonequilibrium phenomena in uniform and nonuniform materials. Typically offered Fall Spring.

PHYS 55000 - Introduction To Quantum Mechanics

Credit Hours: 3.00. Brief historical survey of the development of quantum mechanics; wave-packets, uncertainty principle, wave functions, operators, Schrodinger equation with application to one-dimensional problems, the hydrogen atom, electron spin, selected topics in perturbation theory, scattering theory, and compounding of angular momenta. Not available for students with credit in PHYS 36000 or PHYS 46000. Typically offered Fall.

PHYS 55600 - Introductory Nuclear Physics

Credit Hours: 3.00. Theory of relativity, brief survey of systematics of nuclei and elementary particles, structure of stable nuclei, radioactivity, interaction of nuclear radiation with matter, nuclear reactions, particle accelerators, nuclear instruments, fission, nuclear reactors. Typically offered Spring.

PHYS 56000 - Stellar Evolution

Credit Hours: 3.00. (ASTR 56000) Observational basis of astrophysics; formation of galaxies and stars; evolution of stars; white dwarfs, supernovae and neutron stars, pulsars, quasars, black holes; cosmic rays, their origin and acceleration; radio astronomy, radio galaxies; the H-21 cm line and the 3mK blackbody radiation; gravitational radiation; X-ray and g-ray astronomy; cosmology; space physics, magnetosphere, and solar wind. Typically offered Spring.

PHYS 56100 - Galaxies And Large Scale Structure

Credit Hours: 3.00. (ASTR 56100) Covers basic observed properties and models of galactic structure, dynamics of stars, physics of interstellar medium, formation of galaxies, properties of clusters of galaxies, and dark matter. Typically offered Fall Spring.

PHYS 56200 - Introduction To High Energy Astrophysics

Credit Hours: 3.00. (ASTR 56200) An overview of important physical processes in a variety of astronomical settings and of the experimental techniques employed in the field of high energy astrophysics. Covered in more detail are individual systems that include black holes, neutron stars, white dwarfs, supernova remnants, active galactic nuclei, clusters of galaxies, gamma-ray bursts, and cosmic rays, with special emphasis on several research frontiers. Typically offered Fall Spring.

PHYS 56300 - Astroparticle Physics

Credit Hours: 3.00. (ASTR 56300) An overview of an emerging research frontier in modern physics that lies at the interface of particle physics and astrophysics. Emphasis is on topics that are particularly relevant to both fields, including cosmology, cosmic ray physics, very-high-energy gamma ray astrophysics, neutrino astrophysics, and gravitational wave physics. Typically offered Fall Spring.

PHYS 56400 - Introduction To Elements Particle Physics

Credit Hours: 3.00. This course brings students up to the current status of research in elementary particle physics. The focus of the course is the construction of the Standard Model with emphasis on the electroweak theory. The seminal experiments that confirmed the predictions of the Standard Model is presented. The solar neutrino problem, the search for nonzero neutrino masses, and the efforts to construct a theory which unifies all interactions, including gravity, is discussed. Typically offered Spring.

PHYS 56500 - Introduction To Elementary Particle Physics II

Credit Hours: 3.00. This course follows PHYS 56400, and it continues to present current topics in elementary particle physics. It focuses on the Higgs mechanism, and it explores physics beyond the standard model. Special attention is devoted to supersymmetry and searches for new particles. Typically offered Spring.

PHYS 56600 - Introduction To Quantum Chromodynamics

Credit Hours: 3.00. An introduction to the fundamental theory of strong interactions, Quantum Chromo-Dynamics (QCD), which describes the interactions of quarks and gluons. The main focus is on a reasonably self-contained approach. All the necessary ingredients will be introduced within the course. Knowledge of graduate-level E&M and Quantum Mechanics is helpful but not essential. Typically offered Fall Spring.

PHYS 56700 - Observational Techniques In Astronomy

Credit Hours: 3.00. (ASTR 56700) Fundamental concepts in observational astronomy, including coordinate and time systems, telescopes and detectors, radiation and optics, and methods of statistical data analysis. Typically offered Fall.

PHYS 57000 - Selected Topics In Physics

Credit Hours: 3.00. Specialized topics in physics selected from time to time. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 57500 - Relativity Theory

Credit Hours: 3.00. An introduction to the theory of relativity. Typically offered Fall.

PHYS 58000 - Computational Physics

Credit Hours: 3.00. Introduction to computationally based problem solving in physics, emphasis on understanding and applying various numerical algorithms to different types of physics problems. Topics will include chaos in mechanical systems, stochastic systems including percolation and fractal structures, molecular dynamics and the properties of simple fluids, Monte Carlo methods and phase transitions, and time dependent as well as time dependent problems in quantum mechanics. Typically offered Fall.

PHYS 59000 - Reading And Research

Credit Hours: 1.00 to 3.00 (Calumet, Fort Wayne) 1.00 to 6.00 (IUPUI). Reading and research in Physics. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 59300 - Independent Research

Credit Hours: 1.00 to 4.00. Research in some area of modern physics (spectroscopy, nuclear physics, solid state physics, elementary particle physics, biophysics, geophysics, etc.) with student receiving individualized supervision and guidance from staff member. This course may be used to satisfy the independent project or 500-level elective requirement of the undergraduate majors in Honors and Applied Physics Honors Programs. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 59500 - Instructional Design In Physical Science

Credit Hours: 1.00 to 3.00. PHYS 59500 builds on collaborative interactions among current Purdue Physics or Education students, K-12 science educators, Physics and Purdue College of Science faculty, and Physics Outreach. The goal for this course is to provide opportunities and mentorship for independent work that could include the design, piloting, and assessment of instructional materials, relevant to learning and teaching topics and concepts related to the physical sciences. With a "service learning" orientation, students enrolled in this course should expect to learn and build upon the fundamental principles related to the design and implementation of instructional materials in classroom or informal learning environments, and assessment of learning. Materials developed could contribute to the repertoire of practicing teachers and/or Physics Outreach. Typically offered Fall Spring.

PHYS 60000 - Methods Of Theoretical Physics I

Credit Hours: 3.00. This course is designed to provide first-year physics graduate students with the mathematical background for subsequent studies of advanced mechanics, electrodynamics, and quantum theory. Topics treated include functions of complex variable, ordinary and partial differential equations, eigenvalue problems and orthogonal functions. Green's functions, matrix theory, and tensor analysis in three and four dimensions. Typically offered Fall.

PHYS 60100 - Methods Of Theoretical Physics II

Credit Hours: 3.00. A continuation of PHYS 60000. Prerequisite: PHYS 60000. Typically offered Fall Spring.

PHYS 60200 - Methods Of Theoretical Physics IIIA

Credit Hours: 3.00. The elements of the theory of groups. The theory of group representations. The irreducible representations of the crystallographic point groups and of orthogonal transformations in three-dimensional space. Applications of the theory of group representations to the quantum theory of atoms, molecules, and solids. Prerequisite: PHYS 60100. Typically offered Fall.

PHYS 60300 - Methods Of Theoretical Physics IIIB

Credit Hours: 3.00. Basic theory of groups and group representations. Finite groups and abelian infinite groups, with applications to atomic physics. Elements of Lie group theory. The three-dimensional rotation group. The group SU(3). Application to particle physics. Prerequisite: PHYS 60100. Typically offered Fall.

PHYS 60500 - Pedagogical Methods For Physics Graduate Students

Credit Hours: 2.00. This course prepares physics graduate students for classroom and laboratory teaching assignments. Through 100 minutes per week of lectures and hands-on recitations, it provides an intensive survey of basic pedagogical methods, both theoretically and in practice. Students will learn and practice teaching techniques via various forms and microteaching, reading, and class discussion. A broad range of results from physics education research will be studied in detail. Additional topics include grading and assessment, responsible conduct in teaching related to issues such as gender, culture and ethnicity, students with disabilities, and ethics in academia, generally, including ethical conduct of research. Typically offered Fall.

PHYS 61000 - Advanced Theoretical Mechanics

Credit Hours: 3.00. Lagrangian and Hamiltonian mechanics; variational principles; canonical transformations; Hamilton-Jacobi theory; theory of small oscillations; Lagrangian formulation for continuous systems and fields. Prerequisite: PHYS 51000. Typically offered Fall Spring Summer.

PHYS 61700 - Statistical Mechanics

Credit Hours: 3.00. Classical and quantum statistical mechanics. Prerequisite: PHYS 66000. Typically offered Fall Spring.

PHYS 61800 - Advanced Statistical Mechanics

Credit Hours: 3.00. Advanced statistical physics provides important principles and methods to the studies of many particle and complex systems, including those in condensed matter physics, materials physics, biophysics and so on. This course covers fundamental concepts and modern techniques through solving specific statistical models. Topics include: phase transition and critical phenomena, mean field and Landau-Ginzburg phenomenalogical approaches, thermal and quantum fluctuation, scaling and renormalization group, exactly solvable models, quantum phase transition, topological phase transition, non-equilibrium and dissipative dynamics, and effect of disorder in physical systems. Prerequisites: PHYS 61700. Typically offered Fall Spring.

PHYS 63000 - Advanced Theory Of Electricity And Magnetism

Credit Hours: 3.00. The experimental origins of Maxwell's equations. Electrostatics and magnetostatics; solution of boundary value problems. Quasi-static currents. Electromagnetic energy and momentum and the Maxwell stress tensor. Foundations of optics. Radiation from antennas, multi-pole expansion; waveguides. Prerequisite: PHYS 53000, PHYS 60000. Typically offered Fall Spring.

PHYS 63100 - Advanced Theory Of Electricity And Magnetism

Credit Hours: 3.00. Covariant formulation of electrodynamics; Lienard-Wiechert potentials; radiation from accelerated particles; Cerenkov radiation; dynamics of relativistic particles; radiation damping; introduction to magneto-hydrodynamics. Prerequisite: PHYS 63000. Typically offered Fall Spring.

PHYS 64500 - Electron Theory Of Solids I

Credit Hours: 3.00. Electronic energy bands in crystalline solids; crystal symmetry and Brillouin zones, approximate methods of calculation, electrons and holes under applied fields. Lattice dynamics and thermal conductivity. Electron-lattice interactions. Transport phenomena in metals and semi-conductors. Prerequisite: PHYS 54500, PHYS 60100, PHYS 66100. Permission of instructor required. Typically offered Fall Spring.

PHYS 64600 - Electron Theory Of Solids II

Credit Hours: 3.00. Crystal imperfections, impurities and lattice defects. Magnetic properties: diamagnetic effects, paramagnetism, ferromagnetism, resonance phenomena. Ferroelectricity. Optical properties of metals and semiconductors; interband and intraband transitions, excitons, effects of crystal imperfections. Prerequisite: PHYS 64500. Permission of instructor required. Typically offered Fall Spring.

PHYS 65800 - Theoretical Techniques Of Elementary Particle Physics I

Credit Hours: 3.00. Theory and phenomenology of the standard model of elementary particle interactions. Electro-weak model of Glashow, Salam, and Weinberg: spontaneous symmetry breaking, mass generation, Cabibbo-Kobayashi-Maskawa mixing in charged weak current, path integral quantization, R3 gauge Feynman fules, renormalization. Parton model. Neutral current phenomenology. Comparison to high energy high precision electron-positron annihilation and deep inelastic scattering experiments: weak mixing angle, heavy top quark constraints. Prerequisite: PHYS 66200, PHYS 66300. Permission of instructor required. Typically offered Fall Spring.

PHYS 65900 - Theoretical Techniques Of Elementary Particle Physics II

Credit Hours: 3.00. Theory and phenomenology of the standard model of elementary particle interactions. Quantum Chromodynamics (QCD) theory of strong interactions: asymptotic freedom, perturbative QCD applied to high energy electron-positron annihilation and deep inelastic phenomena using operator product expansion, renormalization group, extended parton model, and Altarelli-Parisi equation. SU(3)xSU(3) current algebra and effective Lagrangians, chiral perturbation theory and chiral anomalies. Weak decay of heavy quarks: Cabibbo-Kobayashi-Maskawa mixing matrix, CP violation. Neutrino physics. Electroweak symmetry breaking and Higgs physics. Other topics of current research interests in and beyond the standard model. Prerequisite: PHYS 65800. Permission of instructor required. Typically offered Spring.

PHYS 66000 - Quantum Mechanics I

Credit Hours: 3.00. Origins of the quantum theory, the uncertainty and complementarity principles. The Schrodinger equation and its solutions for simple physical systems. Mathematical formulation of the quantum theory. Applications: simple harmonic oscillator, theory of angular momentum, the hydrogen atom. Time-independent and time-dependent perturbation theory. The Pauli exclusion principle. Spin of the electron. Elementary theory of scattering. Prerequisite: PHYS 53000, PHYS 55000, PHYS 60000, PHYS 61000, Corequisite: PHYS 60100. Typically offered Fall Spring.

PHYS 66100 - Quantum Mechanics II

Credit Hours: 3.00. Symmetry and conservation laws. The Klein-Gordon and Dirac equations. Interaction of radiation with matter. Applications of quantum mechanics to atomic structure. Scattering theory. Prerequisite: PHYS 60100, PHYS 63000, PHYS 66000. Typically offered Fall Spring.

PHYS 66200 - Quantum Field Theory I

Credit Hours: 3.00. Introduction to relativistic quantum field theory. Representations of the Lorentz and Poincare groups. Noether's theorem: symmetries and conservation laws. Canonical quantization of free Klein-Gordon, Dirac, Maxwell fields. Interacting field theory: Lehmann-Kallen representations. LSZ reduction formula. Schwinger action principle. Quantum Electrodynamics (QED): Gell-Mann Low expansion, Wick's theorem, Feynman rules for Green functions and S-matrix elements. Scattering processes in QED: cross sections in low orders of perturbation theory. Prerequisite: PHYS 66100. Permission of instructor required. Typically offered Fall Spring.

PHYS 66300 - Quantum Field Theory II

Credit Hours: 3.00. Concepts and techniques of relativistic quantum field theory. Quantum Electrodynamics: radiative corrections, renormalization program, infrared divergences, external field problem. Feynman path integral quantization. Global symmetries and Ward identities. Quantum effective action: effective potential, loop expansion. Non-Abelian gauge theories: quantization via Faddeev-Popov prescription, Feynman rules, BRS invariance. Quantum Chromodynamics. Callen-Symanzik equation and renormalization group. Prerequisite: PHYS 66200. Permission of instructor required. Typically offered Fall Spring.

PHYS 66400 - Quantum Theory Of Many-Body Systems

Credit Hours: 3.00. Practical introduction to modern quantum field theory techniques as applied to the study of many-body phenomena occurring in solid state systems. Standard perturbative-theoretic results based on zero- and finite-temperature Green's functions, with application to specific physical situations. Introduction to nonperturbative methods. PHYS 64500 and PHYS 64600 are recommended. Prerequisites: PHYS 61700, PHYS 66000, PHYS 66100. Permission of instructor required. Typically offered Fall.

PHYS 67000 - Selected Topics In Physics

Credit Hours: 1.00 to 3.00. Specialized topics in physics, varied from time to time. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 67200 - Advanced Physics Laboratory

Credit Hours: 3.00. Provides modern laboratory experience for graduate students in physics. Emphasis is on student initiative in accomplishing difficult but meaningful results. The course is intended to fill the gap between undergraduate-level laboratory, with detailed description of each experiment, and real-life experimental work. Students will share in the responsibility of determining how to conduct many of these experiments, learn how to use original equipment manuals, redesign experiments, and redefine goals depending on the progress. Prerequisite: graduate level E & M and QM courses, undergraduate level laboratory course. Permission of instructor required. Typically offered Fall Spring.

PHYS 67500 - General Relativity

Credit Hours: 3.00. Theoretical and experimental general relativity. The equivalence principle and its experimental basis. The Einstein field equations; classical tests of general relativity; gravitational radiation, cosmological considerations; topics to be chosen. Prerequisite: PHYS 60000, PHYS 61000, PHYS 63000. Typically offered Spring.

PHYS 69600 - Introduction To Physics Research

Credit Hours: 1.00. Seminar designed to acquaint first-year physics graduate students with the research programs of the department. Typically offered Fall Spring.

PHYS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

PHYS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Political Science

POL 10100 - American Government And Politics

Credit Hours: 3.00. A study of the nature of democratic government, the U.S. Constitution, federalism, civil rights, political dynamics, the presidency, Congress, and the judiciary. Typically offered Summer Fall Spring. CTL:ISH 1002 American Government

POL 12000 - Introduction To Public Policy And Public Administration

Credit Hours: 3.00. An introduction to the fields of public policy and public administration. Processes of policy formation and administration are examined. Different approaches to evaluating and improving public policies are discussed. Typically offered Summer Fall Spring.

POL 13000 - Introduction To International Relations

Credit Hours: 3.00. An analysis of the fundamentals of international law, organization, and politics, particularly as relevant to contemporary international relations. Typically offered Summer Fall Spring. CTL:ISH 1003 Introduction To World Politics

POL 14100 - Governments Of The World

Credit Hours: 3.00. An introduction to the politics and government in selected foreign countries. The course presents the tools and background needed to understand contemporary events in the world beyond the United States. Readings and discussions pay special attention to democratization and development. Typically offered Summer Fall Spring.

POL 15000 - Introduction To Political Thought

Credit Hours: 3.00. Introduction to basic concepts in political philosophy, such as conflict and community, justice and the good society, the origins of democracy, and the intersections of class, race, gender, and sexuality. Selected classical and contemporary political thinks covered. Typically offered Summer Fall Spring.

POL 20000 - Introduction To The Study Of Political Science

Credit Hours: 3.00. Introduction to basic concepts and methods of political science. Basic concepts including, among others, power, justice, authority, ideology, and democracy, and a variety of quantitative and qualitative methods of analysis will be explored. Typically offered Summer Fall Spring.

POL 22200 - Women, Politics, And Public Policy

Credit Hours: 3.00. An introduction to women's participation in politics, with an emphasis on America. Structural and attitudinal conditions limiting women's political roles and contemporary efforts to change women's status in society through politics. Typically offered Summer Fall Spring.

POL 22300 - Introduction To Environmental Policy

Credit Hours: 3.00. (FNR 22310) Study of decision making as modern societies attempt to cope with environmental and natural resources problems. Focuses on the American political system, with some attention to the international dimension. Current policies and issues will be examined. Typically offered Fall Spring.

POL 23000 - Introduction To The Study Of Peace

Credit Hours: 3.00. This course provides an interdisciplinary introduction to peace studies including an examination of war and violence, forms of exploitation and discrimination, and how to create a peaceful and just world. Typically offered Fall Spring.

POL 23100 - Introduction To United States Foreign Policy

Credit Hours: 3.00. Designed to introduce students to the major themes and issues in contemporary U.S. foreign policy. Lectures, discussion, and readings will examine such areas as U.S. relationships with the major powers, the Third World, and international organizations. Typically offered Fall Spring.

POL 23200 - Contemporary Crises In International Relations

Credit Hours: 3.00. The focus of this course will be on major world crises, such as in the Middle East and Southern Africa, and ways in which these crises may be analyzed. Typically offered Fall Spring.

POL 23500 - International Relations Among Rich And Poor Nations

Credit Hours: 3.00. Introduction to the major themes in the contemporary international relations among rich and poor nations. Examines such areas as North-South relations, interdependence, international organizations, and global development. Typically offered Fall Spring.

POL 23700 - Modern Weapons And International Relations

Credit Hours: 3.00. This course introduces the student to the roles that modern weapons systems play in contemporary international relations. Typically offered Fall Spring.

POL 30000 - Introduction To Political Analysis

Credit Hours: 3.00. An introduction to the study of politics, its basic concepts and major areas of concern; also review of important research techniques, including methods of data collection and analysis. Typically offered Summer Fall Spring.

POL 31400 - The President And Policy Process

Credit Hours: 3.00. A study of presidential leadership as the embodiment of social forces and as reflective of the personality of the incumbent; the president as national leader reflecting national myths and ideologies; the growth of the presidency; issues and forces affecting the continuity of presidential leadership; the degree of institutionalization of the presidency. Typically offered Fall Spring.

POL 32300 - Comparative Environmental Policy

Credit Hours: 3.00. Comparative study of environmental policy development and processes in industrialized democracies, former and current communist states, and developing nations. Typically offered Summer Fall Spring.

POL 32600 - Black Political Participation In America

Credit Hours: 3.00. An examination of African American political participation in the United States. Analyzes political culture and socialization, with a focus on the interaction between African Americans and actors, institutions, processes, and policies of the American system of politics and governance. Typically offered Fall Spring.

POL 32700 - Global Green Politics

Credit Hours: 3.00. Analysis and assessment of the nature of global environmentalism, its connections with other new social movements, and its impact on domestic and international politics worldwide, with particular attention to green political parties and nongovernmental organizations. Typically offered Fall Spring Summer.

POL 34500 - West European Democracies In The Post-Industrial Era

Credit Hours: 3.00. An introduction to the political institutions and processes in West European democracies. The course focuses on the ability of Western democracy to survive the transition to the post-industrial era. Typically offered Fall Spring.

POL 34700 - Introduction To Latin American Politics

Credit Hours: 3.00. Major aspects of Latin American politics and development. Questions such as the impact of the military on political development, the dynamics of Latin American industrialization, and Latin America's changing international role will be explored. Typically offered Fall Spring.

POL 34800 - East Asian Politics

Credit Hours: 3.00. The course will examine East Asian politics and society, with special emphasis on Japan. Typically offered Fall Spring.

POL 35000 - Foundations Of Western Political Theory: From The Renaissance To Marx

Credit Hours: 3.00. A survey of modern political thought from Machiavelli through Marx. Major writers studied include Machiavelli, Hobbes, Locke, Rousseau, the Utilitarians, and Marx. Typically offered Fall Spring Summer.

POL 35100 - Foundations Of Western Political Theory: From Plato To The Reformation

Credit Hours: 3.00. A survey of ancient and medieval political theory in the West. Major writers include Plato, Aristotle, St. Augustine, and St. Thomas Aquinas. Typically offered Fall Spring Summer.

POL 35200 - Selected Topics In Political Theory

Credit Hours: 3.00. This course is intended to provide a more narrowly focused analysis of selected problems and topics that are briefly presented in POL 35000 and POL 35100, giving special emphasis to their conceptual frameworks and their significance in the history of political philosophy. This course also will allow students to see the practical role of the political theorist by stressing the methods and criteria used in the selection, formulation, and solution of problems in political philosophy. Course topics will be different each semester. Typically offered Fall Spring.

POL 35300 - Current Political Ideologies

Credit Hours: 3.00. Liberalism, conservatism, socialism, fascism, communism, and other political ideologies. Typically offered Fall Spring Summer.

POL 36000 - Women And The Law

Credit Hours: 3.00. An introductory survey of women's legal status in America. Topics include constitutional law, marriage and divorce, reproductive rights, employment discrimination, and crimes of violence. Typically offered Fall Spring Summer.

POL 36400 - Law, Ethics, And Public Policy

Credit Hours: 3.00. This course is divided into three sections. Justice as liberty examines the notion of a right to privacy. Justice as equality focuses on economic rights. Finally, justice as community addresses the notion of duties. Permission of instructor required. Typically offered Fall Spring Summer.

POL 37000 - Introduction To Comparative State Politics

Credit Hours: 3.00. An introduction to the structure and process of state government, including the legal and political relationships between the state and local units of government. Typically offered Fall Spring.

POL 37200 - Indiana Government And Politics

Credit Hours: 3.00. An examination of the political and governmental organization of the state of Indiana. Includes the political and historical development of Indiana state government and comparison of policies and institutions with those of other states. Typically offered Fall Spring Summer.

POL 37300 - Campaigns And Elections

Credit Hours: 3.00. This course analyzes the role of political parties, issues, candidates, media, funding, and electoral and campaign strategies in presidential, congressional, and state campaigns. Contemporary election examples will be utilized. Typically offered Fall Spring Summer.

POL 38000 - The Politics Of Bureaucracy

Credit Hours: 3.00. An examination of bureaucratic organization in government. Organization theory and internal politics, foundations of bureaucratic power, and the relationship between bureaucracies and political culture, parties, pressure groups, and other structures of government. Typically offered Fall Spring Summer.

POL 40300 - Field Experience In Political Science

Credit Hours: 1.00 to 3.00. Students are able to earn credit for internships in federal, state, and local government offices as well as with political parties, campaign organizations, nonprofit organizations, legislative bodies, and interest groups. Credit and course requirements to be arranged with the instructor. Permission of instructor required. Typically offered Fall Spring Summer.

POL 41000 - Political Parties And Politics

Credit Hours: 3.00. An analysis of the nature and functioning of U.S. political parties in terms of social and economic forces that shape our political system. Interactions among political parties, pressure groups, and formal government structures are emphasized throughout. Special attention is devoted to political leadership, nominating processes, campaign management, voting behavior, and other important aspects of American politics. Typically offered Fall Spring.

POL 41100 - Congress: Structure And Functioning

Credit Hours: 3.00. A study of how Congress actually operates. Formal and informal power structures within both chambers and roles of the individual members of Congress are analyzed. Attention is directed to latent, as well as manifest, functions of legislative, investigative, and other major activities of Congress. The problem of bringing expertise to bear on the legislative process is considered throughout. Typically offered Fall Spring.

POL 41300 - The Human Basis Of Politics

Credit Hours: 3.00. A broad-based survey of human political behavior and the forces that underlie it, organized around the concept of political power. Examines how people think and communicate about politics, political symbols they employ, roles they occupy, and their political interactions with other individuals, groups, and nations. Typically offered Fall Spring Summer.

POL 41500 - US Politics And The Media

Credit Hours: 3.00. This course examines the roles and influences of the mass media on American politics generally and with particular emphasis on election campaigns and the evolving political culture of the United States. Typically offered Fall Spring.

POL 41900 - The Politics Of Intergovernmental Relations

Credit Hours: 3.00. A behavioral analysis of the dynamics of the American federal system. The interaction among local, state, and federal governmental units will be analyzed. Existing and future political relationships between the various levels of government will be stressed. Typically offered Fall Spring.

POL 42300 - International Environmental Policy

Credit Hours: 3.00. Environmental policy development in the international arena, with attention to international law, international organizations, and transboundary environmental problems. Typically offered Fall Spring Summer.

POL 42500 - Environmental Law And Politics

Credit Hours: 3.00. This course provides an introduction to statutory and case law relating to environmental policy. Regulatory

schemes in environmental policy and the legal framework for environmental regulation are presented. Market alternatives to various regulatory mechanisms will also be treated. Typically offered Summer Fall Spring.

POL 42700 - Comparative Public Policy

Credit Hours: 3.00. An examination of public policy determinants, processes, and outputs in both advanced industrial and less-developed countries and in both democratic and nondemocratic countries. Typically offered Fall Spring Summer.

POL 42800 - The Politics Of Regulation

Credit Hours: 3.00. Politics and policies of federal and state regulatory agencies. Explanations of regulatory agency behavior, arguments for and against government regulation, and alternatives to government regulation. Typically offered Fall Spring Summer.

POL 42900 - Contemporary Political Problems

Credit Hours: 3.00. Contemporary political problems in the United States affecting the interpretation of democracy, human rights and welfare, social pressures, and intergovernmental relations. Typically offered Fall Spring.

POL 43000 - Selected Problems In International Relations

Credit Hours: 3.00. An in-depth analysis of selected problems in international relations. Typically offered Fall Spring.

POL 43100 - Selected Problems In International Law

Credit Hours: 3.00. An in-depth analysis of the role international law plays in resolving selected problems in international relations. Typically offered Fall Spring.

POL 43200 - Selected Problems In World Order

Credit Hours: 3.00. An in-depth analysis of how selected problems in international relations are treated within international organizations. Typically offered Fall Spring.

POL 43300 - International Organization

Credit Hours: 3.00. A study of the structure and functions of the United Nations and associated agencies, with an emphasis on the role of this system in contemporary international relations. Typically offered Fall Spring.

POL 43400 - United States Foreign Policy, Central America And The Caribbean

Credit Hours: 3.00. This course examines United States foreign policy toward Central America and the Caribbean and the impacts of the policy on the region. Typically offered Fall Spring Summer.

POL 43500 - International Law

Credit Hours: 3.00. A study of international legal theories, principles, and practices, with an emphasis on the role and utility of law in contemporary international relations. Typically offered Fall Spring.

POL 43900 - United States Foreign Policy Making

Credit Hours: 3.00. An analysis of the decision-making process in United States foreign policy. Typically offered Fall Spring.

POL 44100 - Violence And Politics

Credit Hours: 3.00. A cross-national approach to the problem of violence in politics. Primarily devoted to the study of collective political violence. Special attention will be given to theoretical explanations of the causes of violence and contemporary patterns. Typically offered Fall Spring.

POL 45300 - Marxism And Its Critics

Credit Hours: 3.00. The Marxian tradition of political thought. The Marxian system (materialism, the state, ideology, the revolution, etc.), its development into Soviet Marxism, and critiques of Marx by Bakunin, Bernstein, Weber, Mosca, and Freud, among others. Typically offered Fall Spring Summer.

POL 46000 - Judicial Politics

Credit Hours: 3.00. A survey of judicial processes as they operate in America. Both trial courts and appellate courts will be examined in light of the procedures with which they operate. The external social, economic, and political pressures surrounding courts and the impact courts have on society will be considered. Typically offered Fall Spring.

POL 46100 - Constitutional Law I

Credit Hours: 3.00. A survey of selected areas of constitutional law, considering the political and social influences as well as the doctrinal forces that have produced these policies and interpretations. Typically offered Fall Spring.

POL 46200 - Constitutional Law II

Credit Hours: 3.00. An examination of the development of individual rights and civil liberties through constitutional law and interpretation of the Bill of Rights and Civil War Amendments. Both doctrinal and political pressures will be discussed to illustrate the evolution of these rights. Typically offered Spring.

POL 49100 - Political Science Senior Seminar

Credit Hours: 3.00. This is a variable-title seminar focusing on contemporary issues in political science at the senior level. It is part of the "capstone" experience for political science majors. Typically offered Fall Spring.

POL 49300 - Interdisciplinary Undergraduate Seminar

Credit Hours: 1.00 to 3.00. An undergraduate seminar devoted to an interdisciplinary examination of social, economic, political, and intellectual movements, using the faculty resources of the participating departments. Subject matter will vary. Each offering of the seminar will be approved by a committee of department heads from the sponsoring departments. Permission of instructor required. Typically offered Fall Spring.

POL 49500 - Undergraduate Research Experience

Credit Hours: 1.00 to 3.00. Students are able to earn credit by working on a research project with a faculty member. Students will become familiar with all phases of the research process. Credit and course requirements are arranged with the instructor. Permission of instructor required. Typically offered Summer Fall Spring.

POL 50100 - Political Science: Methodology

Credit Hours: 3.00. Introduction to the basic techniques of statistical analysis applicable to political science data. Elementary descriptive statistics and statistical inference. Introduction to multivariate analysis. Permission of instructor required. Typically offered Fall Spring.

POL 51700 - The Politics Of Capital And Labor In The United States

Credit Hours: 3.00. An examination of conflicts between capital and labor in the political process, with emphasis upon labor organization, the state and labor policy, and the political economy of capital-labor relations since World War II. Typically offered Fall Spring Summer.

POL 52000 - Special Topics In Public Policy

Credit Hours: 3.00. This is a course focused on a specific current public policy topic, chosen for its contemporary political relevance, which varies from semester to semester. In general, each topic will be examined in terms of its historical roots, past policy initiatives, present policy proposals, and its enduring political and social challenges. Typically offered Fall Spring Summer.

POL 52300 - Environmental Politics And Public Policy

Credit Hours: 3.00. The political problems of natural resource use and environmental quality. Theoretical foundations for environmental policy and its evaluation, the political context of environmental policy, principles of administering environmental policies, and the significance of international law and institutions for environmental policies. Typically offered Summer Fall Spring.

POL 52400 - Public Policy And The Family

Credit Hours: 3.00. An intensive examination of the interrelationships between public policy making and the structure and quality of life of families. The primary focus is the United States, but consideration is given to family policies in other capitalist nations. Typically offered Fall Spring.

POL 59000 - Directed Reading In Political Science

Credit Hours: 1.00 to 3.00. A reading course directed by the instructor in whose field of specialization the content of the reading falls. Approval of each reading project must be secured from the department. Permission of instructor required. Typically offered Fall Spring.

POL 60000 - Political Science: Discipline And Profession

Credit Hours: 3.00. An exploration of the scope of political science and of its development as a profession, with a focus on what American political scientists do as disciplinary professionals. Analysis of major approaches to the study of politics and of current developments. Prerequisite: 6 credit hours in Political Science. Typically offered Fall Spring Summer.

POL 60500 - Research Design And Methods

Credit Hours: 3.00. Selection of research problems involving political phenomena; formulation of concepts and hypotheses; research design; data collection techniques; data processing, analysis, and interpretation, with attention to uses of high-speed facilities. Students will design a research project and, as appropriate, carry out the project in the laboratory or in the field. Prerequisite: POL 50100. Typically offered Fall Spring.

POL 60600 - Advanced Quantitative Techniques In Political Science

Credit Hours: 3.00. This course deals with advanced quantitative techniques useful in political science research. These include multiple correlation and regression, causal modeling, dynamic (time series) analysis, dimensional analysis (Coombsean scaling, Shepard-Kruskal scaling, and factor analysis), and cross-level inference techniques. Prerequisite: POL 50100, POL 60500. Typically offered Fall Spring.

POL 61000 - Proseminar In American Political Systems, Processes, And Behavi

Credit Hours: 3.00. An introduction to American political systems, processes, and behavior as a field of graduate study with an emphasis on literature. Typically offered Fall Spring.

POL 61100 - Research Seminar In American Government And Politics

Credit Hours: 3.00. Topics vary. Permission of department required. Typically offered Fall Spring.

POL 61500 - Proseminar In Electoral Behavior And Political Socialization

Credit Hours: 3.00. A reading and lecture course acquainting the student with the general literature in the field. Traces the descriptive aspects, causes, and consequences of electoral behavior and political socialization in the American polity and selected

European countries. Emphasis on the processes of citizen integration into the larger political system. Both historical and comparative approaches to the material will be used. Typically offered Fall Spring.

POL 61600 - Research Seminar In Political Behavi

Credit Hours: 3.00. Extends the work of POL 51600 (Group Politics) to the empirical study of primary groups, cliques, social groups, voluntary associations, experimental and occupational groups (insofar as they have political impacts) and of political clubs and associations, paraparties, and inchoate political movements and parties. Training will be given in the use of phenomenological observation, interaction analysis, content analysis, personality inventories, and other instruments that reveal the social structure and dynamics of groups. Students will conduct field studies of politically-relevant groups, or will conduct or participate in conducting laboratory experiments. Typically offered Fall Spring.

POL 62000 - Proseminar In Public Policy And Processes

Credit Hours: 3.00. An introduction to public policy and processes as a field of graduate study with an emphasis on the literature. Typically offered Fall Spring.

POL 62200 - Research Seminar In Public Policy And Public Administration

Credit Hours: 3.00. Investigation in depth of a substantive aspect of public policy such as energy policy or social policy, or of a theoretical topic, for example, policy formulation, enactment, implementation, impact, or evaluation. Permission of instructor required. Typically offered Fall Spring Summer.

POL 62300 - Research Seminar In Environmental Policy

Credit Hours: 3.00. Investigation in depth of a substantive aspect of environmental policy or a theoretical approach to environmental policy, with emphasis on student research. Permission of instructor required. Typically offered Fall Spring.

POL 63000 - Proseminar In International Relations

Credit Hours: 3.00. An introduction to international relations as a field of graduate study with an emphasis on literature. Typically offered Fall Spring.

POL 63100 - Research Seminar In International Relations

Credit Hours: 3.00. Topics vary. Permission of department required. Typically offered Fall Spring.

POL 63200 - Research Seminar In Peace And World Order Studies

Credit Hours: 3.00. A study of some of the forces which endanger the planet, the related political problems, and prospective strategies to overcome these problems. Particular attention will be directed to problems such as war, population pressure, resource shortages, and environmental deterioration. Students will examine a variety of ideas that might contribute to the elimination or control of these problems, and their overarching objective will be to conceptualize a "world order model" in conformity with basic canons of scientific inquiry. Permission of department required. Typically offered Fall Spring.

POL 64000 - Proseminar In Comparative Political Systems

Credit Hours: 3.00. An introduction to comparative political systems, processes, and behavior as a field of graduate study with an emphasis on literature. Typically offered Fall Spring.

POL 64100 - Research Seminar On Comparative Politics

Credit Hours: 3.00. Topics vary. Prerequisite: POL 64000. Typically offered Fall Spring Summer.

POL 65000 - Proseminar In Political Theory

Credit Hours: 3.00. An introduction to political theory as a field of graduate study with special emphasis on the literature of great political thinkers. Prerequisite: Master's student standing. Typically offered Fall Spring.

POL 65100 - Research Seminar In Political Theory

Credit Hours: 3.00. Investigation in depth into a selected area of political thought. Intensive study and close analysis of the selected topic, school, or theoretic system. Development of historic and philosophic methods applicable to the study of political thought. Prerequisite: POL 35000, POL 35100. Typically offered Fall Spring.

POL 66200 - Proseminar In Political Economy

Credit Hours: 3.00. An introduction to political economy as a field of graduate study with an emphasis on literature. Typically offered Fall Spring.

POL 69300 - Interdisciplinary Seminar

Credit Hours: 3.00. Topics vary - Interdisciplinary Seminar. Permission of instructor required. Typically offered Summer Fall Spring.

POL 69500 - Directed Reading And Research Topics

Credit Hours: 1.00 to 3.00. Individual topics involving research by the student other than on a thesis topic. Admission and hours require the consent of instructor who will supervise the research. Approval of each topic must be secured from the department. Permission of instructor required. Typically offered Fall Spring.

POL 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Typically offered Fall Spring Summer.

POL 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Portuguese

PTGS 10100 - Portuguese Level I

Credit Hours: 3.00. A beginning course in Portuguese. Typically offered Fall Spring Summer.

PTGS 10200 - Portuguese Level II

Credit Hours: 3.00. Continuation of PTGS 10100. Typically offered Fall Spring Summer.

PTGS 10500 - Accelerated Portuguese

Credit Hours: 3.00. Accelerated acquisition of basic Portuguese for speakers of Spanish or another romance language. Capitalizes on students' backgrounds in related languages to build skills in listening comprehension, reading comprehension, basic writing, and conversation. Knowledge of a romance language. Typically offered Summer Fall Spring.

PTGS 11200 - Elementary Portuguese Conversation I

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in conversation to enhance communicative competence. Small group (enrollment limited to 10 per section) discussions in Portuguese on practical topics. May be taken concurrently with PTGS 10200. Typically offered Fall Spring Summer.

PTGS 20100 - Portuguese Level III

Credit Hours: 3.00. An intermediate Portuguese course with emphasis on communicative skills (listening and speaking), literacy skills (reading and writing) and culture. Typically offered Fall Spring Summer.

PTGS 20200 - Portuguese Level IV

Credit Hours: 3.00. Continuation of PTGS 20100. Typically offered Fall Spring Summer.

PTGS 21100 - Elementary Portuguese Conversation II

Credit Hours: 1.00. Continuation of PTGS 11200. May be taken concurrently with PTGS 20100. Typically offered Fall Spring Summer.

PTGS 21200 - Elementary Portuguese Conversation III

Credit Hours: 1.00. Continuation of PTGS 21100. May be taken concurrently with PTGS 20200. Typically offered Fall Spring Summer.

PTGS 24100 - Introduction To The Study Of Luso-Brazilian Literature

Credit Hours: 3.00. Reading and discussion of selected poetry, prose and theatre from Portugal, Brazil and other Portuguese-speaking countries; introduction to critical discourse and basic concepts of literary theory. Texts, discussion and written assignments in Portuguese. Typically offered Fall Spring.

PTGS 30100 - Portuguese Level V

Credit Hours: 3.00. Continued development of Portuguese speaking, listening, reading and writing abilities, using materials dealing primarily with everyday life and civilization in the Portuguese-speaking countries from a variety of sources (e.g., newspapers, magazines, TV, recent literature, etc). Conducted primarily in Portuguese. Typically offered Fall Spring.

PTGS 30200 - Portuguese Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading, and writing abilities in Portuguese on the basis of materials dealing primarily with the ideas and events that have shaped present-day Portuguese-speaking countries. Conducted primarily in Portuguese. Typically offered Fall Spring.

PTGS 33000 - Brazilian, Portuguese, And African Cinema

Credit Hours: 3.00. Screening and analysis of selected films from Portuguese- speaking countries: Brazil, Portugal, Angola, Mozambique, Cape Verde, Guinea-Bissau, S. Tome and Principe, with discussion of their cultural contexts (colonial/post-colonial societies; cross-Atlantic relationships; racial diversity; minority/majority issues). Knowledge of Portuguese not required. . Typically offered Summer Fall Spring.

PTGS 39800 - Topics In Portuguese

Credit Hours: 3.00. Advanced studies of particular aspects of Portuguese (e.g. culture, civilization, literature, linguistics, film, art, politics, etc.) by examining a varied selection of works. Readings, discussion, and papers in Portuguese. Typically offered Fall Spring.

PTGS 39900 - Special Study Abroad Credit In Portuguese

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in Portuguese earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

PTGS 49800 - Advanced Topics In Portuguese

Credit Hours: 3.00. Advanced studies of particular aspects of Portuguese (e.g. culture, civilization, literature, linguistics, film, art, politics, ect.) by examining a varied selection of works. Readings, discussion, and papers in Portuguese. Typically offered Fall Spring.

PTGS 55100 - Brazilian Poetry

Credit Hours: 3.00. A survey of the major currents and most important writers of Brazilian poetry. Readings include Gregorio de Matos, Goncalves Dias, Castro Alves, Mario de Andrade, Manuel Bandeira, and Cecilia Meireles. Permission of instructor required. Typically offered Spring Fall.

PTGS 55500 - Brazilian Drama

Credit Hours: 3.00. A survey of the primary movements and most important works of Brazilian theatre. Readings include plays by Nelson Rodrigues, Dias Gomes, Ariano Suassuna, and Jorge Andrade. Permission of instructor required. Typically offered Spring Fall.

PTGS 55700 - Brazilian Fiction

Credit Hours: 3.00. A survey of the development and major texts of Brazilian fiction. Readings include novels or short stories by Jose de Alencar, Machado de Assis, Graciliano Ramos, and Clarice Lispector, among others. Permission of instructor required. Typically offered Spring Fall.

PTGS 59000 - Directed Reading In Portuguese

Credit Hours: 1.00 to 4.00. Directed readings in Portuguese. Permission of instructor required. Typically offered Spring Fall Summer.

PTGS 59400 - Special Topics In Luso-Brazilian Literature

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

Psychology

PSY 10000 - Introduction To The Science And Fields Of Psychology

Credit Hours: 1.00. An introduction to psychology as a science and as a profession. Typically offered Fall Spring.

PSY 12000 - Elementary Psychology

Credit Hours: 3.00. Introduction to the fundamental principles of psychology, covering particularly the topics of personality, intelligence, emotion, abnormal behavior, attention, perception, learning, memory, and thinking. As part of their learning experience, students participate in psychological experiments. Typically offered Fall Spring Summer. CTL:ISH 1020 Introduction To Psychology

PSY 12100 - Topics In Psychology For Students Of Science And Engineering

Credit Hours: 3.00. This course surveys the scientific knowledge of the brain, mind, and behavior. Topics include sensation, perception, learning, memory, decisions, emotions, neuropsychology, development, and social interactions. As part of their learning experience, students participate in psychological experiments. Typically offered Fall Spring.

PSY 20000 - Introduction To Cognitive Psychology

Credit Hours: 3.00. A survey of psychology as the science of mental life, covering theories and research in perception, reading, attention, consciousness, imagery, memory and its improvement, problem solving, creativity, decision making, and artificial intelligence. Typically offered Summer Fall Spring.

PSY 20100 - Introduction To Statistics In Psychology

Credit Hours: 3.00. An introduction to the development and application of statistical, quantitative, and measurement techniques pertinent to the psychological sciences. Fundamental concepts of numerical assignment, sampling theory, distribution functions, experimental design, inferential procedures, and statistical control. Should be taken at Purdue University, West Lafayette. Typically offered Summer Fall Spring.

PSY 20200 - Introduction To Quantitative Topics In Psychology

Credit Hours: 3.00. Continuation of PSY 20100. Fundamental concepts of test theory, introduction to applied psychological testing, the scaling of data, and an introduction to mathematical models of psychological phenomena. Typically offered Fall Spring.

PSY 20300 - Introduction To Research Methods In Psychology

Credit Hours: 3.00. The use of scientific method in psychology. Lecture covers principles of collecting and interpreting data, using examples of research from many areas of psychology. In the laboratory portion, the student uses many different techniques from various areas of psychology. Should be taken at Purdue University, West Lafayette. Typically offered Summer Fall Spring.

PSY 22000 - Brain And Behavior: An Introduction

Credit Hours: 3.00. A survey of the relation of brain structure and function to behavior. Topics covered include sensation and perception, the effect of early experience on the growing brain, learning, motivation, sleep and dreaming, language and thought, abnormal behavior and brain injury. Typically offered Summer Fall Spring.

PSY 22200 - Introduction To Behavioral Neuroscience

Credit Hours: 3.00. An introduction to how the nervous system controls behavior. Topics include evolution and comparative psychobiology, the neuroscience of sensation and perception, the neuroscience of motivation, neuropsychology, and cognitive neuroscience. Typically offered Fall Spring.

PSY 23000 - Life-Span Development

Credit Hours: 3.00. A multidisciplinary course intended primarily for non-majors that draws upon a range of physical and social sciences to explore development of the individual from infancy through old age. Physical, cognitive, social, and personality development are covered. Not open to students with credit in PSY 23500. Typically offered Fall Spring.

PSY 23500 - Child Psychology

Credit Hours: 3.00. Not open to students with credit in PSY 36000. General principles of children's behavior and development, from conception to adolescence, including sensory and motor development, and basic psychological processes such as learning, motivation, and socialization. Typically offered Summer Fall Spring.

PSY 23900 - The Psychology Of Women

Credit Hours: 3.00. The purpose of the course is to provide an overview of the psychology of women. Topics include stereotyping, women and achievement, aggression and power, the psychological concept of androgyny, and attitudes toward feminism. Typically offered Summer Fall Spring.

PSY 24000 - Introduction To Social Psychology

Credit Hours: 3.00. Not open to students with credit in SOC 34000. A broad survey in current knowledge about human social behavior. Topics covered include aggression, attraction and love, social influence, attitudes and attitude change, nonverbal communication, leadership, prejudice and discrimination, and application of social psychology to law, medicine, and other fields. Typically offered Fall Spring Summer. CTL:ISH 1024 Social Psychology

PSY 24400 - Introduction To Human Sexuality

Credit Hours: 3.00. This course will provide a broad survey of research on human sexuality from a psychosocial perspective. Topics covered include research methods, gender identity, sexual orientation, reproductive anatomy, typical and atypical sexual behavior, and sexual difficulties and their treatments. Typically offered Fall Spring. CTL:ISH 1022 Human Sexuality

PSY 25000 - Psychology Of Adjustment

Credit Hours: 3.00. A survey of principles of human adjustment, with emphasis on integration of self, perception, control, behavior, and relationships. Solutions to selected problems and anxieties are discussed to illustrate effecting change, building emotional stability, and preventing maladjustment. Typically offered Fall Spring.

PSY 25100 - Health Psychology

Credit Hours: 3.00. Health psychology is concerned with the interaction between behavior and health and illness. It includes the psychological study of the relationship between health and lifestyle, stress and coping, and health-injurious behaviors. Typically offered Summer Fall Spring.

PSY 27200 - Introduction To Industrial-Organizational Psychology

Credit Hours: 3.00. Survey of psychological principles and research methods relevant to organizations and industry. Topics covered include research methodology, individual differences, personnel selection, performance measurement, training, motivation, job satisfaction, emotions, work stress, and leadership. Typically offered Fall Spring Summer.

PSY 28500 - Consumer Behavior

Credit Hours: 3.00. Basic concepts and methods of psychology as used to understand consumer behavior. Course covers general concepts (e.g., personality, information-processing, social class, family decision-making) as well as their applications to specific examples of consumer behavior (e.g., information search, product choice, purchase). Typically offered Summer Fall Spring.

PSY 29200 - Topics In Psychology

Credit Hours: 1.00 to 3.00. Various introductory-level topics in Psychology that may be offered on a semester-by-semester basis by Purdue Psychological Sciences faculty or by non-Purdue faculty/instructors as part of a student's study abroad program. Typically offered Fall Spring Summer.

PSY 30600 - Understanding And Analyzing Experiments

Credit Hours: 3.00. This course is designed to familiarize students with various statistics routinely used in analyzing data from psychological experiments. The course will focus on t-tests and Analysis of Variance (ANOVA), though other types of analysis may also be used to illustrate the nature of the research and analysis process. Permission of instructor required. Typically offered Fall Spring.

PSY 31000 - Sensory And Perceptual Processes

Credit Hours: 3.00. A survey of the study of psychological experiences caused by stimulation to the senses. Topics include theory and research in seeing, hearing, touching, smelling, and tasting as experienced by humans and other animals. Typically offered Summer Fall Spring.

PSY 31100 - Human Memory

Credit Hours: 3.00. A survey of theories and research about how humans remember information and why they often forget. Topics include research on amnesia, forgetting, and sensory memory systems as well as on practical issues such as how to improve memory. Typically offered Fall Spring.

PSY 31400 - Introduction To Learning

Credit Hours: 3.00. This course attempts to make clear the theoretical and practical implications of learning principles and findings. Various theories of learning are examined and the implications of these theories, and the learning approach generally, for a variety of practical problems are emphasized. Typically offered Summer Fall Spring.

PSY 31800 - Problem Solving And Decision Making

Credit Hours: 3.00. This course integrates topics from the fields of psychology, artificial intelligence, and decision sciences with an emphasis on psychology. The course will cover problem solving, decision making, inference, and categorization. The course will stress both research and practical techniques. Typically offered Fall Spring.

PSY 31900 - Research Methods In Infancy And Childhood

Credit Hours: 3.00. (SLHS 34500) This is a laboratory-based course that focuses on methods to test childhood cognitive and language development. As part of the course, students will be working in the Purdue University Infant Labs. Permission of instructor required. Typically offered Fall Spring.

PSY 32000 - Behavioral Neuroscience of Sensation And Arousal

Credit Hours: 3.00. Brain structure and function underlying sensation, perception, cognition, and arousal. Topics include space, time, color, and pattern recognition, agnesias, agnosias, infant experience, habituation, attention, sleep, dreaming, and consciousness. This course is most accessible to students familiar with natural science concepts. Typically offered Fall Spring.

PSY 32200 - Neuroscience Of Motivated Behavior

Credit Hours: 3.00. Neuroanatomical analyses of behavioral functions. Topics include movement, sexual behavior, maternal behavior, hunger, thirst, emotion, pain; addiction, biological rhythms, memory, evolution of the brain, language, hemispheric specialization, brain damage, brain remodeling during development and aging, correlates of cognitive processing. Typically offered Fall Spring.

PSY 32400 - Introduction Cognitive Neuroscience

Credit Hours: 3.00. Introduction to the neural bases of complex human mental abilities. Emphasis on integrating research from cognitive science, brain-scanning techniques, and the lesion technique. Topics include perception, attention, memory, language, motor control, planning/decision-making and consciousness. . Typically offered Fall Spring.

PSY 33300 - Motivation

Credit Hours: 3.00. A survey of current research and theory in motivation. The effects of both learned and unlearned motives on behavior are discussed. Examples of topics covered are: hunger, sex, aggression, pain, emotion, stress, frustration, conflict, and needs for achievement, affiliation, and power. Typically offered Summer Fall Spring.

PSY 33500 - Stereotyping And Prejudice

Credit Hours: 3.00. This course examines the topics of stereotyping, prejudice, and discrimination from a social psychological perspective. Relying on empirical findings and relevant theoretical approaches, the course moves beyond lay opinions to explore the social psychological foundations and forms of stereotyping and prejudice, and to examine various strategies for reducing intergroup biases. Typically offered Fall Spring.

PSY 33600 - Issues In Developmental Psychology

Credit Hours: 3.00. Survey of current issues in developmental psychology and methods for studying these problems. The topics selected for intensive examination reflect contemporary developmental research issues and may involve different-aged children or adults. Typically offered Fall Spring.

PSY 33700 - Social Cognition

Credit Hours: 3.00. A survey of theory and research on the role of thought processes in social behavior (a combination of social and cognitive psychologies). Topics include causal attribution, person perception, stereotyping, impression formation, event memory, and social judgment. Typically offered Fall Spring.

PSY 34200 - Introduction To Psychology Of Personality

Credit Hours: 3.00. This course integrates empirical studies (observational, correlational, experimental) with classical and current personality theories. Topics include the biological foundations of personality, self-esteem, extraversion, sex role orientation, authoritarianism, and personality disorders. Minimum competence is assumed in basic experimental design and correlations. Typically offered Fall Spring.

PSY 35000 - Abnormal Psychology

Credit Hours: 3.00. Various forms of mental disorders from the standpoint of their origin, treatment, prevention, social

significance, and relation to problems of normal human adjustment. Typically offered Fall Spring Summer. CTL:ISH 1023 Abnormal Psychology

PSY 35100 - The Psychology Of Criminal Behavior

Credit Hours: 3.00. Taking a behavioral approach to criminal behavior, the primary focus of this course is accounting for repetitively violent conduct with attention to: scientific description, developmental factors, contemporaneous causal factors, and the effects of incarceration and other interventions on offender's behavior. . Typically offered Fall Spring.

PSY 36000 - Developmental Psychology

Credit Hours: 3.00. Not open to students with credit in PSY 23500. An examination of behavioral ontogeny: differences and similarities arising out of successive transactions of organism with environment over time. Specification of processes and outcomes from conception through maturity. Typically offered Fall Spring.

PSY 36100 - Human Development I: Infancy And Childhood

Credit Hours: 3.00. A consideration of the formative years in human development with primary attention given to the processes of socialization, individualization, and adaptation, initiated by retrospective self-examination and furthered by an analysis of systematic life history data. Typically offered Fall Spring.

PSY 36400 - Determinants Of Individual Differences

Credit Hours: 3.00. A review of biological, environmental, and cultural factors that influence how children develop. Emphasis is placed on the relationship to normal development of genetics, biomedical stress, nutrition, home environment, and cultural-environmental influences occurring outside the family. Typically offered Fall Spring.

PSY 36500 - Development Of Gender Roles In Children

Credit Hours: 3.00. Considers basic concepts and the varying theoretical interpretations for the development of gender roles, with special attention given to recent empirical findings with children. Measures used in this area will be demonstrated in class and critically evaluated. Typically offered Fall.

PSY 36700 - Adult Development And Aging

Credit Hours: 3.00. Theory and research on adult development from young adulthood through the elderly years. Course covers biological, cognitive, personality, and social issues. Topics include vocational choice, marriage, parenthood, the empty nest, menopause, memory and aging, retirement, widowhood, longevity, and death and dying. Typically offered Fall Spring Summer.

PSY 36800 - Children's Development In Cross-Cultural Perspective

Credit Hours: 3.00. Surveys the development of children from different cultures. Topics include: Studying the development of children from other cultures, cultural similarities and differences in children's development, what leads to cultural differences in development, implications for children of clashes in cultural values. Typically offered Fall Spring.

PSY 37000 - Environmental Psychology

Credit Hours: 3.00. The psychological influence of immediate environment on human and, to a lesser extent, animal behavior. Environmental factors will be considered from the viewpoints of social psychology, applied experimental psychology, consumer psychology, community psychology, and ethology. Typically offered Fall Spring.

PSY 38000 - Behavior Change Methods

Credit Hours: 3.00. Application of behavioral learning principles to problems in living. Self-paced learning format covers design and evaluation of behavior modification programs, with practical and ethical issues. Relevant to work with children, adults, clinical patients, athletes, etc., in schools, institutions, and everyday situations. Typically offered Fall Spring.

PSY 39000 - Research Experience In Psychology

Credit Hours: 1.00 to 3.00. Involvement in an ongoing research project in the Department of Psychological Sciences. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 39100 - Readings In Psychology

Credit Hours: 1.00 to 3.00. In-depth reading on a specific topic in psychology under the guidance of a faculty member, often in preparation for PSY 49800. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 39200 - Special Topics In Psychology

Credit Hours: 1.00 to 3.00. Various topics that may change from semester to semester are presented by Psychological Sciences department faculty. Typically offered Fall Spring Summer.

PSY 40300 - Psycholinguistics

Credit Hours: 3.00. (PSY 40300) This course aims to introduce students to the current, research-based understanding of how different aspects of language (such as word perception, language acquisition, or speech production) are represented in the mind. In addition, it will introduce some of the research methods employed by language scientists for gaining insight into such a representation. This course also aims to help students learn how to critically evaluate research data used to support various theories about psychological and neural foundations of language knowledge. Typically offered Fall.

PSY 40400 - Honors Research Seminar I

Credit Hours: 3.00. Part one of a research series aimed at providing a structured learning experience to help students develop the basic research skills needed in order to conduct psychological research. Students will be expected to develop a research plan to be completed in concert with PSY 40500. Permission of instructor required. Typically offered Spring.

PSY 40500 - Honors Research Seminar II

Credit Hours: 3.00. Part two of a research series aimed at providing a structured learning experience to help students develop the basic research skills needed in order to conduct psychological research. Students will be expected to develop a research plan to be completed in concert with PSY 40400. Permission of instructor required. Typically offered Fall.

PSY 41000 - Animal Memory And Cognition

Credit Hours: 3.00. This advanced undergraduate seminar will provide an in-depth look at how memory and other cognitive processes are studied in nonhuman animals. Some of the topics covered are expectancies, concept formation, memory representations, imagery, and counting. Typically offered Fall Spring.

PSY 41100 - Psychology And Law

Credit Hours: 3.00. Issues in the interface between psychology and law are presented and discussed in depth. Topics included are culpability in criminal law, jury decision making, rights of mental patients, the psychologist and the law, and privacy. Typically offered Fall Spring.

PSY 42000 - Introduction To Personality Theory

Credit Hours: 3.00. Personality theories selected from the traditions of psychoanalysis, behaviorism, and phenomenology-existentialism are presented and contrasted in the fundamental assumptions made by each outlook. Theorists surveyed include Freud, Adler, Jung, Dollard and Miller, Skinner, Bandura, Rogers, Boss, Binswanger, and Kelly. Typically offered Fall Spring Summer.

PSY 42200 - Genes and Behavior

Credit Hours: 3.00. An examination of genetic influences on behavior, including the mechanisms of genetic influence, methods of gene manipulation, and the role of genes in development and evolution. Genetic influences on mental illness, learning, memory, and intelligence are considered. Typically offered Fall Spring.

PSY 42600 - Language Development

Credit Hours: 3.00. (SLHS 30900) Specific nature, sequence, and pattern of oral language development from birth through adolescence. Nature of language acquisition and approaches to the study of children's language are presented. Linguistic and psychological explanations of the sequence of development are discussed. Typically offered Fall Spring.

PSY 42800 - Drugs And Behavior

Credit Hours: 3.00. Discussion of the variety of drugs that affect the nervous system and behavior. Emphasis will be upon a discussion of the physiological and pharmacological bases for the use and misuse of drugs in our society. Typically offered Fall Spring.

PSY 42900 - Hormones And Behavior

Credit Hours: 3.00. Discussion of the mechanisms and effects of endocrine hormones and brain peptides on sexual differentiation, sexual behavior, learning, response to stress, maternal behavior, and weight regulation. Typically offered Fall Spring.

PSY 44300 - Aggression And Violence

Credit Hours: 3.00. An intensive examination of the nature of human aggression. Among the topics covered will be (1) theoretical perspectives concerning such behavior; (2) social conditions that encourage its performance; and (3) means for its prevention and control. Typically offered Fall Spring.

PSY 44400 - Human Sexual Behavior

Credit Hours: 3.00. A survey of research in human sexuality with the primary focus at the social psychological level. Problems in sex research and theoretical issues will be considered. Typically offered Fall Spring Summer.

PSY 45000 - Crisis Intervention

Credit Hours: 3.00. Major life crises in areas such as death, suicide, substance abuse, loneliness, sexuality, marital and family relationships, and situational loss are analyzed by means of crisis theory and crisis intervention approaches. Both individual and societal responses are considered primarily from a nonpathological viewpoint. Typically offered Fall Spring.

PSY 45100 - Assessment And Treatment Of Child Behavior Disorders

Credit Hours: 3.00. A review of assessment and treatment procedures in selected areas of child psychopathology. Problems are viewed from several theoretical positions. Typically offered Fall Spring.

PSY 46400 - Research Ethics In Psychological Sciences

Credit Hours: 3.00. Discussion of issues in research ethics including such topics as informed consent, plagiarism, data fabrication and falsification, whistle-blowers, animals in experiments, and restricting research. A case study approach will be used. Previous research experience recommended. Typically offered Fall.

PSY 47300 - Selection And Performance Appraisal In Organizations

Credit Hours: 3.00. Classic and current issues in employee selection and the appraisal of employee performance will be discussed. Topics addressed will include: Equal Employment Opportunity and unfair discrimination, developing effective selection and placement strategies, evaluating employee performance, and understanding the performance appraisal process. Typically offered Fall Spring.

PSY 47500 - Work Motivation And Job Satisfaction

Credit Hours: 3.00. Psychological processes and current theories of work motivation and job satisfaction and their practical implications. Typically offered Fall Spring.

PSY 48400 - The Psychology Of Consciousness

Credit Hours: 3.00. A survey of psychological experiments and theory in consciousness. An emphasis is placed on altered states of consciousness such as dreaming, hypnosis, drug-induced changes in consciousness, and meditation; and comparison with ordinary consciousness is made. Typically offered Fall Spring.

PSY 49200 - Internship In Psychology

Credit Hours: 3.00. Experiential, supervised training in various areas of psychology-related fields including human factors, human resources, mental health-related organizations, research labs, and supervised living institutions. Usually taken in junior or senior year. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 49400 - Introduction To Ethology

Credit Hours: 3.00. (BIOL 49300) Animal and human behavior is presented from an ethological perspective. Emphasis on observation and description of natural behaviors, motivation, behavioral aspects of ecology, the evolution of behavior, and the domestication of animals. Typically offered Fall Spring.

PSY 49800 - Senior Research

Credit Hours: 3.00. Student conducts and writes a report on an individual research project under the guidance of a faculty member. Permission of instructor required. Typically offered Summer Fall Spring.

PSY 50000 - Statistical Methods Applied To Psychology, Education, And Sociology

Credit Hours: 3.00. Descriptive statistics and an introduction to sampling statistics. Applied to psychological, sociological, and education data. Pre-college level course work in Algebra and Number Theory. Typically offered Fall Spring Summer.

PSY 50500 - Mental Measurement

Credit Hours: 3.00. Introduction to the general area of mental measurement. Theory and content of measuring device in the fields of intelligence, interests, personality, and special aptitudes. Typically offered Fall Spring Summer.

PSY 51100 - Psychophysics

Credit Hours: 3.00. (ECE 51100) An examination of the relationship between physical stimuli and perception (visual, auditory, haptics, etc.). Includes a review of various methods for studying this relationship and of the mathematical and computational tools used in modeling perceptual mechanisms. Permission of instructor required. Typically offered Fall Spring.

PSY 51200 - Neural Systems

Credit Hours: 3.00. (SLHS 50700, BIOL 56200) Background in cell biology, psychobiology, physiology, or anatomy is recommended. Overview of the structure and function of neural systems including those involved with motor, somatosensory, visual, auditory, learning, memory, and higher cortical processes. Molecular and cellular aspects of neural function are integrated with discussion of relevant neuroanatomy. Permission of instructor required. Typically offered Spring.

PSY 51400 - Introduction To Mathematical Psychology

Credit Hours: 3.00. This course introduces the student to the field of mathematical modeling of psychological processes. Mathematical techniques employed in modeling are learned, and a number of mathematical models and theories that have been developed and employed in various important areas of experimental psychology are explained. An introduction to problems in theory and model testability also is given. Typically offered Fall Spring.

PSY 51800 - Memory And Cognition

Credit Hours: 3.00. A graduate-level survey of theories and research concerned with the acquisition, retention, and retrieval of information. Topics include amnesia, eyewitness memory, forgetting, developmental trends in memory, related issues in attention, language processing, and problem solving. Typically offered Fall Spring Summer.

PSY 52000 - Attention And Performance

Credit Hours: 3.00. This course explores the relation between the world humans perceive and the actions humans perform. Topics include: (1) the integration of sensory information; (2) attention; (3) compatibility between stimuli and responses; (4) analysis of reaction times and accuracies; and (5) decision making. Typically offered Fall Spring.

PSY 52200 - An Introduction To Pediatric Psychology

Credit Hours: 1.00. This course is designed for the clinical psychologist who desires to become acquainted with the field of

pediatrics as it is seen by the practicing pediatrician. The student will be introduced to common medical terminology, literature, and interrelated pediatric and psychological problems. Permission of instructor required. Typically offered Spring.

PSY 52600 - Psycholinguistics

Credit Hours: 3.00. (SLHS 50800) An introduction to the descriptive devices, central issues, and varying methodologies of psycholinguistics. Permission of instructor required. Typically offered Fall.

PSY 53200 - Psychological Disorders Of Childhood

Credit Hours: 3.00. A review of the nature, causes, and consequences of deviations from normal childhood development. Emphasis is placed on the two most common types of psychological problems in childhood: mental retardation and behavior disorders. Typically offered Fall.

PSY 53500 - Psychology Of Death And Dying

Credit Hours: 3.00. An examination of psychological research and theory related to death and the dying process. Topics include death concepts, attitudes, and fears, psychosocial predictors of death, effects of death on survivors, psycho-social factors related to individual differences and normative dying behaviors, stages of dying, effects of pain and drugs, and managing the dying process. Typically offered Spring.

PSY 54000 - History Of Psychology

Credit Hours: 3.00. A review of the philosophical, theoretical, and methodological issues that entered into the development of modern psychology. Emphasis is placed on historical themes that continue to be active in the science and profession of psychology. Permission of instructor required. Typically offered Spring.

PSY 55000 - Introduction To Clinical Psychology

Credit Hours: 3.00. The case-study method, including a discussion of the importance of historical information, the contribution of clinical tests to diagnosis, and a general survey of prevention and treatment techniques. Typically offered Summer Fall.

PSY 55500 - Cognitive Engineering Of Interactive Software

Credit Hours: 3.00. (IE 55900) Theory and applications of software design to improve productivity and job satisfaction on information processing and cognitive tasks in the workplace. Human information processing models and cognitive theories will be used to provide a theoretical basis for how to choose and display information to the user. Other topics include user-friendly displays and empirical approaches to software design. Applications of the design theory are stressed by class projects. Typically offered Spring.

PSY 55600 - Job Design

Credit Hours: 3.00. (IE 55600) Task analysis, personnel selection and training, job and organizational design, and criteria development and use. Human factors related to job design in order to increase job satisfaction and productivity. Typically offered Fall.

PSY 56000 - Cognitive Functioning In Older Adults

Credit Hours: 3.00. This course provides the student with understanding of cognitive functioning in older adults. Although age differences in sensory systems, attention, perception, and memory will be reviewed, the course will focus on higher order cognitive functioning, such as individual and collaborative problem solving, reasoning, decision making, intelligence, creativity, and wisdom. Typically offered Spring.

PSY 56100 - Personality And Social Functioning In Older Adults

Credit Hours: 3.00. Personality and social behavior of the aged are examined. Emphasis is placed on understanding how stability for certain psychological functions and behaviors is maintained and how change occurs in others. Typically offered Spring.

PSY 57700 - Human Factors In Engineering

Credit Hours: 3.00. (IE 57700) Survey of human factors in engineering, with particular reference to human functions in human-machine systems, and consideration of human abilities and limitations in relation to design of equipment and work environments. Primarily for engineers and other nonpsychology majors. Typically offered Fall Spring.

PSY 58500 - Psychological Foundations Of Consumer Behavior

Credit Hours: 3.00. A survey of the concepts and methods of psychology as they apply to the study of consumer behavior. Typically offered Fall Spring Summer.

PSY 59100 - Topics In Psychology

Credit Hours: 1.00 to 3.00. Various topics that may change from semester to semester are presented by faculty in the Department of Psychological Sciences. Typically offered Fall Spring.

PSY 60000 - Statistical Inference

Credit Hours: 3.00. Emphasis is given to principles underlying both parametric and nonparametric inference. Prerequisite: PSY 50000. Typically offered Fall Spring.

PSY 60100 - Correlation And Experimental Design

Credit Hours: 3.00. Continuation of PSY 60000 with emphasis upon the design and analysis of experiments. Prerequisite: PSY 60000. Typically offered Fall Spring.

PSY 60300 - Psychopharmacology

Credit Hours: 3.00. This course will cover core pharmacology concepts and principles, such as neurotransmitters, receptors, drug classes, and mechanisms of drug action, while highlighting recent findings related to pharmacogenetics and sex/gender differences in psychopharmacology. There will also be a primary focus on drug therapy for major psychiatric disorders including addiction, depression, anxiety and schizophrenia. Prerequisites: (BIOL 56200 and PSY 51200) or PSY 61500 or MCMP 57000. Typically offered Fall Spring.

PSY 60500 - Applied Multivariate Analysis

Credit Hours: 3.00. A survey of the most frequently employed multivariate research techniques, such as multivariate generalizations of univariate tests and analysis of variance, principal components, canonical analysis, and discriminant analysis. A central theme of the course is the general linear model, both univariate and multivariate. A multipurpose program for this model provides the student with practical experience in conducting multivariate research. Some prior exposure to elementary matrix algebra is recommended. Some prior exposure to elementary matrix algebra is recommended. Prerequisite: PSY 60000. Typically offered Spring.

PSY 60600 - Special Topics In Quantitative Psychology

Credit Hours: 3.00. A seminar covering such topics as linear models, statistical decision making, and multidimensional scaling. Permission of instructor required. Typically offered Fall Spring.

PSY 60700 - Scaling And Measurement

Credit Hours: 3.00. An introduction to the theory of measurement and a survey of modern scaling methods (unidimensional and multidimensional, metric and nonmetric) within the framework of the modern theory of measurement. Some prior exposure to elementary matrix and set algebra is recommended. Typically offered Fall Spring.

PSY 60800 - Measurement Theory And The Interpretation Of Data

Credit Hours: 3.00. The theory of measurement and the development of reliability and the Spearman-Brown equations, true scores and variables, and correction for attenuation. Variance or covariance of combinations of variables. Item analysis and test construction strategies. Reliability and validity of measurements and the influence of measurement error and measurement threats to research design. Prerequisite: PSY 60000. Typically offered Spring.

PSY 61000 - Multivariate Analysis In Organizational Research

Credit Hours: 3.00. This is an advanced doctoral-level statistics course that examines the application of multivariate methods to the analyses of organizational data. Topics include: matrix algebra, the general linear model, multivariate analysis of variance, canonical correlation, discriminant function analysis, and factor/component analysis. Prerequisite: Grade of B or higher in (PSY 60000 and PSY 60100) or (STAT 51200 and STAT 51400) or (HDFS 68500 and PSY 63100). Typically offered Fall Spring.

PSY 61101 - Multilevel Theory, Measurement And Analysis

Credit Hours: 3.00. This course is designed to provide doctoral students with an introductory treatment of multilevel theory building and testing. Issues to be discussed include: multilevel theory building, composition and compilation models, aggregation, aggregation bias, the role of within-group agreement in multilevel modeling, cross-level inference, cross-level interactions, and hierarchical linear modeling. Permission of instructor required. Typically offered Fall Spring.

PSY 61401 - Special Topics In Ingestive Behavior

Credit Hours: 3.00. (NUTR 61600) Explore, in -depth, important and current issues in ingestive behavior: enhance critical thinking skill; and acquire professional skills (e.g., organizational, interpersonal) and develop rapport with scholars in the field. Typically offered in even ending years. Typically offered Spring.

PSY 61500 - Introduction To Behavioral Neuroscience

Credit Hours: 3.00. A survey of the integrated neurosciences for nonconcentrators emphasizing human physiological psychology. Neural processes of sensory and motor function, arousal and sleep, motivation, learning and memory, language function, and personality disorders will be presented with selected coverage of neuroanatomy, neurophysiology, neuropharmacology, and neuroendocrinology. Both normal and pathological functions will be covered. Not intended for students in the neurobiology program. Typically offered Spring.

PSY 61801 - Ingestive Behavior Seminar

Credit Hours: 1.00. (NUTR 61700) Fosters an exchange of ideas and promotes greater familiarity among individuals from different laboratories and departments with interests related to ingestive behavior, and gives students opportunities to build their communication skills and lead/mediate discussions at a high scholarly level. Typically offered in alternate years. Typically offered Fall.

PSY 61900 - Sensory Coding Mechanisms

Credit Hours: 3.00. Psychobiology of coding of sense information in the nervous system. Intensive treatment of several topics including: structural and functional characteristics of neural coding units, types of neural codes, transducer properties, adaptation, lateral inhibition, feature analysis, central control, and effects of early experience. Typically offered Fall Spring.

PSY 62200 - Animal Learning

Credit Hours: 3.00. A survey of the methods, problems, and research in Pavlovian, instrumental, and operant conditioning. Current issues and attempts at theoretical integration are highlighted. Emphasis is also given to the empirical and conceptual foundations underlying the present views on the mechanisms governing learned behavior. Typically offered Fall Spring.

PSY 62400 - Human Learning And Memory

Credit Hours: 3.00. Selected survey of important problems in the encoding, storage, and retrieval of laboratory and naturalistic events. Prerequisite: Coursework in Human Development, Family Studies and related services. Typically offered Fall Spring.

PSY 62500 - Complex Cognitive Processes

Credit Hours: 3.00. Surveys research and theory concerned with the nature of the "higher-order" mental processes, including decision making, categorization, problem solving, and language. Fundamental questions regarding the nature of the representations that underlie conceptual and linguistic behavior will be addressed. Permission of instructor required. Typically offered Fall Spring.

PSY 62700 - Advanced Topics In Visual Perception

Credit Hours: 3.00. All important aspects of visual perception are covered: neurophysiology and neuroanatomy, psychophysics, color, perceptual organization, size, shape, depth, motion, and binocular disparity. Emphasis is on mathematical and computational models and on experimental verification of the models. Course work in Mathematics; including matrix algebra, calculus, probability, and elementary geometry. Typically offered Fall Spring.

PSY 62800 - Perceptual Processes

Credit Hours: 3.00. This course is an advanced introduction to the psychology of perception. The course emphasizes visual and auditory perception, reviewing basic concepts, methodologies, research findings, and theoretical approaches. Theories of direct perception, constructivist perception, and computational vision are discussed in detail. Typically offered Spring.

PSY 63000 - Sterotyping And Prejudice

Credit Hours: 3.00. Provides an in-depth examination of issues related to stereotyping, prejudice, and discrimination. After a general introduction and historical overview, students will be exposed to a detailed study of the social psychological foundations of stereotyping and prejudice to include their impact and reduction strategies. Permission of instructor required. Typically offered Fall Spring.

PSY 63100 - Applied Multiple Regression Analysis For The Behavioral Sciences

Credit Hours: 3.00. This "data analytic" course provides an examination of the conceptual underpinnings and advanced application of multiple regression analyses to psychological data. Permission of instructor required. Typically offered Spring.

PSY 63300 - Seminar In Experimental Psychology

Credit Hours: 2.00 or 3.00. Critical analysis of current problems in experimental psychology. Emphasis upon reviewing literature, preparing and presenting papers. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 63400 - Evolutionary Determinants Of Cognition

Credit Hours: 3.00. This course explores the developing literature on evolutionary determinants of cognition. Students will be

exposed to the methodology of evolutionary analyses, its applications in empirical domains, as well as the major criticisms that surround the enterprise. Permission of instructor required. Typically offered Fall Spring.

PSY 63700 - Human Information Processing

Credit Hours: 3.00. This course develops the methodological tools required for an information processing approach to human behavior. These techniques are applied to such topics as reaction time, signal detection, attention, and skilled behavior, with emphasis upon unifying empirical findings. Prerequisite: PSY 60000, PSY 60100. Typically offered Fall.

PSY 63900 - Seminar In Cognition

Credit Hours: 2.00 or 3.00. Analysis of current research findings in cognitive psychology. Emphasis is upon design of experiments and theoretical unification of existing data. Prerequisite: PSY 60000, PSY 60100. Typically offered Fall Spring.

PSY 64000 - Survey Of Social Psychology I

Credit Hours: 3.00. An extensive survey of methods, research, and theory in social psychology. Typically offered Fall.

PSY 64200 - Social Influence

Credit Hours: 3.00. Students are immersed into the exciting sub-field of social psychology: social influence through lively discussions and readings on the subject. Students will evaluate what is meant by social influence, what it includes, what it doesn't include, as well as current trends in social influence. Permission of instructor required. Typically offered Fall Spring.

PSY 64300 - Attitudes And Attitude Change

Credit Hours: 3.00. Considers relation of attitudes to beliefs and to behaviors. Surveys major theories of attitude formation and change as well as empirical research related to these theories. Typically offered Fall Spring.

PSY 64400 - Close Relationships

Credit Hours: 3.00. Acquaints participants with the major social psychological approaches to the study of close, interpersonal relationships, including evolutionary, attachment, and interdependence perspectives. Methodological and data analytic issues relevant to relationships research also are examined. Typically offered Fall Spring.

PSY 64500 - Social Cognition

Credit Hours: 3.00. Cognitive approaches to social psychology. Topics to be covered include attribution theory, impression formation, stereotype formation, perceptual salience, memory for persons and interpersonal events, and the processing of emotionally significant information. Typically offered Fall Spring.

PSY 64600 - Seminar In Social-Personality Psychology

Credit Hours: 3.00. A seminar covering a special topic in personality or social psychology. Specific topic varies from seminar to seminar. Permission of instructor required. Typically offered Fall Spring.

PSY 64700 - Group Processes And Performance

Credit Hours: 3.00. Provides a survey of research concerning small group interaction and performance. Covers topics such as group problem-solving, group decision-making, group polarization, and group structure. Will also discuss group interaction and communication patterns. Typically offered Fall Spring.

PSY 64900 - Social Psychology Of Health

Credit Hours: 3.00. A seminar covering an assortment of social psychological topics with health emphases, including theories of health behavior and behavioral prediction, habits, safer sexual behavior, inhibition, relational factors in health, and measurement issues relevant to the scientific study of health. Permission of Instructor required. Typically offered Fall Spring.

PSY 65100 - Development In Infancy And Childhood

Credit Hours: 3.00. Critical review of physical-motor, cognitive, and social development with special emphasis on infancy and early childhood. Permission of instructor required. Typically offered Fall Spring.

PSY 65300 - Social Development

Credit Hours: 3.00. An examination of major theories and current research on the development of social behavior and personality. Parent-child relationships, peer relations, aggressive and prosocial behavior, sex typing, self-concepts, moral reasoning, social cognition, and other topics are considered. Permission of instructor required. Typically offered Fall Spring.

PSY 65500 - Cognitive Development

Credit Hours: 3.00. An analysis of research findings and current theories relevant to the development of cognitive processes. Emphasis is placed upon the changing characteristics of some fundamental cognitive processes. Special attention is given to verbal behavior and language. Permission of instructor required. Typically offered Fall Spring.

PSY 66400 - Research Methods In Clinical Psychology I

Credit Hours: 2.00. A review of scientific and correlational research methods appropriate for clinical psychologists. Topics include philosophy of science, ethical issues in research with human subjects, hypothesis formulation, measurement, correlational and manipulational designs, and the analysis and interpretation of data. Prerequisite: 6 credit hours at the lower division undergraduate level in Mathematics, or Statistics, 6 credit hours in Clinical Psychology. Typically offered Fall.

PSY 66700 - Clinical Assessment I

Credit Hours: 4.00. Presentation of general assessment principles and methods. Supervised practice in general diagnostic and treatment procedures as applied to both children and adults. Emphasis is placed on laboratory practice in the administration and interpretation of intelligence tests; behavioral observation techniques and operant remediation procedures. Permission of instructor required. Typically offered Fall.

PSY 66800 - Clinical Assessment II

Credit Hours: 4.00. Presentation of methods of clinical assessment including structured and unstructured personality tests, physiological recording, behavioral observation, and interview techniques. Emphasis is placed on laboratory practice in the administration and interpretation of personality tests and training in the basic clinical interview techniques. Permission of instructor required. Typically offered Spring.

PSY 67000 - Principles And Techniques Of Psychotherapy

Credit Hours: 3.00. Discussion and elaboration of the main theories and techniques of psychotherapy, the application of these techniques to the change of behavior, and the analysis of clinical cases for therapy planning. Typically offered Spring.

PSY 67300 - Psychology Of Behavior Disorders

Credit Hours: 3.00. Advanced abnormal psychology. Consideration will be given to research and theory of psychopathology. Typically offered Spring.

PSY 67800 - Seminar In Clinical Psychology

Credit Hours: 2.00. Discussion of special topics in clinical psychology. Permission of instructor required. Typically offered Fall Spring.

PSY 67900 - Practicum In Clinical Psychology

Credit Hours: 1.00 to 6.00. This is a practicum in clinical psychology, whereby students see individuals for therapy. These cases are supervised by faculty in clinical psychology. This is a requirement for the graduate program, and students must do both adult and child practicum. Students enrolled in this program must register for this course a minimum of four times. Prerequisite: Master's student standing and Psychology majors only. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 68000 - Survey Of Industrial/Organizational Psychology

Credit Hours: 3.00. This two-semester sequence extensively surveys the various areas of industrial/organizational psychology. The first semester surveys those topics generally classified as dealing with industrial psychology (e.g., selection, placement, training, performance appraisal), and the second semester surveys organizational psychology topics (e.g., job satisfaction, motivation, leadership, decision making, role making). Course provides a critical and up-to-date review of recent and classical research in these areas. Prerequisite: Any undergraduate Statistics course and any undergradate Social Science Research Methods course. Typically offered Fall Spring Summer.

PSY 68100 - Seminar In Research Methodologies Of Industrial/Organizational Psychology

Credit Hours: 3.00. Intensive analysis of application of various research and statistical methods to the study of human behavior in organizational settings. Typically offered Fall Spring.

PSY 68200 - Advanced Seminar In Industrial Organizational Psychology

Credit Hours: 3.00. Special topics in industrial and organizational psychology are offered on a two-year rotating basis. The special topics are: work motivation, leadership, advanced selection and placement, and performance appraisal. One topic will be treated each semester. Typically offered Fall Spring.

PSY 68300 - Seminar In Industrial/Organizational Psychology

Credit Hours: 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring.

PSY 69000 - Individual Research In Psychology

Credit Hours: 1.00 to 3.00. Involvement in research design, execution, and analysis under the guidance of a faculty member. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 69100 - Readings In Psychology

Credit Hours: 1.00 to 3.00. In-depth reading into specific topic area in psychology, under the guidance of a faculty member. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 69200 - Special Topics In Psychology

Credit Hours: 1.00 to 3.00. Various topics which may change from semester to semester are presented by faculty in the Department of Psychological Sciences. Typically offered Fall Spring Summer.

PSY 69600 - Seminar In Neurobiology, Endocrinology, And Behavior

Credit Hours: 1.00. An examination of advanced research findings in the interdisciplinary areas of neurobiology, endocrinology, and behavior by means of colloquium presentations by outside speakers and students. Permission of instructor required. Typically offered Fall Spring.

PSY 69700 - Clinical Psychology Internship

Credit Hours: 1.00 to 12.00. Clinical psychology internship. Open only to Clinical Psychology students in approved internship facilities. Permission of instructor required. Typically offered Summer Fall Spring.

PSY 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

PSY 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Recreation Leadership

RECR 10000 - Leisure And Recreation In Contemporary Society

Credit Hours: 3.00. Overview of the functional roles of leisure and recreation in cultural contexts. Evaluation of leisure behavior in Western society; the Protestant work ethic; utilitarianism; class-based variations; social, economic, and psychological perspectives in leisure and recreation activity. Typically offered Fall Spring Summer.

Religious Studies

REL 20000 - Introduction To The Study Of Religion

Credit Hours: 3.00. This course will introduce students to the academic study of religion through an exploration of various methodologies available for a critical, reflective investigation of the study of religion. Typically offered Summer Fall Spring.

REL 20100 - Interpretation Of The New Testament

Credit Hours: 3.00. An investigation of the religious content of the Christian Scriptures in light of the historical, social, and intellectual contexts out of which they emerged. Other canons and extra-canonical interpretations of the New Testament will also be investigated. Typically offered Fall Spring.

REL 20200 - Interpretation Of The Old Testament

Credit Hours: 3.00. An investigation of the religious content of documents Christian call the "Old Testament" in light of the historical, social, and intellectual contexts out of which they arose. The student will be introduced to problems and methods in their interpretation. Typically offered Fall Spring.

REL 20300 - Theology Of Paul

Credit Hours: 3.00. A critical examination of the Pauline and Deutero-Pauline epistles, the book of Acts, and other first century texts associated with Paul of Tarsus. Students will be introduced to problems and methods in the interpretation of ancient texts. Typically offered Fall Spring.

REL 20400 - Introduction To Christian Theology

Credit Hours: 3.00. This course is an introductory survey of the goals and aims of theology in the Christian tradition. Focus is on the content of Christian theology, its methodological presuppositions and principles of development. Typically offered Fall Spring.

REL 23000 - Religions Of The East

Credit Hours: 3.00. (PHIL 33000) A study of the history, teaching, and present institutions of the religions of India, Southeast Asia, China, and Japan. This will include Hinduism, Jainism, Sikhism, Buddhism, Confucianism, Taoism, Shintoism, and Zoroastrianism. Typically offered Summer Fall Spring.

REL 23100 - Religions Of The West

Credit Hours: 3.00. (PHIL 33100) A comparative study of the origins, institutions, and theologies of the three major Western religions, Judaism, Christianity, and Islam. Typically offered Summer Fall Spring.

REL 25000 - A History Of The Christian Afterlife

Credit Hours: 3.00. An exploration of the ways Christians have envisioned the afterlife, including New Testament descriptions. Apocryphal notions, Patristic conceptions, mystical and 19th century descriptions of heaven as sexual union, and 20th century understandings of the afterlife as a "process of education". Typically offered Summer Fall Spring.

REL 31700 - Ancient Judaism And Early Christianity

Credit Hours: 3.00. This course is a study of the emergence of Judaism and the rise of Christianity out of roots in the history of ancient Israel. This will include noticing the effects of Greek culture, evidence of anti-Semitism and admiration of the Jews,

conversion in a setting of religious pluralism, and the development of Jewish and Christian self-definition in this climate. Typically offered Fall Spring Summer.

REL 31800 - The Bible And Its Early Interpreters

Credit Hours: 3.00. This course will start with observation of the development of early themes in later parts of the Hebrew Bible and proceed to the on-going influence of these themes in Jewish literature outside the Hebrew canon (apocrypha, pseudepigrapha, targums, midrash, Josephus, Philo, and other Hellenistic Jewish authors), as well as in pagan literature of this era and in early Christian literature, particularly the New Testament. Typically offered Summer Fall Spring.

REL 35000 - History Of Christian Theology

Credit Hours: 3.00. A study of the development of Christian theology in light of the opposing philosophical ideas and movements that challenged it. Specifically, the development of theology will be understood in light of Western conceptions of science. Typically offered Fall Spring.

REL 35100 - Christian Mysticism

Credit Hours: 3.00. A critical, historical examination of the development of Christian mystical thought, beginning with its earliest intimations in the Hebrew Scriptures, the thought of Plato and Aristotle and continuing through Patristic, Medieval, Renaissance, Reformation, Counter-Reformation and Modern periods to the present. Typically offered Summer Fall Spring.

REL 45000 - Christian Ethics

Credit Hours: 3.00. The course explores the historical development of Christian moral theology, from pre-Christian times to the present. It includes a study of Biblical moral conceptions, patristic, medieval, Enlightenment, modern, and contemporary understandings of Christian ethics. Typically offered Summer Fall Spring.

REL 45100 - Christology

Credit Hours: 3.00. The course examines the historical development of Christological doctrine in the Christian faith from the age of the New Testament to the late 20th/early 21st century, paying special attention to the New Testament and conciliar formulations. Typically offered Summer Fall Spring.

REL 45200 - Systematic Theology

Credit Hours: 3.00. An introduction to the nature, tasks, and methods of what Christians have called "systematic theology", historically conceived through an exploration of the writings of figures such as Augustine, Aquinas, Melancthon, John Calvin, Barth, and Paul Tillich. Typically offered Summer Fall Spring.

Russian

RUSS 10100 - Russian Level I

Credit Hours: 4.00. A beginning course in standard Russian. Typically offered Fall Spring Summer.

RUSS 10200 - Russian Level II

Credit Hours: 4.00. Continuation of RUSS 10100. Typically offered Fall Spring Summer.

RUSS 11100 - Conversation Supplement To Russian Level I

Credit Hours: 1.00. Basic development of intonation patterns, formulas for question and response in a variety of situations. Activization of basic Russian vocabulary and grammar. May be taken concurrently with RUSS 10100. Typically offered Fall Spring Summer.

RUSS 11200 - Conversation Supplement To Russian Level II

Credit Hours: 1.00. Guided practice in conversation based on vocabulary and grammar learned in RUSS 10200. May be taken concurrently with RUSS 10200. Typically offered Fall Spring Summer.

RUSS 20100 - Russian Level III

Credit Hours: 4.00. Readings from the works of nineteenth-century and contemporary Russian writers; practice in speaking and writing Russian. Typically offered Fall Spring Summer.

RUSS 20200 - Russian Level IV

Credit Hours: 4.00. Continuation of RUSS 20100. Typically offered Fall Spring Summer.

RUSS 21100 - Conversation Supplement To Russian Level III

Credit Hours: 1.00. Guided practice in conversation based on vocabulary, grammar, and readings covered in RUSS 20100. May be taken concurrently with RUSS 20100. Typically offered Fall Spring Summer.

RUSS 21200 - Conversation Supplement To Russian Level IV

Credit Hours: 1.00. Guided practice in conversation, based on vocabulary, grammar, and readings covered in RUSS 20200. May be taken concurrently with RUSS 20200. Typically offered Fall Spring Summer.

RUSS 24100 - Introduction To The Study Of Russian Literature

Credit Hours: 3.00. Reading and discussion of selected Russian poetry, prose, and drama; introduction to critical discourse and basic concepts of literary theory. Texts, discussion, and written assignments largely in Russian. Typically offered Summer Fall Spring.

RUSS 28100 - Post-Soviet Experiences

Credit Hours: 3.00. An introduction to three distinct "post-Soviet" cultures: Russia, one former satellite of Eastern Europe and one former Soviet republic of Central Asia. The course draws on diverse cultural texts, including art, architecture, film, song, essays, and fiction. Conducted in English. Typically offered Fall Spring Summer.

RUSS 28900 - Russia: Yesterday, Today, And Tomorrow

Credit Hours: 3.00. A comprehensive interdisciplinary view of Russia, stressing those issues in the political, economic, technological, and cultural spheres that are most relevant to the current situation. This team-taught course is accessible to beginning undergraduates. Typically offered Fall Spring Summer.

RUSS 29800 - Special Topics In Russian

Credit Hours: 3.00. Studies of particular aspects of Russian (e.g. culture, civilization, linguistics, literature, film, etc.) by examining varied selection of works. Readings, discussion, and papers in English. Typically offered Summer Fall Spring.

RUSS 30100 - Russian Level V

Credit Hours: 3.00. Continued development of Russian speaking, listening, reading, and writing abilities, using material dealing primarily with everyday life and civilization in the Soviet Union from a variety of sources (e.g., newspapers, magazines, TV, recent literature, etc.). Conducted primarily in Russian. Typically offered Fall Spring.

RUSS 30200 - Russian Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading, and writing abilities in Russian, on the basis of materials dealing with the ideas and events that have shaped present-day Russia and the Soviet Union. Conducted primarily in Russian. Typically offered Fall Spring.

RUSS 33000 - Russian And East European Cinema

Credit Hours: 3.00. Viewing and analysis of significant Russian and East European films. Evolution of the Russian and East European cinema, its place in world cinema, and its relation to cultural, political, and social trends. Cinematic adaptation of literary and theatrical works. Knowledge of Russian or East European languages not required. Typically offered Fall Spring Summer.

RUSS 34100 - Russian Literature I: From The Beginnings To 1900

Credit Hours: 3.00. Selected Russian poetry, prose, and drama from the Kievan period to 1900 in historical and cultural context. Students will write critical essays on literary topics. Conducted largely in Russian. Typically offered Fall Spring.

RUSS 34200 - Russian Literature II: From 1900 To The Present

Credit Hours: 3.00. Selected Russian poetry, prose, and drama of the 20th century in historical and cultural context. Students will read and discuss major authors and texts and will write critical essays on literary topics. Conducted largely in Russian. Typically offered Fall Spring.

RUSS 36100 - The Structure Of Russian I: Sound System And Sentence Structure

Credit Hours: 3.00. This course treats the sound system and sentence structure of Russian, dealing with the structural pattern on various levels (phonetic, phonemic, syntactic) and with problems of pronunciation and word order. One weekly class is devoted to practical phonetics and intonation. Typically offered Fall Spring.

RUSS 36200 - The Structure Of Russian II: Wordforms And Word Formation

Credit Hours: 3.00. This course will present a systematic study of Russian morphology, dealing both with the various categories of inflected words (nouns, pronouns, adjectives, verbs) and with word formation. Typically offered Fall Spring.

RUSS 39900 - Special Study Abroad Credit In Russian

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in Russian earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

RUSS 40100 - Russian Level VII

Credit Hours: 3.00. Advanced work on development of Russian speaking, listening, reading, and writing abilities, focusing on materials dealing primarily with culture and the arts in Russia and the Soviet Union. Conducted primarily in Russian. Typically offered Fall Spring.

RUSS 40200 - Russian Level VIII

Credit Hours: 2.00. Further advanced work on speaking, listening, reading, and writing abilities in Russian. Course materials will cover a variety of topics illustrated by film and other media, both print and nonprint. Conducted primarily in Russian. Typically offered Fall Spring.

RUSS 42400 - Business Russian

Credit Hours: 3.00. A study of the terminology and techniques used in commercial transactions, including the interpretation and writing of business materials. Development of the four language skills, with emphasis on writing and speaking. Typically offered Fall Spring Summer.

RUSS 48000 - Russian Civilization

Credit Hours: 3.00. A study of Russian life (intellectual, social, and cultural) with emphasis on the modern period. Typically offered Fall Spring Summer.

RUSS 56100 - The Structure Of Russian I: Phonology And Syntax

Credit Hours: 3.00. This course treats the sound system and sentence structure of Russian, dealing with the structural pattern on various levels (phonetic, phonemic, syntactic) from various points of view. One weekly class is devoted to theoretical issues affecting Russian phonology and syntax. Credit will not be given for both RUSS 36100 and 56100. Typically offered Spring Fall.

RUSS 56200 - The Structure Of Russian II: Morphology

Credit Hours: 3.00. This course will present a systematic study of Russian morphology in the light of current linguistic research, dealing both with the various categories of inflected words (nouns, pronouns, adjectives, verbs) and with word formation. Credit will not be given for both RUSS 36200 and 56200. Typically offered Spring Fall.

RUSS 58100 - Russian Culture

Credit Hours: 3.00. The development of the cultural life of the Russian people as reflected in the geography, history, music, art, and architecture of Russia. Lectures in Russian and English. Typically offered Spring Fall Summer.

RUSS 59000 - Directed Reading In Russian

Credit Hours: 1.00 to 4.00. Directed readings in Russian. Permission of instructor required. Typically offered Spring Fall Summer.

RUSS 59600 - Special Topics In Russian Linguistics

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

Sociology

SOC 10000 - Introductory Sociology

Credit Hours: 3.00. A survey course designed to introduce the student to the scene of human society. Fundamental concepts, description, and analysis of society, culture, the socialization process, social institutions, and social change. Students of junior or senior standing should take SOC 31200, unless they are sociology or law and society majors. Typically offered Fall Spring Summer. CTL:ISH 1060 Introduction To Sociology

SOC 22000 - Social Problems

Credit Hours: 3.00. Contemporary problems at the community, society, and international levels, focusing on patterns of social organization and social change in American society, with concentration on such topics as technological militarism and war, poverty, racism, political protest, and cybernation. Typically offered Fall Spring Summer. CTL:ISH 1061 Social Problems

SOC 27500 - Social Gerontology

Credit Hours: 3.00. An examination of the basic points of view and a review of the accumulated body of knowledge specific to gerontology. Consideration of the problems of population change, housing, social adjustment, retirement, mobility, family living arrangements, and finances of older people in the United States. Comparison with other countries. Typically offered Fall Spring.

SOC 31000 - Racial And Ethnic Diversity

Credit Hours: 3.00. Examines racial and ethnic pluralism in America: ways groups have entered our society; their social and cultural characteristics; and their relationships with other groups. Groups include the English, Germans, Irish, Jews, Chinese, Japanese, Blacks, Hispanics, and Native Americans. Typically offered Fall.

SOC 31200 - American Society

Credit Hours: 3.00. An exposure to sociology, focused on American sociology and society (the U.S.), recommended for juniors and seniors who are not sociology or law and society majors. Students with freshman standing or who have had SOC 10000 may not enroll in this class without special permission. Typically offered Fall Spring.

SOC 31600 - Industry And Society

Credit Hours: 3.00. This course examines the social content and consequences of industrial development and introduces key issues in industrial sociology, including technological change, management systems, labor organization, community development, and international relations. Typically offered Fall Spring.

SOC 32400 - Criminology

Credit Hours: 3.00. Nature and cause of crime; methods of dealing with adult and juvenile offenders, consideration of present programs for the social treatment of crime in the light of needed changes. Typically offered Summer Fall Spring.

SOC 32600 - Social Conflict And Criminal Justice

Credit Hours: 3.00. This course examines the dynamics of social conflict, with a special focus on legal institutions and criminological processes. Students will learn to think more analytically about the causes of social conflict, its dynamics, and strategies for resolution. Typically offered Fall Spring.

SOC 32700 - Crime, Deviance And Mass Media

Credit Hours: 3.00. Various forms of mass media are used to explore the sociology of crime and deviance. Topics may include white collar crime, juvenile delinquency, street crime, sexuality and sexual orientation, hate crimes, deviance and community. Assignments include quizzes and short papers. Typically offered Fall, Spring.

SOC 32800 - Criminal Justice

Credit Hours: 3.00. Introduction to institutionalized responses of society to the problem of crime. Analysis of the administration of justice in each of the major components of the criminal justice system and laws regulating their operations. Some consideration given to comparative criminal justice. Typically offered Fall Spring. CTL:ISH 1030 Introduction To Criminal Justice

SOC 33400 - Urban Sociology

Credit Hours: 3.00. Development of the city and its functions; types of social behavior in cities; influences of city life on personality; city planning. Typically offered Summer Fall Spring.

SOC 33800 - Global Social Movements

Credit Hours: 3.00. Explores dynamics of social movements in the world; emphasizes movements in non-western world. Examines emergences of movements, mobilization, tactical actions and consequences, and formal and informal organizations within movements to understand how international, national and local structures affect people. Typically offered Fall Spring.

SOC 33900 - Introduction To The Sociology Of Developing Nations

Credit Hours: 3.00. Analysis of the causes of development in the Third World. Topics include: the food crisis; population growth; poverty and inequality; industrialization, including the role of multinational corporations; debt; and the International Monetary Fund. Regional differences in patterns and causes analyzed. Typically offered Fall Spring.

SOC 34000 - General Social Psychology

Credit Hours: 3.00. Social influences on the individual and processes of social interaction. Individual attitudes and behavior as related to socialization, social norms, social roles, communication and propaganda, and other social influences. Among the interaction processes considered are interpersonal attraction, influence, leadership, cooperation, and conflict. Not open to students with credit in PSY 24000. Typically offered Summer Fall Spring.

SOC 34100 - Culture And Personality

Credit Hours: 3.00. A cross-cultural survey stressing differing basic personality types and the processes by which adult personality is acquired. Case studies of selected non-Western cultures will be used to provide comparative perspectives. Typically offered Summer Fall Spring.

SOC 35000 - Social Psychology Of Marriage

Credit Hours: 3.00. Designed to provide an understanding of contemporary courtship, marriage, and family interaction as cultural, social, and social-psychological phenomena. Consideration of the major sources of marital strain and conflict within a heterogeneous, rapidly changing society. Typically offered Summer Fall Spring.

SOC 35200 - Drugs, Culture, And Society

Credit Hours: 3.00. (ANTH 35200) The course provides an overview of the social and cultural underpinnings of drug use across societies. Students engage with various topics, including addiction, global markets, drug epidemics, public policy, and cross-cultural differences in drug use. Typically offered Summer Fall Spring.

SOC 35600 - Hate And Violence

Credit Hours: 3.00. Examines the causes of and solutions to hatred and violence. Concepts such as anti-Semitism, discrimination, hate crimes, prejudice, racism, bullying, homosexual prejudice, terrorism and other topics will be addressed. This course uses experiential activities, videos, guest speakers and classroom discussion. Typically offered Fall Spring.

SOC 36700 - Religion In America

Credit Hours: 3.00. Examines the social dimensions of religion in American life; religion in American culture; social profiles of America's religious groups, trends in individual religious commitment; and religion's impact on American life. . Typically offered Fall.

SOC 36800 - The Social Significance Of Religion

Credit Hours: 3.00. Examines religion's relationship with family, work, politics, gender, war and peace, race and ethnicity, health, crime and deviance, education, law, and poverty. Content differs each time course is taught. Typically offered Fall.

SOC 37400 - Medical Sociology

Credit Hours: 3.00. Provides an overview of the sociological determinants and consequences of health, the patient experience, health care providers, the organization of the health care system. Typically offered Fall Spring.

SOC 38200 - Introduction To Statistics In Sociology

Credit Hours: 3.00. Introduction to the basic techniques of statistical analysis applicable to sociological data. Elementary descriptive statistics and statistical inference. Introduction to multivariate analysis. Typically offered Fall Spring.

SOC 38300 - Introduction To Research Methods In Sociology

Credit Hours: 3.00. Introduction to the methods of data collection and analysis and to the use of the scientific method of social research. Formulation of hypotheses and research designs for their testing. Elementary principles for the conduct of experiments, observation and interviewing, documentation, content analysis, and surveys. Relationship between social research and social theory. Typically offered Fall Spring.

SOC 39000 - Individual Research In Sociology

Credit Hours: 1.00 to 3.00. Individual research or reading in an area of sociology under the guidance of a sociology faculty member. Permission of instructor required. Typically offered Fall Spring Summer.

SOC 39100 - Selected Topics In Sociology

Credit Hours: 1.00 to 3.00. Various topics in sociology that may change from semester to semester are presented by sociology faculty members. Typically offered Fall Spring.

SOC 40200 - Sociological Theory

Credit Hours: 3.00. An advanced critical treatment of the theories, concepts, and methods of sociology. A basic course required of undergraduate majors in sociology. Typically offered Fall Spring.

SOC 41100 - Social Stratification

Credit Hours: 3.00. Examination of systems of class and caste, with special attention to the United States; status, occupation, income, and other elements in stratification. Typically offered Spring.

SOC 41900 - Sociology Of Law

Credit Hours: 3.00. Provides an overview of American legal thought and legal processes. Major topics include definitions of law; anthropological studies of law; origin and development of law; jurisprudence; police behavior; lawyers and courts; deterrent and labeling effects of legal sanctions. Typically offered Fall Spring.

SOC 42000 - Sociology Of Criminal Law

Credit Hours: 3.00. Investigates substantive and procedural criminal law. Emphasizes common law crimes, the major defenses, search and seizure, and the privilege against self-incrimination. Professor Miller. Typically offered Fall Spring.

SOC 42100 - Juvenile Delinquency

Credit Hours: 3.00. A study of social and psychological factors influencing individual delinquent behavior patterns. Emphasis on preventive and rehabilitative programs and the role of community agencies such as social service agencies, juvenile courts, and youth authorities. Visits to selected organizations and institutions. Typically offered Fall Spring.

SOC 42300 - Field Practicum In Criminal Justice

Credit Hours: 4.00. Field experience in criminal justice system. Students serve as "interns" in a criminal justice agency one day (or its equivalent) per week, under the supervision of agency personnel. Application of theory and empirical research findings to field problems. Permission of instructor required. Typically offered Fall Spring.

SOC 42600 - Social Deviance And Control

Credit Hours: 3.00. Sociological and social psychological study of social control and social deviance. Emphasis on theoretical frameworks and empirical research. Consideration also given to specific areas such as substance abuse, suicide, violence, and deviant collective behavior. Typically offered Fall.

SOC 42900 - Sociology Of Protest

Credit Hours: 3.00. This course focuses on the sociological study of protest. Topics include protest emergence, individual reasons for participation in protest, and outcomes. Course readings cover protest in the United States as well as other cultural contexts. Typically offered Fall Spring.

SOC 45000 - Gender Roles In Modern Society

Credit Hours: 3.00. A critical examination of the complementary roles of men and women, with particular attention to problems of role adjustment in the contemporary United States. The neofeminist movement and countermovements. Role conflicts and adjustments in such areas as family, education, employment, and the political arena. Typically offered Fall Spring.

SOC 45400 - Family Violence

Credit Hours: 3.00. Child abuse, intimate partner violence, and elder abuse are examined with a focus on correlates, treatments and prevention strategies. Definitions of family violence and the social contexts related to family violence are assessed. Legal and medical models to explain family violence are compared. Typically offered Summer Fall Spring.

SOC 49300 - Interdisciplinary Undergraduate Seminar

Credit Hours: 1.00 to 3.00. An undergraduate seminar devoted to an interdisciplinary examination of social, economic, political, and intellectual movements, using the faculty resources of the participating departments. Subject matter will vary. Each offering of the seminar will be approved by a committee of department heads from the sponsoring departments. Permission of instructor required. Typically offered Fall Spring.

SOC 49700 - Senior Honors Seminar

Credit Hours: 3.00. A critical examination of some major works in sociology and anthropology, both classical and modern, and of some current theoretical and substantive issues in these disciplines. Open only to students in the departmental honors program. Typically offered Spring.

SOC 49800 - Senior Honors Paper

Credit Hours: 3.00. The production of a major paper on a topic selected by the student in consultation with the instructor. The students will meet early in the semester for orientation and discussion of topics; in the middle of the semester for progress reports; and late in the semester for presentation and critique of their papers. Open only to students in the departmental honors program. Typically offered Fall.

SOC 51400 - Racial And Cultural Minorities

Credit Hours: 3.00. America's minority groups; immigration; interracial and intercultural conflicts; assimilation. Typically offered Fall Spring.

SOC 52000 - Work In Contemporary America

Credit Hours: 3.00. Examines meaning and organization of work in technological society, including job satisfaction, alienation, mobility, conflict, stratification, and unemployment and the impact of race-sex composition of occupations on mobility and politics. Also considers relations with colleagues, organization, clients, and public. Typically offered Spring.

SOC 52500 - Social Movements

Credit Hours: 3.00. Origins and developmental stages of revolutionary and reform movements and communitarian societies; relation between social structure and political attitudes; personality needs and affinity for social and political ideologies. Typically offered Spring.

SOC 52900 - Introduction To Political Economy: A Sociological Perspective

Credit Hours: 3.00. This course examines and evaluates concepts, propositions, and theories within Marxian approaches to an analysis of contemporary society. Topics include (but are not limited to) class structure and class formation, the labor theory of value, historical materialism, and surplus value. Typically offered Fall.

SOC 53000 - Political Sociology

Credit Hours: 3.00. Analysis of the social and social psychological sources of routine political participation such as voting and interest group activity, and nonroutine political action such as protest movements and revolution; the organization of power at the community, national, and international level; and political ideology. Typically offered Fall.

SOC 53100 - Community Organization

Credit Hours: 3.00. Analysis of the local community in terms of its institutional structure, relationships among institutions, political and economic power relationships, and the role of voluntary organizations and interest groups. Typically offered Fall.

SOC 55400 - Social Psychology Of The Family

Credit Hours: 3.00. Analysis of interactional aspects of the modern American family emphasizing variation in family patterns, marital roles, power, influence, attraction conflict and control. Typically offered Fall.

SOC 56700 - Religion In Social Context

Credit Hours: 3.00. Examines the social bases of religion at the societal, organizational, and individual levels. Topics include the formation of religious groups and ideas; social dynamics within religious groups; religion's persistence over time; and the conditions under which religion tends to change. Typically offered Fall.

SOC 56800 - Religion And Society

Credit Hours: 3.00. Examines religion's relationships with other spheres of social life. Other areas include family life, education, economy, politics, health, media, inequality, deviance, and social movements. Typically offered Spring.

SOC 57000 - Sociology Of Education

Credit Hours: 3.00. Analysis of the American public school as a social organization. Includes: interrelations among community power structure, social stratification, and the school; the roles of superintendent, principal, and teacher in community and school; the classroom as a social system; student culture; and teaching as a profession. Typically offered Summer Spring.

SOC 57100 - Health And Social Behavior

Credit Hours: 3.00. A sociological examination of health and illness that emphasizes the patient and his or her relations to others. Considers the distribution of illness, stress, health and illness behavior, patient-practitioner relationships, and treatment modes. Typically offered Fall Spring.

SOC 57200 - Comparative Healthcare Systems

Credit Hours: 3.00. Using cost, quality, and access to care as core concepts, this course explores healthcare in comparative context. Special topics are health and gender, the environment, epidemics, long-term care, technology, and rationing, among others. Typically offered Fall Spring.

SOC 57300 - The Human Side Of Medicine

Credit Hours: 3.00. Focuses on sociological theory and research related to social conflicts over the delivery of healthcare in the U.S. Considers social issues pertaining to abortion, AIDS, human experimentation, reproductive technologies, euthanasia, and others. Typically offered Fall Spring.

SOC 57400 - The Social Organization Of Healthcare

Credit Hours: 3.00. Analysis of the determinants and consequences of the social organization of medical care. Considers morbidity and mortality, costs and utilization of medical services, healthcare occupations and institutions, and change in programs and policies. Typically offered Fall Spring.

SOC 57600 - Health And Aging In Social Context

Credit Hours: 3.00. Analysis of the social and cultural influences on health in adulthood and later life. Considers distribution of illness among older adults, health behavior, and health services use, including long-term care. Typically offered Fall Spring.

SOC 58000 - Methods Of Social Research I

Credit Hours: 3.00. An intermediate-level examination of research designs, measurement, and sampling with emphasis on issues of problem formulation and the logic and application of methodological procedures. Typically offered Fall.

SOC 58100 - Methods Of Social Research II

Credit Hours: 3.00. Emphasis on statistical inference applied to sociological problems; topics include the binomial distribution and the logic of inference, one and two sample tests, confidence intervals, and chi-square. Introduction to bivariate correlation and regression, analysis of variance. Typically offered Spring.

SOC 58300 - Application Of Social Research Methods

Credit Hours: 3.00. Specific methods of survey research, including questionnaire construction, and sampling techniques, as well as case studies and field experiments are covered. Emphasis is on the use of such methods and their implications for the nature of social data. Permission of instructor required. Typically offered Fall.

SOC 59000 - Individual Research Problems

Credit Hours: 1.00 to 3.00. Individual research or reading in an area of sociology under a sociology department staff member. Does not include thesis work. Permission of instructor required. Typically offered Fall Spring Summer.

SOC 59100 - Selected Topics In Sociology

Credit Hours: 1.00 to 3.00. Topics vary. Typically offered Fall Spring Summer.

SOC 60000 - Development Of Sociological Theory

Credit Hours: 3.00. The development of sociological thought in Western Europe and subsequently in the United States from the publication of Marx's early manuscripts through the sociological writings of the 1940s. Typically offered Fall.

SOC 60200 - Contemporary Sociological Theories

Credit Hours: 3.00. A companion course to SOC 60000. Examination of the works of recent and contemporary sociological theorists such as Durkheim, Weber, Pareto, Parsons, and Merton, and of major theorists in related disciplines such as Marx, Freud, and Malinowski. Includes an examination of major "schools" or frames of reference such as ecology, structural-functionalism, etc. Typically offered Spring.

SOC 60300 - The Individual In Society

Credit Hours: 3.00. Examines social influences on the individual. Socialization, social class, racial and ethnic memberships, organizational and occupational memberships, and mass media are among the social influences considered. Prerequisite: SOC 34000. Typically offered Fall.

SOC 60900 - Seminar In Sociology

Credit Hours: 3.00. Topics vary. Typically offered Fall Spring.

SOC 61000 - Seminar On Teaching Sociology

Credit Hours: 3.00. Acquaints students with the literature on teaching sociology and its issues and provides practice instruction through videotaped microteaching, syllabus and examination construction, etc. A theoretical or research paper is required. Prerequisite: Master's student standing. Typically offered Fall Spring.

SOC 61100 - Social Inequality: Class, Race, And Gender

Credit Hours: 3.00. Survey of major approaches (functional, status attainment, labor market, class, culture) to the sociological study of inequality, including qualitative and quantitative, historical and comparative studies. Students will be asked to complete a project analyzing inequality, which might provide the basis for a publishable paper. Prerequisite: Master's student standing and Sociology majors only. Typically offered Summer Fall Spring.

SOC 63000 - Seminar In Political Sociology

Credit Hours: 3.00. Intensive consideration of a selected topic or set of topics in political sociology such as political socialization, political movements, comparative political analysis, political ideology in the industrialized West. Typically offered Spring.

SOC 65900 - Seminar In Marriage And The Family

Credit Hours: 3.00. Seminar in Marriage and the Family. Offered in alternate years. Typically offered Spring.

SOC 66700 - Seminar In The Sociology Of Religion

Credit Hours: 3.00. Examines topics of traditional or emerging interest in the sociology of religion. Topics covered depend on the theoretical research interests of participating faculty and students. Prerequisite: SOC 56700 or SOC 56800. Typically offered Spring.

SOC 67400 - Seminar In Medical Sociology

Credit Hours: 3.00. Seminar in Medical Sociology. Prerequisite: SOC 57100, SOC 57400. Typically offered Spring.

SOC 67700 - Research Seminar On Aging And The Life Course

Credit Hours: 1.00. An interdisciplinary seminar examining recent research on aging and the responsible conduct of research. Emphasis is given to professional development in gerontology and related fields. Typically offered Fall Spring.

SOC 68000 - Advanced Social Research Methods

Credit Hours: 3.00. Survey analysis using regression models. Emphasizes ordinary least squares model applied to sociological problems. Also considered are path analysis and logit and logistic regression. A series of projects are required using the PUCC mainframe computer applying course concepts. Prerequisite: SOC 58100 or SOC 60000. Typically offered Fall.

SOC 68100 - Selected Problems Of Social Research

Credit Hours: 3.00. Working with already available data, each student will conduct one or more research projects, including conceptualization, operational procedures, analysis of the data, and report writing. The data to be used may be from surveys, small group studies, organizational studies, or written documents. Prerequisite: SOC 60000 or SOC 68000. Permission of instructor required. Typically offered Fall Spring.

SOC 68600 - Qualitative Methods

Credit Hours: 3.00. Surveys qualitative research methods. Considers methods of data collection and data analysis, including computer-assisted techniques. Critical examination of perspectives, assumptions, and issues, including protection of human subjects. Students conduct research projects and write papers using techniques encountered in class. Prerequisite: SOC 58000. Typically offered Fall.

SOC 69300 - Interdisciplinary Seminar

Credit Hours: 3.00. A seminar on a topic of interdisciplinary interest, taught in cooperation with a member of another department. Typically offered Fall Spring Summer.

SOC 69500 - Analytic Project In Sociology

Credit Hours: 3.00 or 6.00. Designed to provide experience in defining a research problem, in assessing knowledge and research about the problem, and in analysis. Prerequisite: SOC 58000, SOC 58100. Permission of instructor required. Typically offered Fall Spring.

SOC 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Spanish

SPAN 10100 - Spanish Level I

Credit Hours: 3.00. A beginning Spanish course with emphasis on communicative skills (listening and speaking), literacy skills (reading and writing) and culture. Permission of department required. Typically offered Fall Spring Summer. CTL:IWL 1910 Spanish Level I

SPAN 10200 - Spanish Level II

Credit Hours: 3.00. Continuation of SPAN 10100. Typically offered Fall Spring Summer. CTL:IWL 1911 Spanish Level II

SPAN 11200 - Elementary Spanish Conversation

Credit Hours: 1.00. Development of oral skills for self-expression. Guided practice in conversation to enhance communicative competence. Small group; discussions in Spanish on various topics. Not open to students enrolled in or having credit for SPAN 20100 or above. Typically offered Fall Spring Summer.

SPAN 20100 - Spanish Level III

Credit Hours: 3.00. Readings from the works of nineteenth-century and contemporary Spanish writers. Practice in speaking and writing Spanish. Typically offered Fall Spring Summer. CTL:IWL 1912 Spanish Level III

SPAN 20200 - Spanish Level IV

Credit Hours: 3.00. Continuation of SPAN 20100. Typically offered Fall Spring Summer. CTL:IWL 1913 Spanish Level IV

SPAN 21100 - Elementary Spanish Conversation II

Credit Hours: 1.00. Continuation of SPAN 11200. May be taken concurrently with SPAN 20100. Typically offered Fall Spring Summer.

SPAN 21200 - Elementary Spanish Conversation III

Credit Hours: 1.00. Continuation of SPAN 21100. May be taken concurrently with SPAN 20200. Typically offered Fall Spring Summer.

SPAN 22400 - Spanish Level IV: Business Spanish

Credit Hours: 3.00. Practical reading, writing, speaking, and listening comprehension skills directed towards use of Spanish for business purposes. Course materials cover a variety of business aspects in several professions. Typically offered Fall Spring.

SPAN 23100 - Cervantes' Don Quixote

Credit Hours: 3.00. Reading and discussion of Cervantes' masterpiece. All readings, discussion, papers, and examinations will be in English. Typically offered Fall Spring Summer.

SPAN 23500 - Spanish American Literature In Translation

Credit Hours: 3.00. Reading and discussion of selected masterpieces of Spanish American literature. The course context will change from semester to semester. Knowledge of Spanish not required. Typically offered Fall Spring Summer.

SPAN 24100 - Introduction To The Study Of Hispanic Literature

Credit Hours: 3.00. Reading and discussion of selected poetry, prose, and theatre from Spain and Spanish-speaking America; introduction to critical discourse and basic concepts of literary theory. Texts, discussion, and written assignments in Spanish. Typically offered Fall Spring.

SPAN 28000 - Second-Year Spanish: Special Topics

Credit Hours: 3.00. Selected topics on the civilization, culture, and literature of Spain and Spanish America. Lectures and readings primarily in English, but knowledge of Spanish at the first-year level necessary. Typically offered Fall Spring Summer.

SPAN 30100 - Spanish Level V

Credit Hours: 3.00. Continued development of Spanish speaking, listening, reading, and writing abilities, using materials dealing primarily with everyday life and civilization in the Spanish-speaking countries from a variety of sources (e.g., newspapers, magazines, TV, recent literature, etc.). Conducted primarily in Spanish. Typically offered Summer Fall Spring.

SPAN 30200 - Spanish Level VI

Credit Hours: 3.00. Further work to develop speaking, listening, reading, and writing abilities in Spanish on the basis of materials dealing with the ideas and events that have shaped the present-day Spanish-speaking countries. Conducted primarily in Spanish. Typically offered Summer Fall Spring.

SPAN 30500 - Spanish For Heritage Speakers

Credit Hours: 3.00. This course is intended for the student whose home language is Spanish, but whose education has been exclusively in English. The students will first learn to read and write their native dialects and then the standard language using the orthographic norms of the standard language. Typically offered Fall Spring.

SPAN 30801 - Advanced Spanish For Heritage Speakers

Credit Hours: 3.00. This course is a continuation of SPAN 30500. It is an advanced grammar course designed for Spanish-English bilinguals exposed to Spanish as a minority/native language during early childhood or adolescence but who have not received formal instruction or education in the language. It aims to develop advanced grammar and writing skills. Typically offered Fall Spring Summer.

SPAN 31200 - Advanced Spanish Conversation

Credit Hours: 1.00. One credit hour advanced Spanish conversation course focused on guided practice in conversation to enhance communicative competence. Discussions in Spanish on various topics. Course may be taken concurrently with SPAN 30100, SPAN 30200, SPAN 40100 or SPAN 40200. Typically offered Fall Spring Summer.

SPAN 32200 - Spanish For The Health Professions

Credit Hours: 3.00. Intermediate level course directed towards the use of Spanish in the health care professions. It covers specialized vocabulary from the medical fields, as well as grammar and syntax with the goal of developing speaking, listening, reading and writing abilities. Students will have the opportunity to apply their skills in practical contexts and discuss cultural considerations. Typically offered Fall Spring Summer.

SPAN 33000 - Spanish And Latin American Cinema

Credit Hours: 3.00. Screening and analysis of selected Spanish and Latin American films with readings and discussions relative to their historical, social, political, aesthetic, literary, and linguistic contexts. No knowledge of Spanish required. Typically offered Fall Spring Summer.

SPAN 33500 - The Literature Of The Spanish-Speaking Peoples In The United States

Credit Hours: 3.00. Study of selected poetry, fiction, theatre, and essays written in the United States by Spanish-speaking writers; includes readings in the literature written in Spanish and English as well as bilingual poetry and prose. Conducted in Spanish and English. Typically offered Fall Spring Summer.

SPAN 34100 - Hispanic Literature I: Poetry And Drama

Credit Hours: 3.00. Reading of selected poetic and dramatic texts from Spain and Spanish-speaking America in their historical and cultural contexts. Readings, discussion, and papers in Spanish. Typically offered Fall Spring.

SPAN 34200 - Hispanic Literature II: Prose

Credit Hours: 3.00. Reading of selected novels and short fiction from Spain and Spanish-speaking America in their historical and cultural contexts. Readings, discussion, and papers in Spanish. Typically offered Fall Spring.

SPAN 36100 - The Structure Of Spanish I: Phonetics And Phonology

Credit Hours: 3.00. Linguistic analysis of Spanish phonology, phonetics, and dialectology. Selected topics within the areas of Spanish sociolinguistics and language acquisition. Each of these topics will be approached from a contrastive Spanish/English perspective. One session per week devoted to pronunciation improvement. Typically offered Fall Spring.

SPAN 36200 - The Structure Of Spanish II: Morphology, Lexicology, And Syntax

Credit Hours: 3.00. Linguistic analysis of Spanish, focusing on morphology, lexicology, and syntax. This course will present the grammatical structure of Spanish dealing with word-level phenomena (derivational and inflectional morphology, the lexicon) and phrase- and sentence-level phenomena (constituents, word order, sentence structure, etc.). Typically offered Fall Spring.

SPAN 39800 - Special Topics In Spanish

Credit Hours: 3.00. Studies of particular aspects of Spanish (e.g., culture, civilization, literature, linguistics, film, art, politics, etc.) by examining a varied selection of works. Readings, discussion, and papers in Spanish. Typically offered Summer Fall Spring.

SPAN 39900 - Special Study Abroad Credit In Spanish

Credit Hours: 1.00 to 4.00. This course number is for assignment after the fact of credits in Spanish earned while enrolled at a foreign university on a Study Abroad program which cannot be appropriately accommodated under an established Purdue course number. It is not for use for courses offered at or conducted by Purdue. Typically offered Summer Fall Spring.

SPAN 40100 - Spanish Level VII

Credit Hours: 3.00. Advanced work on development of Spanish speaking, listening, reading, and writing abilities, focusing on materials dealing primarily with culture and the arts in the Spanish-speaking countries. Conducted primarily in Spanish. Typically offered Fall Spring.

SPAN 40200 - Spanish Level VIII

Credit Hours: 2.00. Further advanced work on speaking, listening, reading, and writing abilities in Spanish. Course materials will cover a variety of topics illustrated by film and other media, both print and nonprint. Conducted primarily in Spanish. Typically offered Fall Spring.

SPAN 41500 - Spanish Translation And Interpretation

Credit Hours: 3.00. Introduction to the Translation and Interpretation Studies field for Spanish speakers. High level of competence in Spanish required. Overview of translation theory, methodology, and practice both in class and in real settings. Includes a service learning component. Conducted in English and Spanish. Typically offered Fall Spring Summer.

SPAN 41900 - Directed Tutoring In Spanish

Credit Hours: 1.00 to 4.00. Guided practicum in tutoring Spanish, operation of a tutorial laboratory, and the rationale for audiotutorial second language learning. Students learn tutorial techniques, grade homework, and maintain records under the supervision of the SPAN 10100-SPAN 10200 course chairperson and experienced teaching assistants. Permission of instructor required. Typically offered Fall Spring.

SPAN 42400 - Business Spanish

Credit Hours: 3.00. A study of the terminology and techniques used in commercial transactions, including the interpretation and writing of business materials. Development of the four language skills, with emphasis on writing and speaking. Typically offered Fall Spring Summer.

SPAN 48000 - Spanish Civilization

Credit Hours: 3.00. The study of modern Spanish life, with special emphasis on social institutions and customs. Lectures in Spanish. Typically offered Fall Spring Summer.

SPAN 48100 - Spanish Culture

Credit Hours: 3.00. The development of the cultural life of the Spanish people as reflected in the geography, history, music, art, and architecture of Spain. Lectures in Spanish. Typically offered Fall Spring Summer.

SPAN 48200 - Latin American Civilization

Credit Hours: 3.00. Outline of Latin American history; the cultural heritage from Spain and from the pre-Spanish civilizations; the intellectual, social, and cultural progress of the Latin American countries. Lectures in Spanish. Typically offered Fall Spring Summer.

SPAN 48300 - Latin American Culture

Credit Hours: 3.00. Study of Latin American cultures and U.S. Latino culture, from pre-Columbian times to the present. The course will focus on selected aspects of the cultures of Latin American groups. Conducted in Spanish. Typically offered Fall Spring.

SPAN 49800 - Advanced Topics In Spanish

Credit Hours: 3.00. Advanced studies of particular aspects of Spanish (e.g. culture, civilization, literature, linguistics, film, etc) by examining a varied selection of works. Readings, discussion, and papers in Spanish. Typically offered Summer Fall Spring.

SPAN 51900 - Teaching College Spanish

Credit Hours: 3.00. A course designed to provide a forum for ideas connecting theory and research to teaching practice. Explores issues related to how learning and teaching can be enhanced and presents practical ideas that can be implemented in the classroom. Permission of instructor required. Typically offered Fall.

SPAN 54000 - Spanish Literature Of The Middle Ages

Credit Hours: 3.00. A survey of Spanish Literature from 11th to the 15th century through the reading and discussion of representative prose, dramatic and poetic works. Lectures and supplemental readings on literary criticism and on various aspects of the period useful to an understanding of the literature it produced. Permission of instructor required. Typically offered Fall Spring Summer.

SPAN 54100 - Spanish Literature Of The Golden Age

Credit Hours: 3.00. A survey of Spanish literature from 1500 to 1681. Reading and discussion of representative prose, dramatic and poetic works. Lectures and supplemental readings on literary criticism and on various aspects of the period useful to an understanding of the literature it produced. Typically offered Spring.

SPAN 54200 - Cervantes' Don Quijote

Credit Hours: 3.00. Reading and discussion of Don Quijote in the context of Spanish Renaissance literature and subsequent developments in the genre of the novel. Typically offered Spring Fall Summer.

SPAN 54300 - Spanish Literature Of The 18th And 19th Centuries

Credit Hours: 3.00. The development of Spanish peninsular literature from Neoclassicism to Realism. Reading, analysis, and discussion of a representative selection of works of the periods. Typically offered Fall.

SPAN 54500 - Spanish Literature Of The 20th Century

Credit Hours: 3.00. The study of major trends in Spanish peninsular literature from the generation of 1898 to the present. Reading, analysis, and discussion of a representative selection of works of the period. Typically offered Spring.

SPAN 54900 - Hispanic Women Writers

Credit Hours: 3.00. A survey of the literature of Hispanic women writers from Latin America, the Caribbean, and Spain in light of their traditions and of feminist literary theory and criticism. Permission of Instructor required. Typically offered Fall, Spring, Summer.

SPAN 55000 - Spanish American Literature Of The Colonial Period

Credit Hours: 3.00. A survey of Spanish American literature of the colonial period. Reading and discussion of a number of representative works as well as excerpts from several others. Typically offered Fall.

SPAN 55100 - Spanish American Literature Of The 19th Century

Credit Hours: 3.00. A survey of Spanish American literature of the 19th century. Reading and discussion of a number of representative works as well as excerpts from several others. Typically offered Spring.

SPAN 55200 - Spanish American Literature From 1900 To 1970

Credit Hours: 3.00. A survey of Spanish American literature from 1900 to 1970. Readings and discussion of a number of representative works, as well as excerpts from several others. Typically offered Fall Spring.

SPAN 55300 - Spanish American Literature From 1970- Present

Credit Hours: 3.00. A survey of Spanish American literature from 1970 to the present. Readings and discussion of a number of representative works, as well as excerpts from several others. Typically offered Fall Spring.

SPAN 55400 - Hispanic Caribbean Literature

Credit Hours: 3.00. This course focuses on various topics pertaining to Hispanic Caribbean literature. The particular works included will change each time the course is offered. All coursework and discussion is in Spanish. Typically offered Fall Spring.

SPAN 55500 - Latino/a Literature

Credit Hours: 3.00. A survey of the literature of Chicano and Puerto Rican writers in Spanish and English and produced in the United States in the light of their tradition and of contemporary interdisciplinary theories. Permission of Instructor required. Typically offered Fall Spring Summer.

SPAN 55600 - Mexican Literature

Credit Hours: 3.00. A survey of Mexican literature. Reading and discussion of a number of representative works as well as excerpts from several others. Permission of Instructor required. Typically offered Fall Spring Summer.

SPAN 55700 - Argentine Literature

Credit Hours: 3.00. A survey of Argentine literature. Reading and discussion of a number of representative works as well as excerpts from several others and from standard anthologies. Typically offered Fall.

SPAN 56100 - The Structure Of Spanish I: Phonetics, Phonology, And Dialectology

Credit Hours: 3.00. Linguistic analysis of Spanish phonology, phonetics, and dialectology. Selected topics within the areas of

Spanish sociolinguistics and language acquisition. Each of these topics will be approached from a theoretical and contrastive Spanish/English perspective. Credit will not be given for both SPAN 36100 and 56100. Typically offered Spring Fall.

SPAN 56200 - The Structure Of Spanish II: Morphology, Lexicology, And Syntax

Credit Hours: 3.00. Linguistic analysis of Spanish focusing on morphology, lexicology, and syntax. This course will present the grammatical structure of Spanish dealing with word-level phenomena (derivational and inflectional morphology, the lexicon) and phrase- and sentence-level phonomena (constituents, word order, sentence structure, etc.). Credit will not be given for both SPAN 36200 and 56200. Typically offered Spring Fall.

SPAN 56300 - History Of The Spanish Language

Credit Hours: 3.00. Development of Spanish since the Ancient Latin period, taking into account influences of other cultures and languages; Spanish in relation to Latin and other Romance languages; basic principles of language change; language change underlying differences between American and Peninsular Spanish. Typically offered Spring Fall.

SPAN 59000 - Directed Reading In Spanish

Credit Hours: 1.00 to 4.00. Directed readings in Spanish. Permission of instructor required. Typically offered Spring Fall Summer.

SPAN 59400 - Special Topics In Hispanic Literature

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

SPAN 59600 - Special Topics In Spanish Linguistics

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Spring Fall.

SPAN 60300 - Second Course To Establish Reading Knowledge

Credit Hours: 3.00. Readings in the physical and biological sciences, mathematics, and engineering. Prerequisite: SPAN 60100. Typically offered Spring Fall Summer.

SPAN 60500 - Second Course To Establish Reading Knowledge

Credit Hours: 3.00. Readings in the humanities and social sciences. Prerequisite: SPAN 60100. Typically offered Spring Fall Summer.

SPAN 63000 - Bibliography And Literary Criticism

Credit Hours: 3.00. The use of general and specific reference materials and bibliographical aids in literary research; the basic concepts and terminology of literary criticism. Required of all MA candidates in Spanish. Typically offered Spring Fall Summer.

SPAN 64200 - Seminar In Spanish Theater

Credit Hours: 3.00. Advanced study of Spanish theater. Content will vary depending on the choice of periods, authors, works, and themes. Permission of instructor required. Typically offered Spring Fall Summer.

SPAN 65900 - Seminar In Hispanic Literature

Credit Hours: 3.00. Advanced study of special subject. Topics to be announced in advance. Content varies. Permission of instructor required. Typically offered Spring Fall Summer.

SPAN 67900 - Seminar In Spanish Linguistics

Credit Hours: 3.00. Advanced study and research on a significant topic in Spanish linguistics. Topic to be announced in advance. Permission of instructor required. Typically offered Spring Fall Summer.

SPAN 68200 - Topics In Latin American Culture

Credit Hours: 3.00. Selected facets of Latin American culture through the eyes of the continent's artists, creative writers, essayists, and social scientists - and in view of current theories of the arts, literatures, multiculturalism, and postcolonialism. Typically offered Spring Fall.

SPAN 69800 - Research MA Thesis

Credit Hours: 1.00 to 18.00. Research MA Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

SPAN 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Spring Fall Summer.

Speech, Language and Hearing Science

SLHS 11500 - Introduction To Communicative Disorders

SLHS 21500 - Exploring Audiology And Hearing Science

Credit Hours: 3.00. This course will introduce students to the discipline of hearing science and to the clinical profession of audiology, with a focus on the unique and exciting aspects of the auditory system. Students will be introduced to the acoustic properties of environmental and speech sounds in relation to hearing loss, the fundamental anatomical and physiological bases of hearing, normal development of hearing and auditory behaviors, history and scope of practice in Audiology, hearing disorders across the life span and assessment and intervention techniques used to manage hearing disorders in children and adults. Guest speakers will include hearing researchers from Purdue University who will talk about their specific research, audiologists from Purdue University and the community who will talk about clinical practice and individuals with hearing disorders who will speak about their personal stories. Typically offered Spring.

SLHS 22700 - Elements Of Linguistics

Credit Hours: 3.00. (ENGL 22700) Credit will not be awarded for both AUSL 22700 and LC 26100. A summary of what is known about human language, its structure, its universality, and its diversity; language in its social setting; language in relation to other aspects of human inquiry and knowledge. Typically offered Summer Fall Spring.

SLHS 30100 - Introduction To Cognitive Neuroscience

Credit Hours: 3.00. (PSY 32400) Introduction to the neural bases of complex human mental abilities. Emphasis on integrating

research from cognitive science, brain-scanning techniques, and the lesion technique. Topics include perception, attention, memory, language, motor control, planning/decision-making, and consciousness. Typically offered Spring.

SLHS 30200 - Acoustic Bases Of Speech And Hearing

Credit Hours: 3.00. The physical characteristics of speech sounds and the psychophysical processes involved in hearing. Typically offered Spring.

SLHS 30300 - Anatomy And Physiology Of The Speech Mechanism

Credit Hours: 3.00. This course provides an introduction to the anatomical and physiological bases of the speech mechanism with an emphasis on the neural, respiratory, laryngeal, and supralaryngeal subsystems. Typically offered Fall.

SLHS 30400 - Anatomy And Physiology Of The Speech And Hearing Mechanism

Credit Hours: 4.00. An introduction to the anatomical and physiological bases of normal and abnormal voice, articulation, and hearing. Laboratory includes demonstrations to support lecture material. Typically offered Fall.

SLHS 30600 - Introduction To Phonetics

Credit Hours: 3.00. Credit will not be given for both AUS 30600 and LING 31500. An introduction to articulatory phonetics, speech sounds in languages of the world, and principles and symbols of the International Phonetic Alphabet. Extensive practice in phonetic transcription. Typically offered Fall Spring.

SLHS 30900 - Language Development

Credit Hours: 3.00. (PSY 42600) Specific nature, sequence, and pattern of oral language development from birth through adolescence. Numerous examples illustrating the nature of language acquisition and approaches to the study of children's language are presented. Linguistic and psychological explanations of the sequence of development are discussed. Typically offered Fall Spring.

SLHS 34500 - Research Methods In Infancy And Childhood

Credit Hours: 3.00. (PSY 31900) This is a laboratory-based course that focuses on methods to test childhood cognitive and

language development. As part of the course, students will be working in the Purdue University Infant Labs. Permission of instructor required. Typically offered Fall Spring.

SLHS 40100 - Language And The Brain

Credit Hours: 3.00. Introduction to neurolinguistics: evidence for language organization in the brain drawn primarily from lesion studies, behavioral experiments, direct cortical stimulation, WADA test, dichotic listening, tachistoscopic and functional neuroimaging techniques. Typically offered Fall.

SLHS 40300 - Psycholinguistics

Credit Hours: 3.00. (SLHS 40300) This course aims to introduce students to the current, research-based understanding of how different aspects of language (such as word perception, language acquisition, or speech production) are represented in the mind. In addition, it will introduce some of the research methods employed by language scientists for gaining insight into such a representation. This course also aims to help students learn how to critically evaluate research data used to support various theories about psychological and neural foundations of language knowledge. Typically offered Fall.

SLHS 41900 - Topics In Audiology And Speech Pathology

Credit Hours: 2.00 or 3.00. Study of selected topics, varying from semester to semester. Course content will be drawn from areas for which there are no permanent courses. Typically offered Fall Summer Spring.

SLHS 42000 - Introduction To Developmental Speech And Language Disorders

Credit Hours: 3.00. Students cannot receive credit for both AUS 42000 and AUS 42200. Introduction to disorders of speech and language in children. Characteristics of these disorders, methods of evaluation, and intervention procedures are discussed. Typically offered Fall Spring.

SLHS 42200 - Introduction To Developmental Speech And Language Disorders Of Exceptional Children

Credit Hours: 3.00. A beginning study of speech and language disorders in exceptional children. Topics include characteristics of these disorders as well as evaluation and intervention methods. (Students in the EMR, ED, LD, or TMR certification programs should register for this course rather than AUS 42000. Students cannot receive credit for both AUS 42000 and 42200). Typically offered Fall Spring.

SLHS 43000 - Speech-Language Disorders In Health Care Settings

Credit Hours: 3.00. Presents speech-language disorders across the lifespan, encountered in a variety of health care settings. Discusses the etiology, evaluation, and management of these disorders; addresses administrative structures, team approaches, and reimbursement issues in health care settings. Typically offered Fall.

SLHS 44400 - Introduction To Research In Communication Sciences And Disorders

Credit Hours: 3.00. An introduction to fundamental concepts of research in the basic and clinical disorder aspects of speech, language, and hearing processes. Among topics to be covered are research design/strategies, model and theory development, research ethics and data collection and interpretation. Typically offered Fall.

SLHS 44900 - Introduction To Clinical Practice In Communication Disorders

Credit Hours: 3.00. A course designed to provide instruction in basic diagnostic procedures and therapeutic approaches to speech, language, and hearing disorders. Typically offered Fall.

SLHS 45000 - Introduction To Aural Rehabilitation Across The Lifespan

Credit Hours: 4.00. The effects of hearing disorders on communication, psychosocial development, academic achievement, and employment will be explored. The roles of residual hearing, vision, signing, and technology in increasing communication proficiency will be discussed, and models of assessment and intervention will be examined. Typically offered Fall Spring.

SLHS 46000 - Introduction To Assessment Audiology

Credit Hours: 4.00. History of audiology; normal and abnormal processes of hearing; basic methods of audiological assessment; and introduction to the development and management of hearing conservation programs. Laboratory provides practical instruction in the procedures discussed in class. Typically offered Fall Spring.

SLHS 49000 - Directed Study Special Problems

Credit Hours: 1.00 to 6.00. Designed for student to work with individual instructors on special topics of interest. Permission of instructor required. Typically offered Summer Fall Spring.

SLHS 49800 - Undergraduate Research Experience

Credit Hours: 1.00 to 4.00. The course allows students an opportunity to obtain first-hand experience with research in speech, language, and hearing sciences. Permission of instructor required. Typically offered Summer Fall Spring.

SLHS 50100 - Neural Bases Of Speech And Hearing

Credit Hours: 3.00. Study of normal human neuroanatomy and neurophysiology related to speech, language, and hearing functions. Includes material concerning normal and abnormal neurological development over the lifespan. Typically offered Fall.

SLHS 50200 - Fundamentals Of Speech Production And Perception

Credit Hours: 3.00. The physical, biological, and behavioral correlates of normal speech production and perception. Includes an exposure to the measures and methods of speech science. Typically offered Fall.

SLHS 50300 - Auditory Perception

Credit Hours: 3.00. Behavioral measurement of the capabilities of the normal and impaired auditory system. The laboratory experience includes an exposure to the measures and methods of hearing science. Typically offered Fall.

SLHS 50900 - Language Acquisition

Credit Hours: 3.00. An examination of research and theory dealing with first language acquisition in children. A linguistic framework is used to describe developing language. Topics considered include speech perception, grammatical development, meaning, and language in nonmodal populations. Permission of instructor required. Typically offered Fall Spring.

SLHS 51100 - Seminar In Aging And Communication

Credit Hours: 3.00. This course examines normal age-related changes to the systems of communication. This includes anatomic and physiologic changes to the respiratory, laryngeal, and supralaryngeal systems and the resulting functional changes to speech production and changes to speech perception, language, cognition, emotional processing, and memory. A background that includes basic anatomy and physiology, neurophysiology, and linguistics is preferred. Typically offered Fall.

SLHS 51200 - Acoustics And Perception Of Speech - Honors

Credit Hours: 3.00. Acoustics of speech for SLHS prerequisite AuD and SLP students, honors undergraduates, and interested students from outside SLHS. This course provides an overview of the science of acoustics from the perspective of the study of spoken language, including discussion of basic aspects of speech perception, with particular attention paid to methods for analyzing and manipulating digital recordings of speech sounds. Typically offered Spring.

SLHS 51800 - Counseling In Speech-Language Pathology And Audiology

Credit Hours: 2.00. Application of counseling models, theories, and methods to persons with communicative disorders and their families. Permission of instructor required. Typically offered Fall Spring Summer.

SLHS 51900 - Special Topics In Audiology And Speech Pathology

Credit Hours: 1.00 to 3.00. Study of special topics, drawn from areas not covered in permanent courses. Topics may vary from semester to semester. Typically offered Summer Fall Spring.

SLHS 52100 - Phonetic And Phonological Disorders In Children

Credit Hours: 2.00. A detailed study of phonetic and phonological aspects of speech sound disorders in children. Recent research findings dealing with normal and disordered development are reviewed. Advanced procedures for diagnosis and intervention are discussed. Typically offered Fall.

SLHS 52200 - Language Disorders Of Exceptional Children

Credit Hours: 3.00. Description and diagnosis of children with language disorders and procedures for management. Students in a certification program for EMR, ED, LD or TMR should register for this course rather than AUS 52300. Typically offered Spring.

SLHS 52300 - Language Disorders In Children: Basic Principles

Credit Hours: 3.00. Principles of description assessment and intervention for children with language disorders. Specific language evaluation and treatment procedures for children in the preschool years. Typically offered Spring.

SLHS 52400 - Infant Communication Disorders

Credit Hours: 2.00. Theories of normal and disordered communication development (including related areas of cognitive and social development) are studied. Theoretical knowledge is applied to a range of clinical populations to generate assessment and treatment approaches for infants and their families. Typically offered Spring.

SLHS 52500 - Language And Communication In Autism Spectrum Disorders

Credit Hours: 3.00. (EDPS 52500) This course will address development and impairment of language and communication in individuals with autism spectrum disorders (ASD). In addition to language and communication characteristics, this course will review the behavioral, cognitive, sensory, and social -emotional abilities of individuals with ASD. Differential diagnosis, assessment, and intervention strategies will be emphasized with a focus on empirically supported treatments and evidence-based practices. Current developments and research findings will be highlighted related to etiology and diagnosis of ASD, advances in biomedical research, augmentative and alternative communication strategies, assistive technology solutions, behavioral, cognitive, and physiological interventions, and comprehensive treatment approaches. Typically offered Fall Spring Summer.

SLHS 52900 - Stuttering: Nature, Diagnosis, And Treatment

Credit Hours: 2.00. Reviews applications of research findings and theoretical developments to our understanding of the onset, development, perpetuation, and amelioration of stuttering. Demonstrates and discusses methods and procedures for diagnosing and treating stuttering across the lifespan. Typically offered Fall.

SLHS 53100 - Language Disorders In Adults

Credit Hours: 3.00. Study of the causes, assessment, and treatment of acquired language disorders in adults, including aphasia, right hemisphere syndromes, and dementia. Typically offered Spring.

SLHS 53200 - Voice Disorders

Credit Hours: 3.00. Principles of differential diagnosis and clinical management for children and adults presenting voice disorders, based on a working knowledge of normal laryngeal structure and function. Typically offered Fall.

SLHS 53300 - Medical Speech-Language Pathology

Credit Hours: 2.00. Introduces the graduate speech-language pathology student to issues encountered in the medical environment in preparation for a healthcare externship and a career in the healthcare setting. Topics will include collaborative models in the

medical setting, clinical documentation, ethical issues, equipment and instrumentation, medications, among others. Typically offered Spring.

SLHS 53600 - Traumatic Brain Injury

Credit Hours: 2.00. The mechanisms, effects, assessment, and re-habilitation of traumatic brain injury in children and adults, with emphasis on a team approach to remediation. Typically offered Spring.

SLHS 53700 - Developmental Motor Speech And Feeding Disorders

Credit Hours: 2.00. Normal aspects of speech motor and feeding development are studied. Theories derived from normal processes are applied to designing assessment and intervention approaches for infants and children with a range of clinical diagnoses (e.g., cleft palate, tracheostomy, or Down Syndrome). Typically offered Fall.

SLHS 53800 - Motor Disorders Of Speech

Credit Hours: 3.00. A study of the neuropathologies that affect the speech production system. Emphasizes the differential diagnosis and management of acquired motor speech disorders. Typically offered Fall.

SLHS 53900 - Dysphagia

Credit Hours: 3.00. A study of the normal and disordered anatomy and physiology of the swallowing process. Principles of evaluation and treatment of dysphagia are discussed. Typically offered Spring.

SLHS 54000 - Augmentative And Alternative Communication

Credit Hours: 3.00. (EDPS 56200) Introduction to augmentative and alternative communication. Cognitive, educational, physical, psycho-social, and linguistic aspects are considered together with symbol characteristics, teaching strategies, and research issues. Typically offered Fall.

SLHS 54400 - School-Clinical Methods In Communication Disorders

Credit Hours: 3.00. Organization, materials, and methods for conducting speech, language, and hearing services in elementary and secondary schools. Permission of instructor required. Typically offered Summer Fall Spring.

SLHS 54900 - Clinical Practice In Speech-Language Pathology I

Credit Hours: 1.00 to 8.00. The second in a series of practicum courses designed to provide instruction and practical experience in fundamental diagnostic and therapeutic approaches to speech and language disorders. AUS 43000 is recommended. Permission of instructor required. Typically offered Spring Summer Fall.

SLHS 55200 - Educational Audiology

Credit Hours: 3.00. Study of classroom acoustics, hearing, hearing loss, and auditory processing, and their impact on language, academic, and psychosocial development. Discussion of hearing conservation programs and assistive hearing technologies into academic areas. Typically offered Fall.

SLHS 55300 - Implantable Devices

Credit Hours: 3.00. Provides fundamental principles to assist audiologists and speech-language pathologists in the understanding of candidacy, principles of signal processing, and audiologic rehabilitation for children and adults who use cochlear implants. Typically offered Spring.

SLHS 56000 - Audiologic Diagnostics

Credit Hours: 3.00. Audiometers, audiometric standards, and the use of pure tone and speech signals in the measurement of auditory abilities. Laboratory provides practical instruction in the procedures discussed in class. Typically offered Fall.

SLHS 56100 - Medical Audiology

Credit Hours: 3.00. Study of the etiology, pathogenesis, symptomology, epidemiology, diagnosis and treatment of diseases, and injuries to the auditory system. Typically offered Spring.

SLHS 56300 - Pediatric Auditory Assessment

Credit Hours: 3.00. Examination of protocols for the identification and evaluation of infants and children with hearing loss, using behavioral, physiologic, and electro-physiologic assessment methods. Course content places an emphasis on clinical decision-making and problem-solving skills. Typically offered Fall.

SLHS 56400 - Hearing Aids I

Credit Hours: 3.00. An examination of amplification systems as applied in audiological rehabilitation; acoustic, electroacoustic, electronic, and clinical considerations. Laboratory exercises in measurement, modifications, maintenance, selection, and dispensing of hearing aid systems. Typically offered Spring.

SLHS 56700 - Auditory Evoked Responses I

Credit Hours: 3.00. Evaluation of peripheral and brainstem auditory system function using evoked potentials. Typically offered Spring.

SLHS 56800 - Tinnitus Assessment And Rehabilitation

Credit Hours: 2.00. Ringing in the ears (tinnitus) is a common problem among millions of individuals with sensorineural hearing loss. This course will review the physiology, measurement, and treatment for tinnitus. Typically offered Fall.

SLHS 57000 - Noise And Man

Credit Hours: 3.00. A study of noise as a health hazard and as a nuisance; an examination of the ways in which hearing problems related to noise may be reduced. Permission of instructor required. Typically offered Spring.

SLHS 57700 - Auditory Evoked Responses II

Credit Hours: 3.00. Administration and interpretation of auditory evoked responses generated in the auditory thalamus and cortex. Emphasis is on application of auditory evoked potentials in clinical diagnosis and intra-operative monitoring. Topics include middle (AMLR), late (AEP), and steady-state (SSEP) evoked responses. Typically offered Fall.

SLHS 57900 - Clinical Practice In Audiology

Credit Hours: 1.00 to 12.00. Supervised clinical practicum in evaluation of hearing and communication status and in remediation of communication problems. Clinical practices include, but are not limited to, auditory site of lesion, sensory aid selection, fitting and evaluation and communication training for children and adults. Clinical practicum is available in the M. D. Steer Audiology Center and off-campus facilities. Permission of instructor required. Typically offered Fall Spring Summer.

SLHS 58400 - Seminar In Hearing Aids

Credit Hours: 2.00. Advanced study of hearing aid technology and its appropriate applications to the various signal processing needs of persons with hearing loss, with emphasis on critical review and analysis of research and proposals for future research. Typically offered Summer.

SLHS 58500 - Engineering Projects In Community Service: AuD I

Credit Hours: 2.00. Audiology clinical doctoral students, engineering, and speech, language, and hearing sciences undergraduate students work in a team-oriented research and development service-learning process. Students with faculty advisors collaborate with community partners to develop technology meeting adaptive and educational needs. Typically offered Fall Spring.

SLHS 58600 - Engineering Projects In Community Service: AuD II

Credit Hours: 1.00. Second semester registration in EPiCS for audiology clinical doctoral (AuD) students. AuD students complete collaboration with engineering students, other undergraduate students, and community project partners in the development of technology meeting adaptive and educational needs. . Typically offered Fall Spring.

SLHS 59000 - Directed Study Of Special Problems

Credit Hours: 1.00 to 6.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

SLHS 60500 - Signal Processing For Hearing And Speech Sciences

Credit Hours: 3.00. Provides an overview of the fundamental theory of signals and systems analysis with applications to hearing and speech sciences. Topics include: Introduction to MATLAB, time and frequency domain characterizations of signals and systems, analyses of signals through systems, time/frequency relations, spectrograms, applications to hearing (e.g., hearing-aid and cochlear-implant signal processing), applications to speech, and digital signal processing. Practical experience with digital signal processing (primarily in MATLAB) will supplement lectures. No explicit background in signal processing or MATLAB is assumed. Typically offered Spring.

SLHS 60600 - Experimental Phonetics

Credit Hours: 3.00. Review and critical study of current experimental literature in acoustics and perception of speech. Offered in alternate years. Permission of instructor required. Typically offered Fall.

SLHS 60900 - Seminar In Language Acquisition

Credit Hours: 2.00. Critical review of current research in selected areas of typical and atypical language acquisition. Prerequisite: SLHS 50900. Permission of instructor required. Typically offered Spring.

SLHS 61900 - Advanced Topics In Audiology And Speech Pathology

Credit Hours: 1.00 to 3.00. Study of advanced topics, varying from semester to semester. Course content will be drawn from areas for which there are no permanent courses. Typically offered Fall Spring.

SLHS 64800 - Speech-Language Pathology Education Externship

Credit Hours: 1.00 to 8.00. Full-time school-clinical experience to provide speech, language, and hearing services in elementary and secondary schools, under the supervision of a school clinician and university staff holding the ASHA Certificate of Clinical Competency. Typically offered Summer Fall Spring.

SLHS 64900 - Speech-Language Pathology Healthcare Externship

Credit Hours: 1.00 to 8.00. An advanced-level clinical practicum in speech and language disorders. Prerequisite: SLHS 54900. Permission of instructor required. Typically offered Spring Summer Fall.

SLHS 65800 - Advanced Topics In Audiology

Credit Hours: 2.00 or 3.00. Detailed study of selected topics in audiology. Permission of instructor required. Typically offered Summer Fall Spring.

SLHS 65900 - Audiology Practice Management

Credit Hours: 2.00. An examination of business and professional issues related to audiology. Practice management topics include conducting a feasibility analysis, writing a business plan, employee management, marketing, reimbursement, and practice

growth. Professional issues include licensing, certification, liability issues, and career planning. Prerequisite: SLHS 57900 and Doctor of Audiology majors only. Typically offered Fall Spring.

SLHS 67800 - Audiology Educational Externship

Credit Hours: 1.00 to 8.00. School clinical experience to provide audiology services in elementary and secondary schools under the supervision of a school clinician and University staff holding the Certificate of Clinical Competence in Audiology from the American Speech-Language and Hearing Association. Prerequisite: SLHS 55200, SLHS 57900. Permission of department required. Typically offered Fall Spring.

SLHS 67900 - Advanced Clinical Practice In Audiology

Credit Hours: 1.00 to 8.00. An advanced-level clinical practicum in audiology. Permission of instructor required. Typically offered Fall Spring Summer.

SLHS 69000 - Directed Study Of Special Problems

Credit Hours: 1.00 to 4.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

SLHS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

SLHS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Sustainable Food and Farm Systems

SFS 21000 - Small Farm Experience I

Credit Hours: 3.00. This is the first course of two designed to help students gain an understanding of what is needed to establish a

productive small farm enterprise. There will be short field trips to local small farming enterprises. Classes will also be taught by guest lecturers and local farmers who have been successful at establishing small farming enterprises. Students in the class will be responsible for working on the Purdue Student Farm to gain practical experience on the topics and concepts being taught in the class. Typically offered Spring.

SFS 21100 - Small Farm Experience II

Credit Hours: 3.00. This course is a continuation of SFS 21000 and is designed to help students gain an understanding of what is needed to establish a productive small farm enterprise. There will be short field trips to local small farming enterprises. Classes will also be taught by guest lecturers and local farmers who have been successful at establishing small farming enterprises. Students in the class will be responsible for working on the Purdue Student Farm to gain practical experience on the topics and concepts being taught in the class. Typically offered Fall.

SFS 30100 - Agroecology

Credit Hours: 3.00. This course introduces students to the application of ecological concepts to food production systems and farm management. We will consider species interactions, nutrient and water cycles, regenerative practices, alternative approaches to agriculture, and ecosystem services provided to and by agro-ecosystems. Typically offered Spring.

SFS 30200 - Principles Of Sustainability

Credit Hours: 3.00. Principles of sustainability is an experiential (discussion/debate) course that delivers an expansive overview of the principles of sustainability as they relate to energy and resources, communities, and agriculture. Students will learn to understand and analyze different food and farming systems and how they relate to environmental, economic and social sustainability. Typically offered Fall.

SFS 31100 - Aquaponics

Credit Hours: 1.00. There has been significant renewed interest in the investigation of integrated fish-food plant systems. Such systems have a long and rich history, particularly in Asia, and our impending food crisis has kindled an interest in developing aquaponic systems in western countries. Many growers are turning to controlled environment and hydroponic production methods to produce high-value crops in tight quarters. High input costs can, however, be a limitation. High value food plants and fish can be a natural marriage. The waste disposal problem of the fish can become the nutrient supply to the plants. Typically offered Fall.

SFS 31200 - Urban Agriculture

Credit Hours: 1.00. Urban agriculture has the potential to address a range of social, economic and environmental issues including food insecurity, energy conservation, and human health and well-being. During this 5-week course, students will learn about the forces driving urban agriculture as well as the political and biophysical factors constraining it by reading articles, reviewing case studies, and visiting urban farms, vertical farm factories, food pantries, and local food advocacy groups. At the end of this course, students will apply the knowledge they've gained by developing a plan to increase urban agriculture in the greater Lafayette metropolitan area. Typically offered Fall.

SFS 31300 - Fam To Fork

Credit Hours: 1.00. This course will investigate the culinary opportunities of local and seasonal foods and the horticultural demands of producing and marketing them. Dr. Hallett will represent the "farm", giving students a brief overview of the production of local and seasonal foods in Indiana. The "farm" will harvest produce at the student farm and deliver it to the "fork" -- Chef Ambarish Lulay - who will work his culinary magic in the teaching kitchens in the HTM department. The focus, from both "sides" of the course will be the importance of niche marketing for farmers and chefs. This course is going to be tasty and fun! Typically offered Fall.

SFS 31400 - Comparative Livestock Production Systems

Credit Hours: 1.00. This course will compare and contrast the various livestock and poultry systems in the United States. The course will begin with in depth analysis of the history and structure of prevalent or conventional livestock and poultry production systems followed by a similar analysis of the various alternative production systems currently in use in the US, including organic, grass-fed, and pasture-raised among others. A heavy focus will be placed on critically evaluating the pros and cons of each system, regulations of both conventional and process-verified systems and potential differences in products resulting from different management and processing systems. Typically offered Spring.

SFS 31500 - Energy And Resource Systems

Credit Hours: 1.00. The goal of this class is to encourage students to think of human systems, including food and farming, energy, economic and political systems in the ways that ecologists think of ecological systems. How does energy flow through these systems and how do resources flow or recycle through and throughout these systems? What are the weaknesses of human systems that could be mitigated by mimicking natural systems? Issues of efficiency, sustainability and resilience will be investigated in the context of vegetation succession, fire cycles, ecological tipping points and adaptive cycles. Typically offered Spring.

SFS 31600 - Decisions Through Systems Analysis

Credit Hours: 1.00. This class introduces students to the basic rationale, concepts and mechanics of systems analysis. After an introduction to the concepts, students go through examples of integrated research carried out with systems analysis that has been used for decision making on both enterprise and broader scales. These examples also illustrate such things as the importance of

data, metrics and the validity of information to be used in a systems analysis. Finally, students will set up their own systems decision framework for a problem of their interest. Typically offered Spring.

SFS 35000 - Summer Farm Internship

Credit Hours: 0.00. The summer internship will give students the opportunity to spend ten weeks on a farming enterprise, either at the Purdue University student farm, or at another farm in the region. A number of types of internships will be considered, and these might include internships not on farms, but on other farm-related businesses. We will assess these internships on a case-by case basis. The majority of the time spent by students is expected to be farm management work under the supervision of the host farmer. A list of requirements of both intern and host farmer will ensure that interns are engaged in enriching internship activities and not just exploited as laborers. Curricular activities will also be presented at farm visits, workshops and tours. Typically offered Summer.

SFS 35100 - SFS Capstone Project

Credit Hours: 1.00. The SFS Capstone Project is a directed-learning course that will require students to prepare and present a sustainability analysis of a farm enterprise, most likely the enterprise at which they conduct their required summer internship, and this may be an internship approved at an operation other than a farm. Students will be required to analyze and enterprise taking into account its economic, environmental and social sustainability, and its broader role in sustaining the local and regional economy, environment and community. The analysis will be prepared as a paper and a presentation that will be given to the undergraduates of the SFS program at an SFS program meeting. The paper and the presentation will be prepared in consultation with a faculty mentor from the SFS program committee and will be graded by the faculty mentor. Typically offered Fall Spring Summer.

Statistics

STAT 11300 - Statistics And Society

Credit Hours: 3.00. Introduction to statistical ideas and their impact on public policy and the sciences. Sample surveys, design of experiments, measurement, analysis of data, simulating probabilities, concepts of inference. Application to current issues and controversies. Not available for credit toward graduation in the School of Science. Typically offered Summer Fall Spring.

STAT 11400 - Elements Of Probability And Statistics

Credit Hours: 3.00. Probability, principles of choice, decision problems, use of data, examples in testing and estimation. STAT 11300 may be helpful. Not available for credit toward graduation in the School of Science. Typically offered Fall Spring.

STAT 17000 - Introduction To Actuarial Science

Credit Hours: 2.00. (MA 17000) An introduction to actuarial science from the point of view of practicing actuaries from life insurance, casualty insurance and consulting; introduction to insurance and the mathematical theory of interest; application of spreadsheets to problems related to actuarial science. Typically offered Fall.

STAT 18300 - Cooperative Work Experience I

Credit Hours: 0.00. Cooperative Work Experience. Must be accepted for the program by the cooperative program coordinator. For Cooperative Education Program students only. Typically offered Fall Spring Summer.

STAT 18400 - Cooperative Work Experience II

Credit Hours: 0.00. Cooperative Work Experience. Must be accepted for the program by the cooperative program coordinator. For Cooperative Education Program students only. Typically offered Fall Spring Summer.

STAT 19000 - Topics In Statistics For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading course or special topics course at the freshman level for undergraduates are given under this number. Permission of instructor required. Typically offered Summer Fall Spring.

STAT 22500 - Introduction To Probability Models

Credit Hours: 3.00. An introduction to basic probability. Emphasis is placed on formulation of models and applications. Probability calculus, standard distributions, random variables, and moments. Credit cannot be given for more than one of STAT 22500, STAT 31100, or STAT 41600. Typically offered Summer Fall Spring.

STAT 25000 - Problems Solving In Probability

Credit Hours: 2.00. (MA 25000) This course is designed to teach techniques for solving problems in probability theory which are relevant to the actuarial sciences. It is intended to help actuarial students prepare for the Society of Actuaries and Casualty Actuarial Society Exam P/1. Credit by Examination is not available for this course. MA 41600/STAT 41600 is strongly recommended. Typically offered Fall Spring.

STAT 28400 - Cooperative Work Experience III

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

STAT 29000 - Topics In Statistics For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading course or special topics course at the sophomore level for undergraduates are given under this number. Permission of instructor required. Typically offered Summer Fall Spring.

STAT 30100 - Elementary Statistical Methods

Credit Hours: 3.00. Introduction to statistical methods with applications to diverse fields. Emphasis on understanding and interpreting standard techniques. Data analysis for one and several variables, design of samples and experiments, basic probability, sampling distributions, confidence intervals and significance tests for means and proportions, correlation and regression. Software is used throughout. Credit cannot be given for more than one of STAT 30100, 30500, STAT 35000, 43300, STAT 50100, STAT 50300, and STAT 51100. Prerequisite: college algebra. Typically offered Summer Fall Spring.

STAT 31100 - Introductory Probability

Credit Hours: 3.00. Formulation of probability problems, discrete and continuous random variables, expectation, standard distributions, applications to statistical problems, and problems in the physical sciences. Credit cannot be given for more than one of STAT 22500, 31100, or STAT 41600. Prerequisite: two semesters of college calculus. Typically offered Spring.

STAT 35000 - Introduction To Statistics

Credit Hours: 3.00. A data-oriented introduction to the fundamental concepts and methods of applied statistics. Exploratory analysis of data. Sample design and experimental design. Probability distributions and simulation. Sampling distributions. The reasoning of statistical inference. Confidence intervals and tests for one and two samples. Inference for contingency tables, regression, and correlation. Introduction to regression with several explanatory variables. Essential use is made of statistical software throughout. Intended primarily for students majoring in the mathematical sciences. Credit cannot be given for more than one of STAT 30100, 30500, 35000, 43300, STAT 50100, STAT 50300, and STAT 51100. Prerequisite: two semesters of college calculus. Typically offered Fall Spring.

STAT 38600 - Cooperative Work Experience IV

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

STAT 39000 - Topics In Statistics For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading course or special topics course at the junior level for undergraduates are given under this number. Permission of instructor required. Typically offered Summer Fall Spring.

STAT 41600 - Probability

Credit Hours: 3.00. (MA 41600) An introduction to mathematical probability suitable as preparation for actuarial science, statistical theory, and mathematical modeling. General probability rules, conditional probability and Bayes theorem, discrete and continuous random variables, moments and moment generating functions, joint and conditional distributions, standard discrete and continuous distributions and their properties, law of large numbers and central limit theorem. Credit cannot be given for more than one of STAT 22500, STAT 31100, or 41600. Prerequisite: multivariate calculus. Typically offered Fall Spring.

STAT 41700 - Statistical Theory

Credit Hours: 3.00. An introduction to the mathematical theory of statistical inference, emphasizing inference for standard parametric families of distributions. Properties of estimators. Bayes and maximum likelihood estimation. Sufficient statistics. Properties of test of hypotheses. Most powerful and likelihood-ratio tests. Distribution theory for common statistics based on normal distributions. Typically offered Fall Spring.

STAT 42000 - Introduction To Time Series

Credit Hours: 3.00. An introduction to time series analysis suitable for actuarial science, engineering, and sciences. Model building and forecasting with ARMA and ARIMA models. Resampling methods for confidence intervals. Multivariate, state-space, and nonlinear models. Volatility models (ARCH and GARCH). Smoothing in time series. Typically offered Fall Spring.

STAT 47201 - Actuarial Models- Life Contingencies

Credit Hours: 4.00. Mathematical foundation of actuarial science, emphasizing probability models for life contingencies as the basis for analyzing life insurance and life annuities and determining premiums and reserves. This course provides the background for Course MLC of the Society of Actuaries and Course 3L of the Casualty Actuarial Society. Typically offered Fall.

STAT 47301 - Introduction To Arbitrage-Free Pricing Of Financial Derivatives

Credit Hours: 3.00. This course exposes students to a number of financial economics concepts related to arbitrage-free option pricing in the binomial market model and the Black-Scholes model. Specific models include: (1) Options and parity relationship between options (2) Option Pricing under the Binomial model (3) Option Pricing under the Black-Scholes model (4) Option hedging and the market maker's overnight profit (5) Black Scholes theory with Brownian motion and Ito calculus (6) Risk-neutral option pricing and Monte Carlo valuation (7) Stochastic interest rates and Stochastic Volatility. This course provides the background for Couse MFE of the Society of Actuaries and Course 3F of the Casualty Actuarial Society. Typically offered Fall Spring.

STAT 47800 - Introduction To Bioinformatics

Credit Hours: 3.00. (CS 47800 and BIOL 47800) Bioinformatics is broadly defined as the study of molecular biological information, targeting particularly the enormous volume of DNA sequence and functional complexity embedded in entire genomes. Topics will include understanding the evolutionary organization of genes (genomics), the structure and function of gene products (proteomics), and the dynamics of gene expression in biological processes (transcriptomics). Inherently, bioinformatics is interdisciplinary, melding various applications of computational science with biology. This jointly taught course introduces analytical methods from biology, statistics and computer science that are necessary for bioinformatics investigations. The course is intended for junior and senior undergraduates from various science backgrounds. Our objective is to develop the skills of both tool users and tool designers in this important new field of research. . Typically offered Fall.

STAT 47900 - Loss Models

Credit Hours: 3.00. This material provides an introduction to modeling and covers important actuarial methods that are useful in modeling. Students will be introduced to survival, severity, frequency and aggregate models, and use statistical methods to estimate parameters of such models given sample data. The student will further learn to identify steps in the modeling process, understand the underlying assumptions implicit in each family of models, recognize which assumptions are applicable in a given business application, and appropriately adjust the models for impact of insurance coverage modifications. The student will be introduced to a variety of tools for the calibration and evaluation of the models. Permission of instructor required. Typically offered Spring.

STAT 48700 - Cooperative Work Experience V

Credit Hours: 0.00. Cooperative Work Experience. Typically offered Fall Spring Summer.

STAT 49000 - Topics In Statistics For Undergraduates

Credit Hours: 1.00 to 5.00. Supervised reading course or special topics cousre at the senior level for undergraduates are given under this number. Permission of instructor required. Typically offered Fall Spring Summer.

STAT 50100 - Experimental Statistics I

Credit Hours: 3.00. Concepts and methods of applied statistics. Exploratory analysis of data. Sample design and experimental design. Normal distributions. Sampling distributions. Confidence intervals and tests of hypotheses for one and two samples. Inference for contingency tables, regression and correlation, and one-way analysis of variance. Use of the SAS statistical software. Intended primarily for students who have not had calculus. Not open to students in mathematical sciences or engineering. Credit cannot be given for more than one of STAT 30100, 30500, STAT 35000, 43300, 50100, STAT 50300, or STAT 51100. Prerequisite: College Algebra. Typically offered Summer Fall.

STAT 50200 - Experimental Statistics II

Credit Hours: 3.00. Regression with several explanatory variables. Regression diagnostics. Analysis of variance for factorial designs. Multiple comparisons. Analysis of covariance. Repeated measures designs. Extensive use of the SAS statistical software. Intended primarily for students who have not had calculus. Not open to students in mathematical sciences or engineering. Typically offered Summer Spring.

STAT 50300 - Statistical Methods For Biology

Credit Hours: 3.00. Introductory statistical methods, with emphasis on applications in biology. Topics include descriptive statistics, binomial and normal distributions, confidence interval estimation, hypothesis testing, analysis of variance, introduction to nonparametric testing, linear regression and correlation, goodness-of-fit tests, and contingency tables. Open only to majors related to the life sciences. Credit cannot be given for more than one of STAT 30100, 30500, STAT 35000, 43300, STAT 50100, 50300, or STAT 51100. Typically offered Fall Spring.

STAT 50600 - Statistical Programming And Data Management

Credit Hours: 3.00. Use of the SAS software system for managing statistical data. The SAS environment. Data description. Data access and management. SAS macro language and application development. Prerequisite: STAT 51200 and coursework in computer programming. Typically offered Fall.

STAT 51100 - Statistical Methods

Credit Hours: 3.00. Descriptive statistics; elementary probability; sampling distributions; inference, testing hypotheses, and estimation; normal, binomial, Poisson, hypergeometric distributions; one-way analysis of variance; contingency tables; regression. Credit cannot be given for more than one of STAT 30100, 30500, STAT 35000, 43300, STAT 50100, STAT 50300, or 51100. Prerequisite: Two semesters of college calculus. Typically offered Fall Spring.

STAT 51200 - Applied Regression Analysis

Credit Hours: 3.00. Inference in simple and multiple linear regression, residual analysis, transformations, polynomial regression, model building with real data, nonlinear regression. One-way and two-way analysis of variance, multiple comparisons, fixed and random factors, analysis of covariance. Use of existing statistical computer programs. Prerequisite: Coursework in Statistical Methods with a calculus prerequisite. Typically offered Fall Spring Summer.

STAT 51300 - Statistical Quality Control

Credit Hours: 3.00. A strong background in control charts including adaptations, acceptance sampling for attributes and variables data, standard acceptance plans, sequential analysis, statistics of combinations, moments and probability distributions, applications. Offered in alternate years. Typically offered Fall.

STAT 51400 - Design Of Experiments

Credit Hours: 3.00. Fundamentals, completely randomized design; randomized complete blocks; latin square; multi-classification; factorial; nested factorial; incomplete block and fractional replications for 2n, 3n, 2m x 3n; confounding; lattice designs; general mixed factorials; split plot; analysis of variance in regression models; optimum design. Use of existing statistical programs. Typically offered Fall Spring.

STAT 51500 - Statistical Consulting Problem

Credit Hours: 1.00 to 3.00. A written report of a consultation problem involving a designed experiment or sampling plan in which the student participates with members of the Department of Statistics staff. Permission of instructor required. Typically offered.

STAT 51600 - Basic Probability And Applications

Credit Hours: 3.00. A first course in probability, intended to serve as a background for statistics and other applications. Sample spaces and axioms of probability, discrete and continuous random variables, conditional probability and Bayes' theorem, joint and conditional probability distributions, expectations, moments and moment generating functions, law of large numbers, and central limit theorem. (The probability material in course one of the Society of Actuaries and the Casualty Actuarial Society is covered by this course.) Typically offered Fall Spring.

STAT 51700 - Statistical Inference

Credit Hours: 3.00. A basic course in statistical theory covering standard statistical methods and their application. Estimation

including unbiased, maximum likelihood and moment estimation; testing hypotheses for standard distributions and contingency tables; confidence intervals and regions; introduction to nonparametric tests and linear regression. Typically offered Fall Spring.

STAT 51900 - Introduction To Probability

Credit Hours: 3.00. (MA 51900) Algebra of sets, sample spaces, combinatorial problems, independence, random variables, distribution functions, moment generating functions, special continuous and discrete distributions, distribution of a function of a random variable, limit theorems. Typically offered Fall Spring.

STAT 52000 - Time Series And Applications

Credit Hours: 3.00. A first course in stationary time series with applications in engineering, economics, and physical sciences. Stationarity, autocovariance function and spectrum; integral representation of a stationary time series and interpretation; linear filtering, transfer functions; estimation of spectrum; multivariate time series. Use of computer programs for covariance and spectral estimation. Typically offered Spring.

STAT 52200 - Sampling And Survey Techniques

Credit Hours: 3.00. Survey designs; simple random, stratified, and systematic samples; systems of sampling; methods of estimation; costs. Offered in alternate years. Typically offered Spring.

STAT 52400 - Applied Multivariate Analysis

Credit Hours: 3.00. Extension of univariate tests in normal populations to the multivariate case, equality of covariance matrices, multivariate analysis of variance, discriminant analysis and misclassification errors, canonical correlation, principal components, factor analysis. Strong emphasis will be placed on use of existing computer programs. Typically offered Fall.

STAT 52500 - Intermediate Statistical Methodology

Credit Hours: 3.00. Statistical methods for analyzing data based on general/generalized linear models, including linear regression, analysis of variance (ANOVA), analysis of covariance (ANCOVA), random and mixed effects models, and logistic/loglinear regression models. Application of these methods to real world problems using SAS statistical software. Typically offered Fall Spring.

STAT 52600 - Advanced Statistical Methodology

Credit Hours: 3.00. As a sequel to STAT 52500, this course introduces some statistical modeling tools that are developed for situations where least squares regression and standard ANOVA techniques may not naturally apply. One coverage centers around two lines of models that are closely related, the generalized linear models (GLM) for regression (and ANOVA) with non Gaussian responses, and survival models for the analysis of lifetime data. Among issues to be discussed are the estimation of the models, the testing of hypotheses, and the checking of model adequacy. Data examples will be used throughout the course to illustrate the methodologies and the related software tools in R. Typically offered Fall Spring.

STAT 52800 - Introduction To Mathematical Statistics

Credit Hours: 3.00. Distribution of mean and s2 in normal samples, sampling distributions derived from the normal distribution, Chi square, t and F. Distribution of statistics based on ordered samples. Asymptotic sampling distributions. Introduction to multivariate normal distribution and linear models. Sufficient statistics, maximum likelihood, least squares, linear estimation, other methods of point estimation, and discussion of their properties, Cramer-Rao inequality and Rao-Blackwell theorem. Tests of statistical hypotheses, simple and composite hypotheses, likelihood ratio tests, power of tests. Typically offered Fall Spring.

STAT 52900 - Applied Decision Theory And Bayesian Statistics

Credit Hours: 3.00. Bayesian and decision theoretic formulation of problems; construction of utility functions and quantifications of prior information; methods of Bayesian decision and inference, with applications; empirical Bayes; combination of evidence; Bayesian design and sequential analysis; comparisons of statistical paradigms. Typically offered Summer.

STAT 53200 - Elements Of Stochastic Processes

Credit Hours: 3.00. (MA 53200) A basic course in stochastic models, including discrete and continuous time Markov chains and Brownian motion, as well as an introduction to topics such as Gaussian processes, queues, epidemic models, branching processes, renewal processes, replacement, and reliability problems. Typically offered Fall Spring.

STAT 53800 - Probability Theory I

Credit Hours: 3.00. (MA 53800) Mathematically rigorous, measure-theoretic introduction to probability spaces, random variables, expectation, independence, weak and strong laws of large numbers, conditional expectations, and martingales. Typically offered Spring.

STAT 53900 - Probability Theory II

Credit Hours: 3.00. (MA 53900) Convergence of probability laws; characteristic functions; convergence to the normal law; infinitely divisible and stable laws; Brownian motion and the invariance principle. Typically offered Fall.

STAT 54000 - Mathematics Of Finance

Credit Hours: 3.00. An introduction to the mathematical tools and techniques of modern finance theory, in the context of Black-Scholes option pricing. Brownian motion and its stochastic calculus, Ito's formula, and Feynman-Kac formula. Pricing and hedging of claims on Black-Scholes assets. Incomplete markets. Path-dependent options. Stochastic portfolio optimization. Typically offered Spring.

STAT 54100 - Advanced Probability And Options With Numerical Methods

Credit Hours: 3.00. Stochastic interest rate models. American options from the probabilistic and PDE points of view. Numerical methods for European and American options, including binomial, trinomial, and Monte-Carlo methods. Typically offered Fall.

STAT 54500 - Introduction To Computational Statistics

Credit Hours: 3.00. This introductory course covers the fundamentals of computing for statistics and data analysis. It starts with a brief overview of programming using a general purpose compiled language (C) and a statistics-oriented interpreted language (R). The course proceeds to cover data structures and algorithms that are directly relevant to statistics and data analysis and concludes with a computing-oriented introduction to selected statistical methods. A significant part of the course involves programming and hands-on experimentation demonstrating the covered techniques, ration, and Markov chain Monte Carlo methods. Typically offered Fall Spring.

STAT 54600 - Computational Statistics

Credit Hours: 3.00. The course focuses on two fundamental aspects in computational statistics: (1) what to compute and (2) how to compute. The first is covered with a brief review of advanced topics in statistical inference, including Fisher's fiducial inference, Bayesian and frequenstist methods, and the Dempster-Shafer (DS) Theory. The second is discussed in detail by examining exact, approximation, and interactive simulation methods for statistical inference with a variety of commonly used statistical models. The emphasis is on the EM-type and quasi-Newton algorithms, numerical differentiation and integration, and Markov chain Monte Carlo methods. Typically offered Spring Summer.

STAT 54900 - An Introduction To QTL Mapping In Experimental Populations

Credit Hours: 3.00. This is an introductory/interdisciplinary (master's level) quantitative trait locus (QTL) mapping course. QTL

mapping is associated with the statistical analysis of genetic/genomic data and is considered part of the general science known as bioinformatics. Typically offered Spring.

STAT 55300 - Theory Of Linear Models And Analysis Of Experimental Designs

Credit Hours: 3.00. Least squares analysis of linear models. Gauss Markov Theorem. Estimability and testability of parameters. Confidence regions and prediction regions. Introduction to design of experiments. Analysis of variance. Factorial and block designs. Analysis of random, fixed, and mixed models. Components of variance. Distribution of linear and quadratic forms in normal vectors. A firm background in matrix algebra and some previous exposure to linear models or analysis of variance is desirable. Typically offered Fall.

STAT 58000 - Application Of Statistical Theory

Credit Hours: 3.00. The use of numerical methods to obtain answers in problems arising in probability and statistics. Topics will include the use of the likelihood function, Bayesian and classical methods of estimation and testing, evaluation of probabilities, linear and nonlinear regression. STAT 53200, 55400, and some knowledge of computing and complex analysis are desirable. Typically offered Fall.

STAT 58100 - Bioinformatics Seminar

Credit Hours: 1.00. This is a weekly forum for presenting both applied and theoretical work in the broad area of bioinformatics. Bioinformatics is the science of generating, organizing, and analyzing biological data. This seminar series occurs both in the fall and spring semesters and attracts speakers from Purdue University, as well as throughout the world. Students are encouraged to register for this course, and everyone else is encouraged to attend this open seminar. Typically offered Fall Spring.

STAT 58200 - Statistical Consulting And Collaboration

Credit Hours: 3.00. This course is designed to emphasize and develop the skills needed by a statistical consultant/collaborator. Topics include: problem solving, consulting session management, written and oral communication, research ethics, design of experiments, collection of data, and application of statistical methods to real problems. Class activities include actively participating in consulting sessions held by the Statistical Consulting Service, small group projects, short papers, and oral presentations. Permission of instructor required. Typically offered Fall Spring Summer.

STAT 59000 - Internship Seminar

Credit Hours: 3.00. Students complete an internship where they will use statistical methods. A detailed report describing the internship work is required. Permission of instructor required. Typically offered Summer Fall Spring.

STAT 59700 - Statistical Consulting Seminar

Credit Hours: 1.00. Active participation in weekly consulting meetings, directed reading in the statistical literature, application of statistical methods to real problems, report writing. Permission of Instructor required. Typically offered Fall Spring Summer.

STAT 59800 - Topics In Statistical Methods

Credit Hours: 0.00 to 6.00 (West Lafayette, IUPUI) 1.00 to 3.00 (North Central) Directed study and reports for students who wish to undertake individual reading and study on approved topics. Permission of instructor required. Typically offered Fall Spring Summer.

STAT 63800 - Stochastic Processes I

Credit Hours: 3.00. (MA 63800) Advanced topics in probability theory which may include stationary processes, independent increment processes, Gaussian processes; martingales, Markov processes, ergodic theory. Prerequisite: STAT 53900. Typically offered Fall Spring.

STAT 63900 - Stochastic Processes II

Credit Hours: 3.00. (MA 63900) Continuation of STAT 63800. Typically offered Fall.

STAT 66700 - Measure-Theoretic Statistics: Decision Theoretic And Classical

Credit Hours: 3.00. Decision theoretic approach to statistical problems, complete class theorems, Bayes and minimax procedures, sequential decision problems, sufficiency, comparison of experiments, invariance; most stringent, similar, unbiased, likelihood ratio tests; efficiency, Cramer-Rao inequality, estimation analogues of good tests; confidence sets. Prerequisite: MA 57100, STAT 52800, STAT 53900, 57600. Typically offered Fall.

STAT 69000 - Seminar

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

STAT 69100 - Seminar In Probability Theory

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

STAT 69200 - Statistics Seminar

Credit Hours: 1.00. A colloquium or seminar course with discussion. Colloquium speakers present current technical results from statistics. A discussion follows in which the speaker and instructor take questions and explain issues in detail. Students give reports on lectures. Permission of department required. Typically offered Fall Spring.

STAT 69500 - Seminar In Mathematical Statistics

Credit Hours: 1.00 to 3.00. Topics vary. Permission of instructor required. Typically offered Fall Spring Summer.

STAT 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

STAT 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Technology

TECH 10000 - Technology Freshman Seminar

Credit Hours: 1.00. Technology Freshman Seminar. Typically offered Fall.

TECH 10100 - Women In Technology: Exploring The Possibilities

Credit Hours: 1.00. An in-depth view of the emerging role of women in technology. Presentations by career professionals and faculty in a variety of technology disciplines will increase familiarity with the diversity of programs within the school. Academic and interpersonal skills and strategies needed to succeed in technology careers, and issues such as balancing work and family, will be addressed. Typically offered Fall.

TECH 10500 - Introduction To Engineering Technology

Credit Hours: 3.00. Introduction to the different disciplines incorporated in engineering technology as well as the skill set needed to be a successful student in engineering technology. Focus will be on individual and professional development, problem identification, developing analytical skills, time and resource management, project planning, design, implementation and evaluation, and oral and written communication in the engineering technology profession. Typically offered Fall Spring Summer.

TECH 11000 - Freshman Honors Seminar

Credit Hours: 1.00. A first-year honors seminar designed to inform and challenge technology students. Discussion will include a broad range of technology and intellectual issues. By invitation or permission of the instructor. Permission of instructor required. Typically offered Fall Spring.

TECH 12000 - Design Thinking In Technology

Credit Hours: 3.00. Student will engage in critical analysis of real-world problems and global challenges. They will demonstrate the ability to recognize opportunity and to take initiative in developing solutions applying the principles of human centered design. Students will be able to communicate effectively and to work well on teams. Problems and solutions will be examined from societal, cultural, and ethical perspectives. Typically offered Fall Spring Summer.

TECH 19900 - Special Topics In Technology

Credit Hours: 1.00 to 3.00. Special topics in Technology; subject matter to be arranged. Typically offered Summer Fall Spring.

TECH 29199 - Professional Practice Extensive Co-Op I

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 29299 - Professional Practice Extensive Co-Op II

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 29900 - Special Topics In Technology II

Credit Hours: 1.00 to 3.00. Hours, subject matter, and credit to be arranged by faculty. Group instruction in new or specialty areas of technology provided by Technology faculty. Typically offered Fall Spring Summer.

TECH 32000 - Technology And The Organization

Credit Hours: 3.00. A course intended to provide students with experiences mirroring what they will encounter in the world of work. Students will participate in interdisciplinary teams to explore technology solutions. Course topics include public policy, regulatory and ethical issues, teaming and leadership, and project management. Permission of department required. Typically offered Fall Spring Summer.

TECH 33000 - Technology And The Global Society

Credit Hours: 3.00. The course examines the interplay of technology, globalization, and ethics. Students will explore concepts and issues related to outsourcing; global competitiveness; communications; contemporary issues; cultural differences such as inequality, security, sustainability, and quality of life; and the ethical dilemmas that often emerge as a result of the impact of technology. Typically offered Fall Spring Summer.

TECH 38199 - Professional Practice Co-Op I

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 38299 - Professional Practice Co-Op II

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 38399 - Professional Practice Co-Op III

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 39399 - Professional Practice Extensive Co-Op III

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 39499 - Professional Practice Extensive Co-Op IV

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 39599 - Professional Practice Extensive Co-Op V

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 39699 - Professional Practice Internship

Credit Hours: 0.00 to 3.00. Professional practice with qualified employers within industry, government, or small business. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 39900 - Special Topics In Technology III

Credit Hours: 1.00 to 3.00. Hours, subject matter, and credit to be arranged by faculty. Group instruction in new or specialty areas of technology provided by technology faculty. Typically offered Fall Spring Summer.

TECH 40000 - Technology Study Abroad

Credit Hours: 1.00 to 8.00. This course is utilized to record credits earned through participation in Purdue study abroad programs. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 49600 - Senior Design Project Proposal

Credit Hours: 1.00. Capstone problem identification and solution design course demonstrating synthesis of technical, professional, and general knowledge for senior engineering technology students. Proposal presentation is required. Typically offered Fall Spring Summer.

TECH 49700 - Senior Design Project

Credit Hours: 2.00. Teams will develop innovative solutions based on proposal outcomes in TECH 49600 for current issues in the engineering technology profession, workplace, or community. Project deliverable, presentation, and written report are required. Typically offered Fall Spring Summer.

TECH 49900 - Special Topics In Technology IV

Credit Hours: 1.00 to 3.00. Hours, subject matter, and credit to be arranged by faculty. Group instruction in new or specialty areas of technology provided by technology faculty. Typically offered Fall Spring Summer.

TECH 52200 - Sustainability Foundations

Credit Hours: 3.00. Emphasis is placed on definitions of sustainability for corporate, governmental and non-governmental organizations, as well as the frameworks used for developing and implementing sustainability programs. Areas of emphasis in environmental, economic, social, and energy sustainability are explored along with policy and regulations that apply to decision-making. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 52300 - Sustainable Critical Infrastructures

Credit Hours: 3.00. This is an applied sustainability course that explores critical infrastructures needed for sustainability efforts, and explores several industrial segments in-depth including supply chain and energy. Frameworks for evaluating benefits versus risks will be introduced as well as metrics for evaluating. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 52400 - Sustainability Analysis Assessment

Credit Hours: 3.00. Applied research project where students conduct a sustainability project under instructor guidance. Emphasis is on new developments relating to technical and operational aspects of sustainability as it applied in industry using triple bottom line evaluations. This course emphasizes a holistic approach to sustainability that includes environmental, economic, and social aspects as well as the impact of policy, standards and regulations on decision-making for sustainability. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 58100 - Workshop In Technology

Credit Hours: 0.00 to 8.00. Advanced study of technical and professional topics. Emphasis is on new developments relating to technical, operational, and training aspects of industry and technology education. Typically offered Fall Spring Summer.

TECH 60100 - Research Seminar In Technology

Credit Hours: 1.00. This course provides an introduction to the field and scholarship of Technology and the skills necessary for success. Prerequisite: Doctoral student standing. Typically offered Fall Spring.

TECH 60200 - Seminar In Technology And Society

Credit Hours: 1.00. This course focuses on relevant issues and challenges facing professionals in technology-related careers. Topics may include, but are not limited to: ethics, legal issues, public policy, defining technology, and technology and society. Prerequisite: Doctoral student standing. Typically offered Fall Spring.

TECH 62100 - Seminar In Technology

Credit Hours: 1.00 to 3.00. Current problems in Technology. Typically offered Fall Spring Summer.

TECH 63700 - Research Focus: The Social Internet

Credit Hours: 3.00. TECH 63700 simulates an interdisciplinary think tank environment where students identify research questions and examine the impact of social media and social networking technologies on various aspects of society, business, culture, communication, web experience, and interface design. The course integrates immersion in social media with consideration of several theoretical perspectives from diverse fields. Students complete an original research project customized to fit individual or team interests. The course encourages theoretical and methodological diversity. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 64100 - Advanced Analytics For Research And Industry

Credit Hours: 3.00. Offers students training and experience in advanced parametric statistical techniques in both research and industrial applications. While statistical theory necessary to properly conduct analyses will be discussed, this course focuses on practical applications of analysis strategies, including issues in handling data from organizations and industry settings. Material includes overview and implementation of relevant statistical software applications. Practical skills in presenting advanced analyses to both professional and scientific audiences is a key component of the course. Prerequisites: IT 50700 or STAT 50100. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 64600 - Analysis Of Research In Industry And Technology

Credit Hours: 3.00. Analysis of research and evaluation of research reports. Emphasis on understanding the application of fundamental statistical methods in design and interpretation of research findings in industrial, technical, and human resource development environments. Prerequisite: Master's student standing. Typically offered Fall Spring Summer.

TECH 69000 - Independent Study In Technology

Credit Hours: 1.00 to 6.00. Intensive individual study of selected current developments and issues in technology. A faculty sponsor is required for this course. Prerequisite: Doctoral student standing. Permission of instructor required. Typically offered Summer Fall Spring.

TECH 69500 - Graduate Professional Practice

Credit Hours: 0.00. Advanced professional experience in Technology. The experience is coordinated by the major professor with cooperation of a participating employer. Students submit a summary report. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 69700 - Qualitative Research Methods In Technology Studies

Credit Hours: 3.00. In-depth examination of qualitative methods and frameworks used in technology research. Students learn by application a variety of methods from the qualitative research toolbox such as interviewing, focus groups, observation, and experience analysis. TECH 69700 prepares students to plan, pilot, and assess an original qualitative research study and to integrate qualitative research findings in the technology design and evaluation process. Permission of instructor required. Typically offered Fall Spring Summer.

TECH 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

Technology Leadership and Innovation

TLI 11100 - Gateway To Technology Systems And Leadership

Credit Hours: 3.00. This course serves as an introduction to the Technology Systems and Leadership (TSL) program. Students study the interface between technology and people, while developing strategies to lead, innovate, and solve problems in a technology-rich, systems environment. Concepts of globalization, ethical practices, and life-long learning are also explored. Typically offered Fall Spring Summer.

TLI 11200 - Foundations Of Technology Leadership

Credit Hours: 3.00. A survey of individual and organizational behavioral concepts and principles that provide a foundation for leadership in technology organizations. The focus will be toward the understanding of behaviors necessary for effective technology leadership, including concepts of work in a technology-rich environment. Typically offered Fall Spring Summer.

TLI 21300 - Project Management

Credit Hours: 3.00. Project management is an ad hoc technique for accomplishing specialized missions or work. Examples of projects include research and development studies, consulting projects, reorganizations efforts, implementation of total quality management, installation of new equipment, advertising campaigns, construction or other one-time efforts. This course will provide a leadership approach to project management, including team development and team selection. Typically offered Fall Spring Summer.

TLI 21400 - Introduction To Supply Chain Managemet Technology

Credit Hours: 3.00. This course is an introduction to supply chain management technology. Topics include supply chain functions including how to organize a supply chain, supply chain strategy, supply chain process mapping, and use of supply chain technologies, analysis, and performance measurements. Typically offered Fall Spring Summer.

TLI 23500 - Introduction To Lean And Sustainable Systems

Credit Hours: 3.00. This course provides the foundation for technology systems processes and practices. The content covers the discussion of current systems issues, basic systems technology processes, and the role of systems engineering professionals in a global business environment. Topics include basic principles of systems thinking, the concepts of performance and cost measures, alternative design concepts, lean processes, and sustainable life-cycle management. Typically offered Fall Spring Summer.

TLI 25300 - Principles Of Technology Strategy

Credit Hours: 3.00. This course explores technological strategy and the innovation process from an organizational perspective. The evolutionary path of technologies is dependent upon a variety of factors that when understood can lead to sound technology leadership practices. These factors include innovative organizational processes, economic enablers, and public policies. Students will explore these factors and their interrelationships with attention to how they contribute to practices such as technological evaluation, assessment, planning, strategy, and forecasting. Typically offered Fall Spring Summer.

TLI 25400 - Leading Change In Technology Organizations

Credit Hours: 3.00. This course provides a framework for creating, monitoring, and leading change within technology-rich organizations. Students will learn how to be change consultants, diagnose organizational problems, identify and implement change interventions at various outcome levels (i.e. individual, group, process, and the organization as a whole), and evaluate the success of change efforts. Typically offered Fall Spring Summer.

TLI 29900 - Special Topics In Technology Leadership & Innovation

Credit Hours: 1.0 to 3.00. Hours, subject matter, and credit to be arranged by faulty. Group instruction in new or specialty areas of Technology Leadership and Innovation is provided by Technology faculty, subject to TLI curriculum committee approval. Typically offered Fall Spring Summer.

TLI 31300 - Technology Innovation And Integration: Bar Codes To Biometrics

Credit Hours: 3.00. This course provides the foundation for automatically capturing data in a system. The content covers an introduction to technology used in automatic identification and data capture systems, including: bar codes; radio frequency identification; smart cards, and biometrics. Topics also include an immersive semester project that examines the integration of these technologies, as well as advanced problem solving. Typically offered Fall Spring Summer.

TLI 31400 - Leading Innovation In Organizations

Credit Hours: 3.00. This course provides the foundation for understanding the manner in which companies capture innovation and use it to set themselves apart from competitors. Topics covered include the attributes of organizations that are successful in fostering a culture of innovation; the characteristics and roles of leaders and members in innovative organizations; managerial processes and organizational systems that facilitate the successful development, commercialization, and adoption of innovative technologies, products, and services; and methods used to measure innovation-related outcomes. Typically offered Fall Spring Summer.

TLI 31500 - Innovative Product Development And Testing

Credit Hours: 3.00. This course introduces the process of technological innovation and new product development from concept to commercialization. Topics covered include ideation, R&D, prototyping (design and modeling), testing for quality, the patent process, intellectual property rights, marketing and cost evaluation. Typically offered Fall Spring Summer.

TLI 31600 - Statistical Quality Control

Credit Hours: 3.00. This course introduces the application of statistical and probability tools to develop, implement, and maintain effective quality assurance in technology and service systems. A systems approach to product or service quality from inception to disposal is employed. Factors affecting variation in quality are studied. The concepts and implications of quality from a global business environment are examined. Typically offered Fall Spring Summer.

TLI 33400 - Economic Analysis For Technology Systems

Credit Hours: 3.00. This course examines techniques of economic analysis for systems technologists, engineers, and leaders who evaluate and determine the financial attractiveness of multiple alternatives. Emphasizes economic feasibility and applying time value of money concepts to cost-volume-profit decisions. Topics include present worth, rate of return, benefit-cost, payback, breakeven analysis, depreciation, economic optimization, and decision-making under uncertainty. Typically offered Fall Spring Summer.

TLI 33520 - Human Factors For Technology Systems

Credit Hours: 3.00. This course provides the foundation for examining the intersection of people, technology, policy, and work across technology systems. Topics include the evaluation, analysis, and design recommendations for improving the safety and efficiency of human-technology interactions. Typically offered Fall Spring Summer.

TLI 33610 - Risk Analysis And Assessment

Credit Hours: 3.00. This course introduces the tools for identifying and analyzing inherent risks associated with the decision making process. The challenges of quantitative risk assessment are introduced using decision trees, influence diagrams, and probability models. The concepts of risk index, options, avoidance, prevention, and reduction are discussed in the context of technology systems. Typically offered Fall Spring Summer.

TLI 33620 - Total Productive Maintenance

Credit Hours: 3.00. This course emphasizes the importance of effective maintenance planning and execution for efficient and economical operation of service or technology systems. A systems approach to maintenance planning is taken. Maintenance activities are discussed from reliability and productivity perspectives in the context of technology systems. Semester-long, team based research project is typically required. Typically offered Fall Spring Summer.

TLI 34200 - Warehouse And Inventory Management

Credit Hours: 3.00. A course designed to develop understanding of types of warehouses, methods of organizing the warehouse environment, and determining efficient inventory control procedures. Technology applications related to the management of warehouse and inventory stock keeping units (SKU) are investigated. Storage of inventory, placement of inventory, picking, packing, shipping, and other internal logistics management topics will be explored. Typically offered Fall Spring Summer.

TLI 34250 - Purchasing And Contract Management

Credit Hours: 3.00. This course examines the processes by which goods and services are acquired through purchasing and contract management. Topics include procurement, contract strategies, source selection, identifying contract type, product liability and risk, the bid process and response evaluation; contract risk assessment, contract negotiation, and contract law. Typically offered Fall Spring Summer.

TLI 34300 - Technical And Service Selling

Credit Hours: 3.00. A study of sales models and techniques for technical and service sales in business to business environments, including development of channel relationships, long-term sales agreements, customer relationship management efforts, total cost of ownership tools and complex sales presentations. Covers critical sales skills such as e-economy sales and marketing, lead management, building credibility, consultative selling, ethical negotiations, and sustainable product management. Typically offered Fall Spring Summer.

TLI 34350 - Business To Business Sales Management

Credit Hours: 3.00. This course covers key topics in sales management while emphasizing customer relationship management, sales productivity, and the effects of technology on the sales function. Topics include analyzing multiple channel models; establishing sales plans; incentivizing and motivating the sales force; and evaluating, monitoring, and managing the effectiveness of the sales force. Typically offered Fall Spring Summer.

TLI 35600 - Global Technology Leadership

Credit Hours: 3.00. This course examines leadership of high-tech organizations across cultures and national boundaries. Topics covered may include forging strategic alliances, negotiating contracts, meeting ISO requirements, managing a multinational workforce, identifying emerging markets, and driving innovation. Typically offered Fall Spring Summer.

TLI 41400 - Financial Analysis For Technology Systems

Credit Hours: 3.00. The course provides students with financial tools needed by managers in technical and service fields. Topics include financial statement analysis, using common-sized statements and financial ratios; the strategic profit model; total cost of ownership; pricing for profitability; margin management; cash flow cycles; and budgeting. A corporate financial analysis project is typically required. Typically offered Fall Spring Summer.

TLI 43530 - Operations Planning And Management

Credit Hours: 3.00. A study of enterprise operations and management, demand forecasting, capacity analysis, research and development, production, personnel, and sales. Examples of the procedures necessary to provide a product or service are included. The course focuses on the tools necessary to solve problems, such as decision analysis, linear programming, transportation modeling, enterprise resource planning (ERP) systems, and forecasting models. Field trips may be required and industry-sponsored research projects are typically completed. Typically offered Fall Spring Summer.

TLI 43540 - Facilities Planning And Material Handling

Credit Hours: 3.00. This course takes a systematic approach to design of facilities and material handling systems for effective and lean production of goods and services. An array of qualitative and quantitative tools and techniques are introduced and utilized, emphasizing lean principles, waste reduction, and overall efficiency of operations. Flow analysis and optimization tools, including computer simulation, are introduced. Strong emphasis is placed on a comprehensive semester-long team project as an integral component of this course. Typically offered Fall Spring Summer.

TLI 43630 - Design Of Experiments

Credit Hours: 3.00. Introduction to statistical design of experiments. The course examines the difference between single, multivariate, and factorial experimental designs. Concepts of optimization and response surface methodologies are introduced. The course focuses on interpreting and communicating experimental results. Typically offered Fall Spring Summer.

TLI 43640 - Lean Six Sigma

Credit Hours: 3.00. A study of the Lean Six Sigma quality and process improvement methodology, using the define, measure, analyze, improve, and control (DMAIC) process. The course addresses advanced topics in statistical quality; introduces quality management concepts as they pertain to the Lean Six Sigma methodology; and provides preparation for the Green Belt Certification exam. Typically offered Fall Spring Summer.

TLI 44275 - Global Transportation And Logistics Management

Credit Hours: 3.00. A study of the various aspects of logistics. The development, implementation, and control of physical transportation systems, product distribution, warehousing, and inventory policy models will be emphasized. A working knowledge of third and fourth party logistics and transportation strategies will be analyzed. The impact of logistics and transportation in the global environment will be discussed. Typically offered Fall Spring Summer.

TLI 45700 - Technology Policy And Law

Credit Hours: 3.00. This course provides a foundation of understanding the broad impact of technology policies and laws on organizational performance, innovation, corporate accountability, and sustainability. Topics include corporate social responsibility, employment and contract law, intellectual property, e-commerce, and environmental and global challenges. Typically offered Fall Spring Summer.

TLI 45800 - Leadership For Competitive Advantage

Credit Hours: 3.00. Organizations who consistently outperform competitors realize bottom-line impact through efficient leveraging of organizational strategy, leadership, internal and external talent acquisition, organizational culture, and marketing strategies. This course will explore the relationships between these areas and introduce organizational tools and concepts to enable the student to recognize and build capacity for sustainable competitive advantage in technology organizations. Typically offered Fall Spring Summer.

TLI 48390 - Technology Systems Capstone I - Design

Credit Hours: 3.00. This course takes an integrative approach to technology systems design. Product development and facilities

planning, incorporating lean production of goods and services will serve as organizing themes. An array of qualitative and quantitative tools and techniques are used, emphasizing lean principles, waste reduction, and overall efficiency of operations. Flow analysis and optimization tools, including computer simulation, are introduced. Strong emphasis is placed on a comprehensive semester-long team project, integrating previous technology systems course concepts. Typically offered Fall Spring Summer.

TLI 48395 - Technology Systems Capstone II - Evaluate

Credit Hours: 1.00. This course takes an evaluative approach to existing product and facility design proposals. The emphasis is on critically assessing, proposing alternative solutions or refinements, and making a final recommendation with supporting justification. Typically offered Fall Spring Summer.

TLI 48490 - Supply Chain Management Technology Capstone - Strategic Analytics

Credit Hours: 3.00. This is an integrative course that focuses on formulating, implementing, and evaluating corporate strategy, using analytics to make decisions to chart the future direction of the organization. Emphasizes applying the strategic planning model for making and justifying decisions. Typically offered Fall Spring Summer.

TLI 48590 - Technology Leadership Capstone

Credit Hours: 3.00. This course will provide the synthesis between each student's technology focus area and technology leadership. Students will apply advanced leadership knowledge and skills to technology-based problems while working in diverse teams. Topics include team leadership, integration of technologies to develop innovative solutions, and project management. Permission of Department required. Typically offered Fall Spring Summer.

TLI 49900 - Special Topics In Technology Leadership & Innovation

Credit Hours: 1.0 to 3.00. Hours, subject matter, and credit to be arranged by faulty. Group instruction in new or specialty areas of Technology Leadership and Innovation is provided by Technology faculty, subject to TLI curriculum committee approval. Typically offered Fall Spring Summer.

TLI 52100 - Drug Development

Credit Hours: 3.00. A review of drug discovery and drug development, with emphasis on the regulatory aspects of these activities. Animal preclinical research and human clinical research are discussed in detail. In addition, the process for the assembly of an IND and NDA is discussed along with the Phases (I,II,III) of human clinical trials. The CMC (chemistry manufacturing and control) aspects of drug development are presented along with ICH documents and manufacturing process

analytical technologies. The course concludes with a brief review of international regulatory issues and patents. Typically offered Summer Fall Spring.

TLI 52200 - Good Regulatory Practice

Credit Hours: 3.00. Includes a review of the FDA and ICH regulations on good manufacturing, good laboratory, and good clinical practices. The meaning of these regulations, the globalization of practices, and the roles and responsibilities of various professionals implementing these regulations are addressed. Special emphasis will be detailed coverage of the process for the assembly and submission of an IND or NDA, and the function of the regulatory affairs department in a pharmaceutical company. Typically offered Summer Fall Spring.

TLI 52300 - Quality Management, Audits And Inspections

Credit Hours: 3.00. This course provides advanced topics in quality management and business improvement methods that apply to the pharmaceutical industry. Emphasis will be placed on specific issues of industry, audits, and inspections, as well as the successful selection and presentation of business and quality improvement projects to produce compliance and competitive advantage. Typically offered Fall Spring Summer.

TLI 52400 - The Documents And Dialogues Of Drug Delivery And Registration

Credit Hours: 3.00. This capstone advanced course will integrate previous learning relating to laws and regulations, quality principles and practices, and the preparation and submission of documents for preclinical research clinical trials and new drug approvals. Special topic lectures will be given. Considerable time will be devoted to preparing regulatory documents and conducting "mock" dialogues and negotiations with "pretend" agency officials. Typically offered Fall Spring Summer.

TLI 52500 - Molecular Basis Of Manufacturing Pharmaceuticals

Credit Hours: 3.00. This advanced course addresses important Chemistry Manufacturing and Control (CMC) issues related to process analytical technology. The course provides important information on strategies for monitoring processes on-line, the best approaches to analyzing data, how the data can be used to find process critical control points, and strategies for reporting the data to the FDA. The course may include laboratory exercises, laboratory tours, and/or workshops outlining how to interpret the data. Typically offered Fall Spring.

TLI 53410 - Implementation And Advanced Topics Of Enterprise Six Sigma

Credit Hours: 3.00. This course is designed to expose master's and doctoral students to the theory behind implementation of Six Sigma at the Enterprise level. Students will develop their own research with regard to the future of the discipline through

particular assessments. Topics include structure and methodology of Six Sigma deployment, including: systems thinking, change management, business process management, competitive intelligence through international standards, and the future of the discipline. Students will learn the methodology of Six Sigma at the project level for technical skill building in addition to practices of implementing and managing Six Sigma at an organizational level. Permission of Instructor required. Typically offered Fall Spring Summer.

TLI 62600 - Life Of A Faculty Entrepreneur: Discovery, Delivery, Translation

Credit Hours: 3.00. The course is designed to introduce graduate students and faculty mentors to the intellectual, financial, and management processes associated with translating research into tangible products through university initiated, early-stage commercialization (start-up) activities. Lectures will present case studies of technologies and pathways to commercialization. Guest speakers will illustrate the start-up process through real-world experience, and will also address approaches for managing entrepreneurial activities, intellectual property and conflicts of interest in a university environment. No course prerequisites, however students should be involved in research with commercial implications. Permission of Instructor required. Typically offered Fall Spring Summer.

Theatre

THTR 13300 - Survey Of Acting

Credit Hours: 3.00. For non-theatre majors. Training and exercise in the basic elements of acting and the use of the stage. Study of historical and theoretical backgrounds of acting and of different types of plays and staging. Typically offered Fall Spring. CTL:IFA 1301 Introduction To Acting

THTR 15001 - Introduction To Drafting

Credit Hours: 1.00. An introduction to hand and computer-aided drafting techniques for theatre and live entertainment. Permission of Instructor required. Typically offered Fall.

THTR 15002 - Introduction To Scenery Construction Tools And Techniques

Credit Hours: 1.00. An introduction to common tools, techniques, and practices in scenery production for theatre and live entertainment. Permission of Instructor required. Typically offered Fall.

THTR 15003 - Introduction To Rigging For Theatre

Credit Hours: 1.00. An introduction to rigging techniques and equipment for theatre and live entertainment. Permission of Instructor required. Typically offered Fall.

THTR 16000 - Introduction To Scene Design And Technology

Credit Hours: 2.00. This course is designed to introduce the students to the process and tools of scene design and technology. Typically offered Fall Spring.

THTR 16100 - Introduction To Costume Design And Technology

Credit Hours: 2.00. Introduction to analytical, artistic, and practical skills required when creating costumes for theatre. Beginning training in elements and principles of design, rendering and presentation skills. Elementary instruction in costume construction, including hand and machine sewing, costume crafts, and basic patterning. Typically offered Fall Spring.

THTR 16200 - Introduction To Light Design And Technology

Credit Hours: 2.00. A course that introduces the student to the basic equipment and design process of stage lighting design. Typically offered Fall Spring.

THTR 16300 - Introduction To Sound Design And Technology

Credit Hours: 2.00. Introduction to theatre sound design and technology for general theatre students. Involvement in Division of Theatre production program. Typically offered Fall Spring.

THTR 16400 - Introduction To Theatre Organization And Management

Credit Hours: 2.00. A theoretical study of performing arts management and backstage operations from audition through performance. Techniques of scheduling, production management, stage management, technical direction, house management, safety issues, and emergency procedures. Typically offered Fall Spring.

THTR 20100 - Theatre Appreciation

Credit Hours: 3.00. Understanding and appreciation of the theatre's role in the modern world, dramatic structure and analysis, the

actor, director, designer, and critic; attendance at current stage productions; class discussion of production elements. Typically offered Summer Fall Spring. CTL:IFA 1302 Theatre Appreciation

THTR 21300 - Voice For The Actor

Credit Hours: 2.00. Designed to heighten the actor's awareness of the vocal instrument. Elementary vocal techniques will be practiced to expand the student's vocal flexibility and range. Emphasis on freeing habitual vocal tensions and teaching the student the fundamentals of vocal health. Typically offered Fall.

THTR 23300 - Acting I: Acting Technique

Credit Hours: 3.00. Beginning training and exercises in the basic elements of acting, including vocal and physical preparation, sensory awareness, releasing the imagination and a basic understanding of action and objective. Staging exercises and terminology are emphasized. Permission of instructor required. Typically offered Spring.

THTR 23500 - Vocal/Physical Preparation

Credit Hours: 2.00. Vocal/Physical Preparation is designed to increase and deepen student's physical awareness, develop physical and vocal stamina, flexibility and strength, modify habitual modes of expression, expand vocal and physical range, and increase students¿ ability to respond expressively. Typically offered Fall Spring.

THTR 25300 - Survey Of Audio Production

Credit Hours: 3.00. An introduction to theories and techniques of audio production. Typically offered Fall.

THTR 25400 - Drafting For Theatre

Credit Hours: 3.00. Projects course in drafting for the theatre using graphic standards and presentations techniques accepted in the performing arts industry. Typically offered Fall.

THTR 25600 - Stage Make-Up

Credit Hours: 2.00. Study of facial anatomy, the aging process, the principles of light and shadow, and character analysis. Theory and practice in the basic techniques of applying stage makeup. Typically offered Fall Spring.

THTR 26300 - Introduction To Sound Studios

Credit Hours: 3.00. An introduction to theories and techniques of audio production. Typically offered Fall Spring.

THTR 26400 - Rendering Techniques

Credit Hours: 3.00. A project approach to the development of the student's ability to pictorially represent ideas through drawing, drafting, painting, etc. Emphasis on clarity of intention and effective presentation of ideas through various media and techniques. Majors have priority. Offered in alternate years. Typically offered Spring.

THTR 27000 - Theatrical Materials And Techniques I

Credit Hours: 3.00. An introduction to traditional scenery construction materials and techniques; rigging techniques and concepts, and scenery construction equipment and technology. Permission of instructor required. Typically offered Spring.

THTR 29000 - Special Topics In Theatre

Credit Hours: 1.00 to 3.00. Topics will vary. Typically offered Fall Spring.

THTR 32300 - Acting: Movement For The Actor

Credit Hours: 3.00. Designed to heighten body awareness in movement and stillness. Characterization techniques will be practiced that expand the student's flexibility, aerobic capacity, strength, agility, and range of self-expression. Emphasis on freeing habitual tension patterns through the exploration of expressive movement. Typically offered Fall.

THTR 33300 - Acting II: Scene Study

Credit Hours: 3.00. Continued development of the basic acting tools of objectives, actions, justification, personalization; continued vocal and physical work; introduction of script and character analysis; and the introduction of audition techniques. The course will use material from contemporary dramatic literature in the rehearsal process. Typically offered Fall Spring.

THTR 33400 - Acting III: Acting For The Camera

Credit Hours: 3.00. Continued development of acting technique, as it relates to challenges unique to acting on film, television and commercials. Students will develop an effective process for on-camera performance. Class exercises/presentations are recorded, viewed and critiqued by the students and the instructor. Typically offered Fall Spring.

THTR 33600 - Rehearsal And Performance II

Credit Hours: 1.00 or 2.00. The study and practice of rehearsal techniques and stage performance. Students will be assigned to acting and stage management duties in experimental and major stage productions. Permission of instructor required. Typically offered Fall Spring.

THTR 35300 - Theater Audio Techniques I

Credit Hours: 3.00. Offered 2002-2003 and alternate years. A theoretical and practical study of the technical aspects of audio as they relate to theatre. The course will include specifications, layout and installation techniques, operation, and maintenance of theatre sound systems, etc. Majors have priority. Typically offered Fall.

THTR 35400 - Painting For The Stage

Credit Hours: 3.00. Offered in 2001-2002 and alternate years. The principles and practice of painting for the stage. Study of tools, media, and techniques used in traditional scenic painting, costume painting, and the creation of dimensionality on various surfaces. Typically offered Fall.

THTR 36000 - Scenic Design

Credit Hours: 3.00. Offered in 2000-2001 and alternate years. Project course in utilizing the principles of design as they can be formed into an environment for dramatic action. Emphasis on the interrelationship among all aspects of production and how the scenic element becomes a building block toward total picturization. Typically offered Fall.

THTR 36100 - Costume Design

Credit Hours: 3.00. Offered in alternate years. Theory and principles of design specifically applied to stage costume design. Emphasis on the interrelationship of all aspects of production and how the costume becomes a building block toward total picturization. Typically offered Fall.

THTR 36200 - Light Design

Credit Hours: 3.00. A project course in utilizing the principles of design as they can convey an environment and its qualities to further dramatic action. Emphasis on the interrelationship among all aspects of production and how light becomes a building block toward total picturization. Offered in alternate years. Typically offered Spring.

THTR 36300 - Sound Design

Credit Hours: 3.00. Offered in 2001-2002 and alternate years. Project course in utilizing the principles of design as they can be formed into auditory response and environment. Emphasis on the interrelationship among all aspects of production and how sound becomes a building block toward total picturization. Majors have priority. Typically offered Fall.

THTR 36800 - Theatre Production II

Credit Hours: 1.00 or 2.00. The study and application of theatre practices. Students will be assigned to all levels of departmental production of applied practice. Permission of instructor required. Typically offered Fall Spring.

THTR 38000 - History Of Theatre I

Credit Hours: 3.00. Theatre history from origins through 1700, with special attention to significant plays and playwrights and the physical development of the theatre. Typically offered Spring.

THTR 38100 - History Of Theatre II

Credit Hours: 3.00. Theatre history from 18th to 21st century with special attention to significant plays and playwrights and the physical development of the theatre. Typically offered Spring.

THTR 39000 - Directed Study Of Special Theatre Problems

Credit Hours: 1.00 to 3.00. An undergraduate level, individualized, and intensive study of any aspect of theatre required by the student's plan of study. Permission of instructor required. Typically offered Fall Spring Summer.

THTR 41300 - Advanced Voice For The Stage

Credit Hours: 3.00. Advanced work in vocal production for performance. Emphasis on development of the full resonant voice, vocal power and range, and standard American speech. Special attention paid to application of knowledge to various performance situations and environments. Typically offered Spring.

THTR 43300 - Acting IV: Acting Shakespeare

Credit Hours: 3.00. Continued development of acting and audition techniques, advancing to the demands of Shakespeare, verse drama and/or period styles work, including textual analysis and/or historical research. Typically offered Fall Spring.

THTR 43400 - Advanced Acting Skills

Credit Hours: 3.00. A specially designed class for the advanced undergraduate actor. Areas of study may include period/ style acting; verse performance; mask work; advanced characterization; and audition techniques. Typically offered Fall Spring.

THTR 44000 - Directing: Page To Stage

Credit Hours: 3.00. This course focuses on theoretical and practical understanding of the essential principles and fundamentals of directing for the stage. Students will learn a proven directorial methodology and engage in essential research and written and practical presentations throughout. Permission of instructor required. Typically offered Fall Spring.

THTR 45800 - Problems In Theatre Technology

Credit Hours: 1.00 to 3.00. A tutorial in technical theatre. Available for students who wish to do more extensive work in theatre technology. Permission of instructor required. Typically offered Fall Spring.

THTR 46800 - Problems In Theatre Design

Credit Hours: 1.00 to 3.00. A tutorial in theatre design. Available for students who wish to do more extensive work in the design aspects of production. Permission of instructor required. Typically offered Fall Spring.

THTR 49000 - Special Topics In Theatre

Credit Hours: 1.00 to 3.00. Topics will vary. Typically offered Summer Fall Spring.

THTR 51000 - Stage Dialects

Credit Hours: 2.00. A study of the actor's use of dialects. Learning dialects and their practical use through scene study. Offered in alternate years. Typically offered Fall Spring.

THTR 51300 - Vocal Production For The Stage I

Credit Hours: 2.00. The study of the voice production mechanism. Emphasis on exercises in relaxation, breath, alignment, and tonal focus. Permission of instructor required. Typically offered Fall Spring.

THTR 51400 - Vocal Production For The Stage II

Credit Hours: 2.00. Continuation of Vocal Production for the Stage I. Emphasis on exercises in vocal exploration through application to performance. Permission of instructor required. Typically offered Fall Spring.

THTR 52300 - Creating A Character I

Credit Hours: 2.00. Techniques towards the physical embodiment of a character. Typically offered Fall Spring.

THTR 52400 - Creating A Character II

Credit Hours: 3.00. Advanced techniques towards the physical embodiment of a character. Typically offered Fall Spring.

THTR 52500 - Theatrical Characterization

Credit Hours: 3.00. The discovery of a unique performing personality through the use of a wide range of mask and clown characterization techniques. Typically offered Fall Spring.

THTR 52600 - Advanced Stage Movement

Credit Hours: 2.00 or 3.00. Advanced movement training, including one or more of the following: stage combat, circus skills, gymnastics, period movement, dance, repatterning techniques, martial arts disciplines, and explorations into character. Typically offered Fall Spring.

THTR 53200 - Professional Issues In Theatre

Credit Hours: 2.00. Training in the techniques of the prepared audition, cold readings, improvisational auditions, and interviews. A survey of various employment opportunities and the demands of the professional theatre, educational theatre, and professional training. Offered in alternate years. Typically offered Fall.

THTR 53300 - Acting Technique

Credit Hours: 3.00. Intensive study of the internal and external elements of acting through the use of improvisational principles within the context of scene study. Typically offered Fall Spring.

THTR 53500 - Vocal/Physical Preparation

Credit Hours: 1.00. Practice in the coordination of the vocal and physical apparatus of the actor. Permission of instructor required. Typically offered Fall Spring.

THTR 53600 - Advanced Problems In Acting

Credit Hours: 2.00 or 3.00. Advanced study of selected problems in acting, including detailed role and play analyses, thorough rehearsals and critiques of performance. Permission of instructor required. Typically offered Fall Spring Summer.

THTR 53800 - Acting For The Camera

Credit Hours: 3.00. Development of acting styles and audition techniques for the camera. Typically offered Spring.

THTR 53900 - Period Style For The Actor

Credit Hours: 3.00. Applied focus on theatrical styles of acting. Scene study related to the development of skills necessary to perform work from a variety of periods and a variety of genres. Typically offered Fall Spring.

THTR 54000 - Advanced Directing

Credit Hours: 3.00. Application of principles of directing to the various types of drama; laboratory practice in directing plays for experimental production. Typically offered Fall.

THTR 54500 - Directional Process In Production

Credit Hours: 3.00. A study of models the director uses when dealing with the other creative personnel involved in production. Primary emphasis will be placed on the directoral and actoral processes as they relate to the work of the designers and technicians. Offered in alternate years. Permission of instructor required. Typically offered Fall.

THTR 55000 - Advanced Scenery Technology

Credit Hours: 3.00. A theoretical and practical study of theatrical scenery planning, construction, and stage use. Topics will vary by semester and will include project management techniques, mechanical design, automation systems, show control systems, rigging, and safety issues. Permission of instructor required . Typically offered Fall Spring.

THTR 55100 - Advanced Costume Techniques

Credit Hours: 3.00. An advanced study of specialized skills and construction techniques used in the creation of theatre costumes. Typically offered Fall Spring.

THTR 55300 - Theatre Audio Technology II

Credit Hours: 3.00. The study of the technical aspects of audio as they relate to use of, and experimentation with, various techniques in the design, installation, and specification of theatre sound systems, etc. Priority for majors. Offered in alternate years. Permission of instructor required. Typically offered Spring.

THTR 55400 - Advanced Theatre Drafting

Credit Hours: 3.00. An advanced projects course in drafting for the theatre. Emphasis on accepted theatrical drafting, standards, types of drawing, and presentation formats. Offered in alternate years. Typically offered Fall Spring.

THTR 55600 - Advanced Stage Makeup

Credit Hours: 3.00. Advanced training and practice in the application of theatrical makeup. Emphasis on problem solving and varied materials and application techniques. Offered in alternate years. Typically offered Fall Spring.

THTR 55800 - Advanced Problems In Theatre Technology

Credit Hours: 1.00 to 3.00. Advanced study and application of technical theatre problems and practice. Permission of instructor required. Typically offered Fall Spring.

THTR 56000 - Advanced Scenic Design

Credit Hours: 3.00. Advanced study of the principles of design and their application to specific staging problems. Typically offered Fall Spring.

THTR 56100 - Advanced Costume Design

Credit Hours: 3.00. Advanced study of the principles of costume design and their application to specific problems. Typically offered Fall Spring.

THTR 56200 - Advanced Light Design

Credit Hours: 3.00. Advanced study of the principles of light design and their application to specific lighting problems. Typically offered Spring.

THTR 56300 - Advanced Sound Design

Credit Hours: 3.00. Advanced study of the principles of sound design for theatre and theory application to specific problems. Offered in alternate years. Typically offered Fall Spring.

THTR 56400 - Theatrical Rendering

Credit Hours: 3.00. Provides advanced training in rendering techniques used by theatrical designers. Students will study perspective drawing, figure drawing, painting, and explore different materials used by designers to communicate their artistic vision. Typically offered Spring.

THTR 56700 - Model Construction

Credit Hours: 3.00. Model construction is one of many skills required of scene designers and is a preferred communication tool for many directors and designers. This course offers a variety of practical exercises for presenting both blueline and full color models. Typically offered Spring.

THTR 56800 - Advanced Problems In Design

Credit Hours: 1.00 to 3.00. A described tutorial in theatrical design or design research. Permission of instructor required. Typically offered Fall Spring.

THTR 56900 - Special Problems In Audio Production

Credit Hours: 3.00. Advanced study and application of sound studio production techniques to different audio related disciplines. Permission of instructor required. Typically offered Fall Spring.

THTR 57001 - Statics And Structures For Theatre I

Credit Hours: 3.00. Advanced study of static forces and analysis of the ability of specific structural shapes and materials traditionally used in theatrical scenery construction to resist these forces. This course will be taught both fall and spring semesters once every three years. Typically offered Fall Spring.

THTR 57002 - Statics And Structures For Theatre II

Credit Hours: 3.00. Advanced study of static forces and analysis of the ability of specific structural shapes and materials traditionally used in theatrical scenery construction to resist these forces. This course will be taught both fall and spring semesters once every three years. Typically offered Fall Spring.

THTR 58000 - Period Style For The Designer

Credit Hours: 3.00. A survey of the major aesthetic developments in art, architecture, interior decor, costume history, and musical styles from Ancient Egypt to the present, intended for the edification of the theatre designer. . Permission of instructor required. Typically offered Fall Spring.

THTR 59000 - Directed Study Of Special Theatre Problems

Credit Hours: 1.00 to 3.00. An individualized and intensive study of any aspect of theatre required by the student's plan of study. Permission of instructor required. Typically offered Fall Spring Summer.

THTR 59700 - Production And Design Seminar

Credit Hours: 3.00. Training in theatrical design based upon a variety of theatrical presentation forms. The type of presentation alternates, and specific content varies each semester. Typically offered Fall Spring Summer.

THTR 61300 - Classical Text I

Credit Hours: 3.00. Concentration on increasing vocal flexibility through exploration and preparation of Shakespearean texts. Permission of instructor required. Prerequisite: THTR 51400. Typically offered Spring Fall.

THTR 61400 - Classical Text II

Credit Hours: 3.00. Continuation of Classical Text I, with emphasis on studio scene work beginning with Shakespeare and progressing through the works of other major classical playwrights. Permission of instructor required. Prerequisite: THTR 61300. Typically offered Fall Spring.

THTR 63300 - Interpretive Acting Techniques

Credit Hours: 3.00. Advanced work in script and character analysis, character development, interpretation, interaction and relationship dynamics; rehearsal of complex scenes using material from various contemporary forms and theatrical genres. Prerequisite: THTR 53300. Permission of instructor required. Typically offered Spring Fall.

THTR 64000 - Directing Internship

Credit Hours: 1.00 to 6.00. Practical experience with a university, professional, or community theatre to facilitate the transition from student to professional director. Available for graduate students in their final year. Particular assignment must be approved by the student's major professor. Permission of instructor required. Typically offered Fall Spring Summer.

THTR 65800 - Special Problems In Technology

Credit Hours: 1.00 to 3.00. A described tutorial leading to postgraduate level project work for those students who are developing advanced theories in stage technology. Prerequisite: THTR 55800. Permission of instructor required. Typically offered Fall Spring.

THTR 66900 - Tutorial Internship For MFA

Credit Hours: 3.00 to 6.00. Off-campus internship designed to provide practical field experience under professional supervision in selected situations related to the candidate's area of specialization. Arrangements for internship must be approved by the candidate's graduate advisory committee. Permission of instructor required. Typically offered Fall Spring Summer.

THTR 67000 - Script Interpretation

Credit Hours: 3.00. The study of scripts through several lenses, ranging from Aristotelian analysis to holistic, contemplative practice. The course includes seminar discussion, response papers, group projects, exercises, and a final script interpretation in the form of a formal paper. Prerequisite: THTR 60100. Permission of department required. Typically offered Spring.

THTR 67100 - Modern Theory And Criticism

Credit Hours: 3.00. A seminar on modern performance theory, aesthetics, and practice. Emphasis on European theatre since 1875 and American theatre after 1960, with application through performance projects. Prerequisite: THTR 60100. Permission of instructor required. Typically offered Fall Spring.

THTR 69700 - MFA Terminal Project

Credit Hours: 3.00 to 6.00. MFA Terminal Project. Permission of instructor required. Typically offered Fall Spring Summer.

THTR 69800 - Research MA Or MFA Thesis

Credit Hours: 1.00 to 18.00. Research MA Or MFA Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

Veterinary Clinical Sciences

VCS 14000 - Small Animal Nursing I For Vet Techs-DL

Credit Hours: 1.50. This is the first of four courses involving nursing and management of the small animal patient. This course provides an introduction to small animal patient care and treatment that a technician will be expected to provide in a veterinary practice. It includes techniques equipment orientation, client education, management of the hospitalized patient, and preventative medicine. Emphasis will be on the role of the veterinary technician in the veterinary hospital. Typically offered Fall Spring Summer.

VCS 14100 - Small Animal Nursing II For Vet Techs-DL

Credit Hours: 1.50. This is the second of four courses involving nursing and management of the small animal patient. It is the continuation of the small animal patient care and treatment that a technician will be expected to provide in a veterinary practice. It includes techniques, equipment, client education, management of the hospitalized patient, and preventative medicine. Emphasis will be on the role of the veterinary technician in the veterinary hospital. Typically offered Fall Spring Summer.

VCS 14200 - Diagnostic Imaging For Vet Techs I -DL

Credit Hours: 1.50. This is the first of two courses involving basic principles of imaging that are necessary for the understanding and performance of diagnostic imaging procedures in a veterinary hospital. This course provides an introduction to x-ray generation, image formation, exposure factors, scatter radiation, grids, film, screens, safety, basic terminology, positioning, darkroom techniques, an artifact identification. Typically offered Fall Spring Summer.

VCS 14300 - Diagnostic Imaging For Vet Techs II -DL

Credit Hours: 1.50. This is the second of two courses involving principles of imaging that are necessary for the understanding and performance of diagnostic imaging procedures in a veterinary hospital. This course provides an introduction to advanced positioning techniques for the small animal, large animal techniques, contrast techniques, technique charts, basic ultrasound, diagnosic imaging in exotic animals, and diagnostic imaging for the veterinary dentistry. Typically offered Fall Spring Summer.

VCS 14500 - Anethesia For Vet Techs I -DL

Credit Hours: 1.50. This is the first of two courses involving basic principles of anesthesia and anesthetic delivery for the veterinary technician. This course focuses on the preparation of the patient for anesthesia, the agents used as pre-anesthetics, induction agents and general anesthesia, and the physiologic impacts of anesthesia on the body. Typically offered Fall Spring Summer.

VCS 14600 - Anethesia For Vet Techs II -DL

Credit Hours: 1.50. This is the second of two courses involving basic principles of anesthesia and anesthetic delivery for the veterinary technician. This course focuses on multi-species anesthetic techniques (small animal, large animal/equine, pocket pets), managing high risk patients, anesthetic complications, and pain management. Typically offered Fall Spring Summer.

VCS 14700 - Principles Of Techniques and Sterilization-DL

Credit Hours: 1.00. This course is designed to instruct veterinary technician students in the basic principles of veterinary operating room protocols and sterilization of surgical supplies commonly used within a veterinary hospital. Emphasis will be placed upon key concepts of surgical preparation of the patient, and the role of the circulating nurse and surgical nurse. In addition, the concepts of proper instrument care, sterilization procedures and inventory rotation will be covered. Typically offered Fall Spring Summer.

VCS 14800 - Large Animal Nursing and Health Management I - Distance Learning

Credit Hours: 1.00. This is the first of four courses involving large animal and equine nursing and health management. This course provides an introduction to nursing and health management that a technician will be expected to provide in a veterinary practice. Emphasis will be on the role of the veterinary technician in the veterinary facility. Typically offered Summer Fall Spring.

VCS 14900 - Large Animal Nursing and Health Management II - Distance Learning

Credit Hours: 1.00. This is the second of four courses involving large animal and equine nursing and health management for the veterinary technician. This course completes the introduction to nursing and health management that a technician will be expected to provide in a veterinary practice. Typically offered Summer Fall Spring.

VCS 16000 - Nursing Of Small Animals

Credit Hours: 2.00. Provides information on medical nursing care of small animals. The practice and application of patient care procedures and techniques required of a veterinary technician will be emphasized. Typically offered Fall.

VCS 16500 - Nursing Of Large Animals

Credit Hours: 2.00. Provides information on medical nursing care of horses, cattle, swine, and sheep. The practice and application of patient care procedures and techniques required of a veterinary technician will be emphasized. Typically offered Spring.

VCS 20100 - Pharmacy Procedures For VT -DL

Credit Hours: 1.00. This course introduces students to the concepts of pharmacy procedures used in veterinary practice. Concepts covered in this course include basic record keeping, safe handling of drugs and chemicals, inventory control, calculation of amount of drugs to be dispensed or dosed, reading prescriptions, labeling drug containers, compounding, and drug regulatory matters that impact the veterinary hospital pharmacy. Typically offered Fall Spring Summer.

VCS 22100 - Veterinary Nursing Techniques For The Normal Animal (SA & LA)

Credit Hours: 4.00. The course will introduce the students to concepts related to normal, healthy large and small animal patients. The course includes both lecture and laboratory components. Typically offered Fall.

VCS 22200 - Dentistry For The Veterinary Technician

Credit Hours: 0.50. This course is an introduction to veterinary dentistry for the technician, with emphasis on basic dental anatomy, pathologies and treatments, dental charting, intraoral radiography, dental cleaning and periodontal disease management. Typically offered Fall.

VCS 22300 - Surgical Nursing And Operating Room Protocols

Credit Hours: 1.00. This course is an introduction to the surgical environment and all aspects related to the principles of asepsis and the practice of sterile technique. Students will learn using a variety of teaching modalities (lecture, group work, laboratory experience). Typically offered Fall.

VCS 22400 - Small Animal Nursing I

Credit Hours: 2.00. This course will introduce students to nursing and diagnostic techniques for small animals and the body' response to disease. Typically offered Spring.

VCS 22500 - Large Animal Nursing I

Credit Hours: 2.00. This course builds on concepts learning in VCS 22100 related to normal, healthy large animal patients. It also introduces the students to higher level patient care for the large animal patient. Typically offered Spring.

VCS 22600 - Principles Of Anethesia

Credit Hours: 2.00. This course is an introduction to surgical nursing and anesthesia. The principles of asepsis and sterile technique will be introduced and demonstrated by staff and in some cases, practiced by the student. The basics of anesthesia will be introduced and practiced by the student. Typically offered Spring.

VCS 22800 - Small And Large Animal Well Animal Nutrition

Credit Hours: 1.00. This course will introduce students to an overview of nutritional concepts as it applies to common domestic small and large animal species and selected exotic companion/avian pets. Basic concepts for understanding nutritional needs for all species will be introduced as well as therapeutic use of diets as it relates to animal nursing. Typically offered Spring.

VCS 23000 - S A Nursing III-VTDL

Credit Hours: 1.50. This is the third of four courses involving nursing and management of the small animal patient. This course continues the concepts of small animal patient care and treatment that a technician will be expected to provide in a veterinary practice. It includes techniques, equipment, client education, management of the hospitalized patient and preventative medicine. Emphasis will be on the role of the veterinary technician in the veterinary hospital. Typically offered Fall Spring Summer.

VCS 23100 - S A Nursing IV-VTDL

Credit Hours: 1.50. This is the fourth of four courses involving nursing and management of the small animal patient. This course involves emergency and critical patient care and treatment that a technician will be expected to provide in a veterinary practice. It includes techniques, equipment, client education, management of the hospitalized patient and preventative medicine. Emphasis will be on the role of the veterinary technician in the veterinary hospital. Typically offered Fall Spring Summer.

VCS 23300 - Introduction to Ophtho Derm and Oncology-DL

Credit Hours: 1.00. This course involves the instruction of nursing and management of small animal patients related to opthalmology, dermatology, and oncology. It presents concepts of small animal patient care and treatment that a technician will be expected to provide in a veterinary practice. It includes techniques, equipment, client education, management of the hospitalized patient, and preventative medicine related to these specific clinical disciplines. Emphasis will be on the role of the veterinary technician in the veterinary hospital. Typically offered Fall Spring Summer.

VCS 23700 - Large Animal Nursing and Health Management III - Distance Learning

Credit Hours: 1.50. This is the third of four courses involving large animal and equine nursing and health management for the veterinary technician. This course focuses more on the observation/assessment of the animal, handling techniques, and basic medical care and management that a technician will be expected to provide in a veterinary practice. Typically offered Summer Fall Spring.

VCS 23800 - Large Animal Nursing and Health Management IV - Distance Learning

Credit Hours: 1.50. This is the fourth of four courses involving large animal and equine nursing and health management for the veterinary technician. This course focuses more on the handling techniques and basic medical care and management that a technician will be expected to provide in a veterinary practice. Emphasis will be on the role of the veterinary technician in practice. Typically offered Summer Fall Spring.

VCS 24500 - Small Animal Health Management

Credit Hours: 2.00. This course will cover management of hospitalized patients, client education programs, and preventive medicine programs. Emphasis will be on the role of the veterinary technician in the veterinary hospital. Typically offered Spring.

VCS 25100 - Introduction To Diagnostic Imaging For The Veterinary Technician

Credit Hours: 0.50. This course is an introduction to veterinary diagnostic imaging and is designed to instruct the veterinary technician student in the basic principles of imaging, necessary to perform imaging tasks within a veterinary hospital. This course will introduce the fundamentals needed in the clinical imaging rotations and in practice. Typically offered Fall.

VCS 25200 - Diagnostic Imaging For Veterinary Technicians

Credit Hours: 2.00. Provides an introduction to imaging of domestic animals. Emphasis will be placed on radiological principles

and techniques, darkroom procedures and design, preparing technique charts for various X-ray units, animal positioning, and radiation safety. Typically offered Spring.

VCS 26100 - Large Animal Health Management

Credit Hours: 2.00. This course will cover basic principles of biologics, pharmaceuticals, livestock health management programs, and client communication to prepare the technician student for entering employment in food animal or general practice. Typically offered Fall.

VCS 32100 - Large Animal Nursing II

Credit Hours: 2.00.This course build on concepts learned in VCS 22100 and VCS 22500 related to normal, healthy large animals patients. It also introduces the student to higher level patient care for the large animal patient. Typically offered Fall.

VCS 32200 - Small Animal Nursing II

Credit Hours: 2.00. This course will cover management of hospitalized patients, client education, and preventative medicine programs. Emphasis will be on the role of the veterinary technician in the veterinary hospital. Typically offered Fall.

VCS 41800 - Applied Small Animal Behavior

Credit Hours: 2.00. Clinical applications of canine and feline behavior problems. The normal and common abnormal behaviors of domestic dogs and cats will be presented. Emphasis will be on taking clinical history from owner, observing animals, and establishing behavioral modification treatment plans as part of the veterinary team. Typically offered Spring.

VCS 46700 - Diagnostic Instrumentation

Credit Hours: 2.00. A laboratory in the utilization, care, and maintenance of electronic equipment used in veterinary diagnostics. Typically offered Spring.

VCS 49000 - Food Animal Husbandry & Technical Skills I

Credit Hours: 0.50. This course is designed to provide the veterinary technologist student with a deeper understanding and broader experience in food animal production than is found in the Associate Degree (Veterinary Technology) Program. Emphasis

will be on selected common diseases of beef and dairy cattle, selected common diseases of swine, field anesthesia, and hoof care. Enrollment is limited to 10 students. Typically offered Fall.

VCS 60200 - Problems In Clinical Medicine And Surgery

Credit Hours: 1.00 to 5.00. Individualized topics selected from the various areas of Veterinary Clinical Sciences. May include directed readings, discussion, and other intensive studies in specialized topics. Prerequisite: DVM degree. Permission of instructor required. Typically offered Fall Spring Summer.

VCS 60300 - Introduction To Clinical Research, Trials and Translational Research

Credit Hours: 1.00. This course is designed for students entering the Graduate Program in the Department of Veterinary Clinical Sciences. During the course, lectures are presented which introduce students to the elements and scope of clinical research, including the methods used in clinical research, trials and translational research. Topics covered will explain the principles of safe and ethical conduct of clinical research. Students will also be introduced to the principles of data collection, management and interpretation. Permission of instructor required. Typically offered Fall.

VCS 60400 - Animal Models In Translational Research

Credit Hours: 1.00. This course is designed for students in the Graduate Program in the Department of Veterinary Clinical Sciences. During the course, lectures are presented which help students obtain a working knowledge of the use of animal models in research. Topics covered will explain the principles of using animals in research and as a model for human diseases. Students will also be exposed to the principle elements of translational research, methods used in translational research and trials, and the principles of data collection, management and interpretation. Prerequisite: VCS 60300. Permission of department required. Typically offered Spring.

VCS 61000 - Clinical Training In Veterinary Clinical Sciences

Credit Hours: 2.00 to 6.00. Veterinary Clinical Sciences (VCS) residents working in specific specialty areas rotate through relevant specialty clinical services in the Veterinary Teaching Hospital (or other specialty facilities) as determined by the resident committee and the requirements of each specialty college. Rotation lengths are 2.5 to 5 weeks. Residents are closely supervised by VCS faculty and gradually are given more individual responsibility as decision-making and clinical skills develop. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 62000 - Seminar In Clinical Medicine And Surgery

Credit Hours: 1.00 to 3.00. Seminars provide a forum for discussion of current concepts and research results in clinical medicine and surgery, and other aspects of veterinary medicine. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 62100 - Topics In Advanced Medicine

Credit Hours: 1.00 to 3.00. Advanced study and investigation of the pathophysiology, occurrence, diagnosis, treatment, management, and prevention of animal diseases. Emphasis will be given to the medical aspects of diseases by body system (e.g., renal, gastrointestinal, etc.) and by medical discipline (e.g., oncology, ophthalmology, etc.). Permission of instructor required. Typically offered Fall Spring Summer.

VCS 63000 - Current Topics In Veterinary Clinical Sciences

Credit Hours: 1.00 to 6.00. One-two hour sessions organized and conducted weekly by VCS residents, with input/discussion from the attending VCS faculty. Alternating weekly topic sessions may include journal club and morbidity and mortality patient rounds or other topics appropriate to the specialty. . Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64000 - Introduction To Veterinary Homeland Security

Credit Hours: 1.00. A didactic course presenting introductory material on topics in veterinary homeland security. Topics include the threat and impact of agri-terrorism, government and veterinarian roles in animal health emergencies and community planning, foreign animal/zoonotic/food borne disease surveillance/early detection, radiological/chemical events, field epidemiology, and biosecurity for emergency responders. A laboratory module in which students become certified at the 10000 level in Incident Command Training is required. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64200 - High Consequence Disease Review: Bovine

Credit Hours: 1.00. A didactic course presenting etiology, transmission, clinical signs, lesions, diagnostic methods and differential diagnoses for high consequence diseases that affect cattle. Actual cases will be included when available. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64300 - High Consequence Disease Review: Equine

Credit Hours: 1.00. A didactic course presenting etiology, transmission, clinical signs, lesions, diagnostic methods and differential diagnoses for high consequence diseases that affect horses. Actual cases will be included when available. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64400 - High Consequence Disease Review: Swine

Credit Hours: 0.50. A didactic course presenting etiology, transmission, clinical signs, lesions, diagnostic methods and differential diagnoses for high consequence diseases that affect pigs. Actual cases will be included when available. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64500 - High Consequence Disease Review: Minor Species

Credit Hours: 1.00. A didactic course presenting etiology, transmission, clinical signs, lesions, diagnostic methods and differential diagnoses for high consequence diseases that affect sheep, goats, and rabbits. Actual cases will be included when available. Prerequisite: DVM degree. Typically offered Summer Fall Spring.

VCS 64600 - High Consequence Disease Review: Avian

Credit Hours: 1.50. A didactic course presenting etiology, transmission, clinical signs, lesions, diagnostic methods and differential diagnoses for high consequence diseases that affect birds. Actual cases will be included when available. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64700 - High Consequence Disease Review: Zoonotic

Credit Hours: 1.00. A didactic course presenting etiology, transmission, clinical signs, lesions, diagnostic methods and differential diagnoses for high consequence diseases that affect both animals and people. Actual cases will be included when available. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64800 - Defining The Threat

Credit Hours: 0.50. A didactic course defining the threat of terrorism to livestock, companion animal, and public health. Course content includes threat assessments, profiles of terrorist groups, specific threats, impact of threats, and veterinarians' role in mitigating threats to animal health. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 64900 - Understanding The Response

Credit Hours: 0.50. A didactic course outlining current state and national protocols for responding to disease outbreaks, acts of terrorism, and natural disasters that affect our animal population. Course content covers response plans for each situation and timetables and standard operating procedures for each response plan. Responsible personnel, their jobs, and their contact information will be identified. The role of the veterinarian in each type of response will be detailed. In addition, laboratory modules in which students become trained in the National Response Plan are required. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 65000 - Biology Of Aging

Credit Hours: 1.00 to 3.00. Provides students with an overview of prevailing theories, experimental data, and human observations pertinent to the biology of aging. Permission of instructor required. Typically offered Spring.

VCS 65100 - Biosecurity For Veterinary Responders

Credit Hours: 1.00. A didactic course outlining biosecurity procedures for veterinarians responding to animal health emergencies. Topics include quarantine establishment, personal protective equipment, general biosecurity procedures, and decontamination techniques. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 65200 - Euthanasia And Carcass Disposal

Credit Hours: 1.00. A didactic course outlining euthanasia and carcass disposal guidelines in the event of an animal health emergency. Topics include humane handling of healthy and morbid animals, mass euthanasia, carcass disposal techniques, and carcass disposal regulations. Permission of instructor required. Typically offered Fall Spring.

VCS 65300 - The Veterinarian's Role In Community Planning

Credit Hours: 0.50. A didactic course outlining the veterinarian's role in community planning for emergencies. Topics include understanding and developing emergency plan templates, informational resources for emergency planning, completing an emergency plan, and evaluation of emergency plans. Veterinarians will be required to access, critique, and revise their community's emergency plan for the service learning component of this course. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 65400 - Food Borne Illnesses

Credit Hours: 1.00. A didactic course outlining the veterinarian's role in food borne disease outbreaks. Topics include regulatory aspects of food safety and food borne disease outbreaks, understanding the classification of food borne diseases, epidemiological

investigation of food borne illness, and a review of common food borne illnesses. Prerequisite: DVM degree. Typically offered Summer Fall Spring.

VCS 65500 - GIS Applications In Veterinary Emergency Management

Credit Hours: 1.00. A didactic course reviewing the application of geographic information systems to emergency preparedness and response in animal-related emergencies. Topics include fundamental GIS concepts, how to display, query, and edit spatial and attribute data, and how to apply specific GIS tools in information and resource management during an animal-related emergency. Prerequisite: DVM degree. Typically offered Summer Fall Spring.

VCS 65700 - Crime Scene Management

Credit Hours: 1.00. A didactic course outlining the protocol law enforcement will utilize when conducting a crime scene investigation where veterinarians are expected to give assistance. The course framework includes initial response, scene processing and evidence collection, documenting the crime scene, and crime scene equipment. Actual cases will be included when available. Prerequisite: DVM degree. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 65900 - Business Continuity Management

Credit Hours: 0.50. A didactic course reviewing the development and implementation of a business continuity management plan in preparation for a disaster. Course content includes developing a culture of enthusiasm and readiness; risk assessment and impact analysis; planning strategies; and exercising and auditing. Prerequisite: VCS 64000. Permission of instructor required. Typically offered Summer Fall Spring.

VCS 66100 - Scientific Inquiry

Credit Hours: .5. A didactic course presenting introductory material on scientific inquiry. Topics include scientific writing, critical evaluation of manuscripts, introductory statistics information resources, and preparing/giving presentations. Students must be graduate students in a non-thesis Master degree with a concentration in Veterinary Homeland Security or graduate students in the Department of Veterinary Clinical Sciences who have clinical duties and animal health emergency responsibilities that prohibit attendance in traditional lecture courses. Permission of instructor required. Typically offered Fall Spring Summer.

VCS 66300 - Building Skill Sets In Veterinary Homeland Security

Credit Hours: 3.00. This course is an experiential course in which students will be required to complete and document 40 hours (2400) minutes of activities (training, planning, exercising, responding, etc) that assist private and public industry, communities, states, regions, or nations prevent, respond, or recover from emergencies resulting from natural disasters, or other emergencies

that could affect animals. Credit for this course can be applied as no more than one elective course in a certificate in Veterinary Homeland Security and/or a required and repeatable elective course in a non-thesis Masters degree with concentration in Veterinary Homeland Security. Prerequisite: VCS 64000 - Introduction To Veterinary Homeland Security. Permission of instructor required. Typically offered Fall Spring Summer.

VCS 66400 - Veterinary Homeland Security Manuscript Preparation And Submission

Credit Hours: 3.00. This is an independent study course that provides an opportunity for students to get experience preparing and submitting a manuscript for publication. Students will be required to prepare and submit a manuscript to a professional journal on a topic related to veterinary homeland security. Students will also be required to respond to feedback from classmates' critiques of their manuscript and to critique the manuscripts of classmates. Credit for this course can be applied as no more than one elective course in a certificate in Veterinary Homeland Security and/or a required and repeatable elective course in a non-thesis Masters degree with a concentration in Veterinary Homeland Security. Prerequisite: VCS 64000 - Introduction To Veterinary Homeland Security. Permission of instructor required. Typically offered Fall Spring Summer.

VCS 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Fall Spring Summer.

VCS 69900 - Research PhD Thesis

Credit Hours: 1.00 to 18.00. Research PhD Thesis. Permission of Department required. Typically offered Fall Spring Summer.

VCS 80100 - Behavior, Husbandry, And Diagnostic Techniques I

Credit Hours: 1.50. Introduction to behavior, husbandry, and diagnostic techniques of domesticated animals. Behavioral patterns and methods of management of various breeds of companion animals and animals used in the production of food, fiber, and feathers; restraint techniques, methods of collecting samples for diagnostic purposes, and methods of medication appropriate to a given species; concepts of population and production medicine and the importance of regulatory medicine. Typically offered Fall.

VCS 80200 - Behavior, Husbandry, And Diagnostic Techniques II

Credit Hours: 1.50. A continuation of VCS 80100. Intermediate studies of behavior, husbandry, and diagnostic techniques. Behavioral patterns and methods of management of various breeds of companion animals and animals used in the production of food, fiber, and feathers; restraint techniques, methods of collecting samples for diagnostic purposes, and methods of medication appropriate to a given species; concepts of population and production medicine and the importance of regulatory medicine. Typically offered Spring.

VCS 80300 - Behavior, Husbandry, And Diagnostic Techniques III

Credit Hours: 1.00. A continuation of VCS 80200. Behavior, husbandry, and diagnostic techniques related to preventive medicine and production systems of domesticated animals. Behavioral patterns and methods of management of various breeds of companion animals and animals used in the production of food, fiber, and feathers; restraint techniques, methods of collecting samples for diagnostic purposes, and methods of medication appropriate to a given species; concepts of population and production medicine and the importance of regulatory medicine. Typically offered Spring.

VCS 80400 - Behavior In Domestic Animals

Credit Hours: 1.00. Instruction in basic principles of behavior; factors determining normal and abnormal behavior; and the different types of learning. The main domestic species will be characterized in terms of their normal behavior with which behavior problems are most important in the different species. Typically offered Fall Summer.

VCS 80500 - Small Animal Behavioral Therapy

Credit Hours: 1.00. Provides information on the diagnosis, treatment, and prevention of behavior problems of dogs and cats, with emphasis on differential diagnosis of behavioral problems and behavioral pharmacology. Topics include aggression, anxiety related problems, inappropriate elimination, client counseling, and problem prevention. Client interaction and the question of euthanasia for behavioral problems is also discussed. Typically offered Spring Summer.

VCS 80600 - Small Animal Medicine And Surgery I

Credit Hours: 3.50. An overview of clinical approach to common medical and surgical diseases of dogs and cats. A systems approach is used to teach the major concepts of diseases affecting each body system. The focus is on diagnosis and treatment of common diseases encountered in small animal clinical practice. Typically offered Fall Summer.

VCS 80616 - Small Animal Clinical Nutrition

Credit Hours: 1.00. The goal of this course is to provide the fundamentals of nutrient assessment while discussing nutritional modification in the management of disease. At the completion of this course, the veterinary student should be proficient in recognizing a nutrition-related problem in a clinical patient, conducting a thorough nutritional assessment, and constructing appropriate nutritional strategies for both the pet and client. The veterinary student will achieve an understanding of clinical nutrition that can be applied to the contemporary practice of veterinary medicine. Typically offered Spring Summer.

VCS 80700 - Small Animal Medicine And Surgery II

Credit Hours: 2.00. An overview of clinical approach to common medical and surgical diseases of dogs and cats. A systems approach is used to teach the major concepts of disease affecting each body system. The focus is on diagnosis and treatment of common diseases encountered in small animal clinical practice. Typically offered Spring Summer.

VCS 80800 - Equine Medicine And Surgery

Credit Hours: 2.50. Diagnostic methods and prevention, control, and treatment regimens for common diseases affecting horses. Issues related to diseases of regulatory importance (epidemic and exotic) are discussed. Students also learn about surgical correction of selected problems and elective surgical procedures. Typically offered Fall Summer.

VCS 80900 - Ruminant Medicine And Surgery

Credit Hours: 2.00. Diagnostic methods and prevention, control, and treatment regimens for common diseases affecting ruminants. Issues related to food quality assurance and safety, and diseases of regulatory importance (epidemic and exotic). Surgical correction of selected problems and elective surgical procedures. Typically offered Fall Summer.

VCS 81000 - Swine Production Medicine

Credit Hours: 1.00. Diagnostic methods and prevention, control, and treatment regimens for common diseases affecting swine. Issues related to food quality assurance and safety and diseases of regulatory importance (epidemic and exotic) are discussed. Typically offered Fall Summer.

VCS 81100 - General Surgery Laboratory

Credit Hours: 1.00. Introduction to basic skills in surgery and anesthesia. Models are used to learn basic skills of instrument use, tissue handling, dissection, and suturing. Students will progress to common anesthetic and surgical procedures on live and cadaver animals. Typically offered Fall.

VCS 81200 - Principles Of Anesthesia, Surgery, And Emergency Medicine

Credit Hours: 2.00. Introduction to basic principles of anesthesiology and surgical practice. The principles of aseptic technique, operating room protocol, tissue handling, hemostasis, and wound repair. Principles of emergency medicine, including shock therapy, fluid therapy, and trauma management. Typically offered Fall Summer.

VCS 81300 - Diagnostic Imaging

Credit Hours: 1.00. In the first half of the core diagnostic imaging course, emphasis is on how images are made using current technology. Although radiography is emphasized, imaging modalities such as ultrasonography, computed tomography, magnetic resonance imaging, scintigraphy, and thermography are discussed. In the second half of the course, types of lesions that can be observed in large and small animals with the various imaging modalities are explained. The course is offered once annually, and its successful completion is required for any of the elective courses offered by Diagnostic Imaging. Typically offered Fall Summer.

VCS 81400 - Comparative Theriogenology

Credit Hours: 1.00. Basic aspects of reproduction in large and small animals, including obstetrics and genital diseases, on a single animal or group basis are covered. Typically offered Fall Summer.

VCS 81500 - Ophthalmology

Credit Hours: 1.00. Introduction to veterinary comparative ophthalmology. Covers the diagnosis, pathophysiology, and treatment of the ocular diseases commonly seen in food and companion animal species. Typically offered Fall Summer.

VCS 81700 - Achieving Success In Private Practice

Credit Hours: 1.50. Provides a foundation for the application of practice management principles. Focuses on operations management, financial management, human resource management, and marketing management. Typically offered Spring Summer.

VCS 81800 - Small Animal Surgery Laboratory I

Credit Hours: 0.50. Common orthopedic and soft tissue surgical procedures are performed on cadaver and live animals. Typically offered Spring.

VCS 81801 - Small Animal Surgery Laboratory I Alternate

Credit Hours: 0.50. Common orthopedic and soft tissue surgical procedures are performed on cadaver and live animals. Typically offered Spring.

VCS 81900 - Small Animal Dentistry

Credit Hours: 3.00. Students will be involved with the evaluation and treatment of small animal dentistry patients. Patient activity will occur during four days of the week. On the fifth day, procedure labs using cadaver specimens will be held. Daily patient discussions will occur, topic/additional patient rounds may also be presented on the fifth day. A complete spectrum of small animal dentistry treatments is provided by the clinical service. Therefore, the Students will be involved with all levels of dental/oral care. For students enrolled in Small Animal/Companion Animal and mixed animal tracks. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 82000 - Small Animal Surgery Laboratory II

Credit Hours: 0.50. More advanced soft tissue and orthopedic surgical techniques are practiced on cadaver and live animals. Typically offered Spring.

VCS 82001 - Small Animal Surgery Laboratory II Alternate

Credit Hours: 0.50. More advanced soft tissue and orthopedic surgical techniques are practiced on cadaver and live animals. Typically offered Spring.

VCS 82100 - Clinical Neurology

Credit Hours: 3.00. Students will be directly or indirectly involved in the evaluation, treatment and care of patients present to the neurology/neurosurgery service. Cadaver work may supplement the clinical experience. Students will be expected to accomplish the objectives of the Neurology/Neurosurgery block and to develop greater knowledge, clinical judgment, diagnostic capabilities and neurologic examination skills that would enable them to manage more complex cases, such as intervertebral disc disease, seizures, encephalopathies and neuropathies. Typically offered Fall Spring Summer.

VCS 82200 - Large Animal Surgery I

Credit Hours: 0.50. Basic surgical training in large animals, including both soft tissue and orthopedic procedures. Typically offered Spring.

VCS 82300 - Large Animal Surgery II

Credit Hours: 0.50. More advanced surgical training in large animals, including both soft tissue and orthopedic procedures. Typically offered Spring.

VCS 82400 - Small Animal Theriogenology

Credit Hours: 0.50. All aspects of small animal reproduction (in detail), including obstetrics and genital diseases, on a single animal or group basis, are covered. Typically offered Spring Summer.

VCS 82500 - Ruminant Theriogenology

Credit Hours: 1.00. All aspects of ruminant reproduction are covered, including obstetrics and genital diseases on a single animal or group basis. Typically offered Spring Summer.

VCS 82600 - Equine Theriogenology

Credit Hours: 0.50. Covers all aspects of equine reproduction (in detail), including obstetrics and genital diseases, on a single animal or group basis. Typically offered Spring Summer.

VCS 82700 - Small Animal Imaging

Credit Hours: 2.00. A continuation of VCS 81300. Specific diseases of small animals where imaging is part of the diagnosis are discussed. Emphasis is on radiography and untrasonography. The use of alternate imaging modalities is discussed where appropriate. Typically offered Spring Summer.

VCS 82900 - Equine Imaging

Credit Hours: 1.00. A continuation of VCS 81300. Specific diseases of horses where imaging is part of the diagnosis are discussed. Emphasis is on radiography and ultrasonography. The use of alternate imaging modalities is discussed where appropriate. Typically offered Spring Summer.

VCS 83100 - Advanced Equine Theriogenology

Credit Hours: 2.00. Palpation of the mare's reproductive tract is emphasized. Students will have the opportunity to become proficient in all aspects of equine reproductive management and to enhance their abilities to recognize reproductive problems and to formulate and carry out a diagnostic and therapeutic plan. Typically offered Spring Summer.

VCS 83200 - Equine Lameness

Credit Hours: 0.50. Advanced study of equine lamenesses, with a focus on the performance horse. Physical examination of the locomotor system, lameness diagnosis, and the establishment of a prognosis are emphasized. Typically offered Spring Summer.

VCS 83300 - Advanced Equine Medicine

Credit Hours: 1.00. A continuation of VCS 50800. Typically offered Spring.

VCS 83400 - Food Animal Surgery

Credit Hours: 0.50. A continuation of Large Animal Surgery for students with a selected interest in large animal/mixed practice. Surgical diseases of cattle are emphasized. Typically offered Spring Summer.

VCS 83500 - Environments For Large Animal Species

Credit Hours: 1.00. Options for systems of management and environments available to producers of animals used in the production of food, fiber, feathers, and horses. An understanding of the principles of designing buildings and controlling environments will be gained through lectures and problem-solving sessions. Typically offered Spring Summer.

VCS 83600 - Introduction To Clinical And Equine Nutrition

Credit Hours: 1.00. Nutritional requirements of different large animal species are learned. Relationships between nutrients and outcomes when nutrients are under- or oversupplied in different phases of an animal's life cycle. Specific ration and nutritional requirements of horses are discussed, and students will be expected to evaluate nutritional problems. Typically offered Spring Summer.

VCS 83700 - Clinical Nutrition For Ruminants And Swine

Credit Hours: 1.00. Current information on nutritional requirements of cattle and pigs, along with the relationships between nutrients and outcomes when nutrients are under- or oversupplied in different phases of the life cycle of cattle and pigs. Specific rations and nutritional requirements of cattle and pigs. Students will be expected to evaluate nutritional problems. Typically offered Spring Summer.

VCS 83800 - Swine Production Medicine

Credit Hours: 1.00. Introduction to production and health management in swine herds. The concept of the model herd is introduced, and the use of records in the diagnosis of problems and maximizing production efficiency is covered. The focus is herd-based and includes problem-solving. Typically offered Spring Summer.

VCS 83901 - Beef Production Medicine

Credit Hours: 1.00. The goal of this course is to present the concepts of beef production medicine to prepare the student to formulate plans to solve herd problems. The topics of herd health, fertility, nutrition, records, genetics, marketing and environment will be discussed and students will work in groups to solve real herd issues. An optional herd visit will also be available to all students. Typically offered Spring Summer.

VCS 83902 - Dairy Production Medicine

Credit Hours: 1.00. The goal of this course is to present the concepts of dairy production medicine to prepare the student to formulate plans to solve herd problems. The topics of dairy cow nutrition (including ration balancing programs), calf nutrition and management, records analysis including the use of PCDart computer program, vaccination programs, and animal welfare evaluations. Additionally, students will be exposed to team troubleshooting and performing farm evaluations. Outside speakers may be used as content experts. Typically offered Spring Summer.

VCS 84000 - Small Ruminant/Llama Medicine

Credit Hours: 1.00. The pathogenesis, diagnosis, treatment, and prevention of common diseases of small ruminants and llamas. Typically offered Spring Summer.

VCS 84101 - Advanced Ophthalomogy

Credit Hours: 0.5. This course is an advanced course in ophthalmology covering topics not covered in the core ophthalmology course. Species discussed will include canine, feline, equine, bovine, ovine, caprine and exotic species. Topics include vision and

neuro-ophthalmology, surgery, ocular emergencies, ocular manifestations of systemic disease, ocular examination, and diagnostic techniques and modalities specific to diseases of the eye. Typically offered Spring Summer.

VCS 84300 - Successful Practice Skills

Credit Hours: 0.50. Builds upon the foundation for the application of practice management principles learned in VCS 51700. Focus is in the areas of communications and relationships with clients, staff, and colleagues; leadership development; and key essentials of practice operation for the prospective associate (or practice director). Typically offered Spring Summer.

VCS 84400 - Client Communications - Companion Animal Practice

Credit Hours: 0.50. The course will be taught in a discussion format utilizing small group exercises and role-plays. The goal is to demonstrate and describe effective client communication skills. Because effective client communication is a learned skill, the course will provide multiple opportunities for students to practice and refine their skills. Students who participate in this course will be videotaped working through a scenario with a simulated client. While being videotaped and then watching oneself can be very uncomfortable and potentially embarrassing, it is a great way to improve communication skills and is worth the potential momentary discomfort. Typically offered Spring Summer.

VCS 84500 - Small Animal Medicine Laboratory

Credit Hours: 0.50. A guided experience in the performance of diagnostic procedures used in small animal practice. Intended for those who will work with dogs and cats as professionals. Designed to introduce some advanced procedures and to provide an opportunity for refinement of procedures introduced earlier in the curriculum. Typically offered Fall.

VCS 84600 - Advanced Small Animal Medicine

Credit Hours: 2.00. An advanced course dealing with selected diseases of dogs and cats. Designed for the student who is focusing on small animal or companion animal practice. A systems approach is used to teach the major concepts of diseases affecting each body system. Focuses on diagnosis and treatment of diseases commonly encountered in small animal clinical practice. Topics covered in this elective include endocrinology, nephrology, gastroenterology, and immune-mediated diseases. Typically offered Spring Summer.

VCS 84700 - Advanced Small Animal Specialties

Credit Hours: 2.00. An advanced course dealing with selected diseases of dogs and cats. Designed for the student who is focusing on small animal or companion animal practice. A systems approach is used to teach the major concepts of diseases affecting each

body system. Focuses on diagnosis and treatment of diseases commonly encountered in small animal clinical practice. Topics included in this elective include cardiology, dermatology, neurology, and oncology. Typically offered Spring Summer.

VCS 84800 - Advanced Small Animal Surgery

Credit Hours: 1.50. An advanced course dealing with selected surgical diseases of dogs and cats. Designed for the student who will be practicing on small animals (small animal, companion animal, or mixed animal track). A systems approach is used to teach important concepts of surgical diseases and procedures affecting each body system. Focuses on the diagnosis and treatment of diseases commonly encountered in small animal practice. Typically offered Spring Summer.

VCS 85000 - Small Animal Dentistry

Credit Hours: 0.50. A thorough understanding and practical knowledge of the oral examination, dental prophylaxis, and tooth extraction. The principles of endodontics, periodontics, orthodontics, and restorations are discussed. Techniques useful in oral surgery, such as dental bonding and intra-oral splinting are presented. Typically offered Spring Summer.

VCS 85100 - Medicine And Surgery Of Nontraditional Pets

Credit Hours: 2.00. An overview of clinical approach to common medical and surgical diseases of nontraditional pets. Focuses on diagnosis and treatment of common diseases encountered in small animal clinical practice. Typically offered Spring Summer.

VCS 86000 - Emergency Medicine/ICU

Credit Hours: 0.00. Designed to teach principles of intensive medical care. Advanced monitoring, critical care technology, and nursing care principles are applied as appropriate for patients under the supervision of their attending clinician. Typically offered Spring.

VCS 86001 - Small Animal Emergency And Critical Care

Credit Hours: 3.00. This course is designed to provide an extensive three-week experiential clinical rotation that is focused on small animal emergency and critical care. The student will participate in receiving, triaging, and treating small animal emergency cases, as well as monitoring and treating critically ill small animal patients admitted to the Veterinary Teaching Hospital. Rounds will be topic and case oriented. For students in all tracks. Typically offered Fall Spring Summer.

VCS 86002 - Small Animal Emergency And Critical Care II

Credit Hours: 3.00. This course is designed to provide an intensive 3-week experiential clinical rotation that is focused on small animal emergency and critical care. The student will participate in receiving, triaging, evaluating emergency cases as well as monitoring and treating critically ill small animal patients admitted to the Veterinary Teaching Hospital. There will be a focus on providing additional opportunities for the student to participate in and perform advanced critical care techniques. Typically offered Fall Spring Summer.

VCS 86100 - Small Animal Medicine I

Credit Hours: 3.00. Basic clinical experience and training in the art and science of small animal medicine. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 86201 - Small Animal Surgery - General I

Credit Hours: 3.00. Students will be expected to participate in the evaluation, treatment, and care of patients, learning from clinical case material, reviewing topics, and reading the surgical literature. Students will perform elective neutering procedures as the primary surgeon and assist in other surgical procedures. Students will participate in surgery rounds at least once each day, with every student researching and discussing the theoretical aspects of cases and making a formal case or topic presentation to other students and faculty at least once during the course. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 86202 - Small Animal Surgery - Orthopedic

Credit Hours: 3.00. Students will be expected to participate in the small animal orthopedic service. Students will be expected to participate in the evaluation, treatment and care of patients, learning from clinical case material, reviewing topics, and reading the surgical literature. Students will gain experience performing orthopedic and neurologic examinations and localizing lesions. Students will participate in surgery rounds at least once each day, with every student researching and discussing the theoretical aspects of cases and making a formal case or topic presentation to other students and faculty at least once during the course. Typically offered Fall Spring Summer.

VCS 86203 - Shelter Medicine And Surgery

Credit Hours: 3.00. Students will spend two weeks performing elective surgery on shelter animals in the mobile surgery unit and one week working at an off-campus shelter. The mobile surgery unit, staffed by a DVM faculty member and a full-time RVT will operate 4 days per week, estimated 12 hours per day. Students will perform independent study on the day they do not participate in mobile surgery. During the one week at the shelter, students will work approximately 50 hours spread over 5 days of the week assisting the shelter medicine veterinarian in all aspects of shelter medicine. There will be a limit of 4 students per block, with a maximum of 3 students participating in the mobile surgery unit at any time. Preference will be given to students who are planning to specialize in shelter medicine. Typically offered Fall Spring Summer.

VCS 86300 - Small Animal Community Practice

Credit Hours: 3.00. Provides students with training in outpatient small animal medicine and client communication. Special emphasis is placed on preventive medicine. Students are required to write one paper as arranged with the instructor. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 86502 - Large Animal Medicine I

Credit Hours: 3.00. Clinical training in problem solving of medical diseases, performance of diagnostic procedures, treatment, and care of individual animals. Emphasis on bovine cases. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 86600 - Large Animal Surgery I

Credit Hours: 3.00. Students are exposed to, and responsible for, case-oriented problem-solving experiences with large animal surgical diseases, including lamenesses. Students may have an opportunity to focus on a particular species during a portion of the basic block. The basic block includes the development of skills and capability with the principles of surgery (e.g., anesthesia, asepsis, and wound healing) as applied to large animal patients. The basic block experience is directed to primary level care. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 86700 - Equine Community Practice I

Credit Hours: 3.00. This course will provide training in outpatient and ambulatory equine medicine, surgery, theriogenology, and preventive medicine. Typically offered Fall Spring Summer.

VCS 86800 - Equine Community Practice II

Credit Hours: 3.00. Provides students with training in outpatient and ambulatory equine medicine, surgery, theriogenology, and preventive medicine. Special emphasis on client communications and computerized practice management is provided. A special project in practice management is required. Total clinic hour 129. Typically offered Summer Fall Spring.

VCS 87000 - Clinical Cardiology

Credit Hours: 3.00. Students will actively participate in diagnostic and therapeutic procedures in all veterinary species with an emphasis on small animals. Students will be instructed and actively perform such diagnostic and therapeutic procedures including: electrocardiography, echocardiography, blood pressure determination and catheter placement. Students will be given exposure to invasive procedures such as angiography, intracavitary pressure determinations, PDA embolization, balloon

valvuloplasty and pacemaker implantation. Students will receive "active" clinical instruction as well as lectures in the form of teaching rounds. Current concepts in cardiovascular medicine will be emphasized. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 87100 - Small Animal Medicine II

Credit Hours: 3.00. Additional clinical experience and training in the art and science of small animal medicine. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 87102 - Oncology I

Credit Hours: 3.00. This block is designed to provide maximum exposure to clinical and comparative oncology. Students will develop skills necessary to fully evaluate and treat canine and feline cancer patients. Students will receive two weeks of exposure to the medical oncology clinic and one week of exposure to the radiation oncology clinic. Students will gain experience with various biopsy techniques and with therapeutic modalities including chemotherapy and radiation therapy. Independent study of relevant current literature is expected. The oncology student will concentrate on handling oncology patients but will have general internal medicine responsibilities during non-clinic hours. Typically offered Fall Spring Summer.

VCS 87104 - Clinical Investigation In Oncology II

Credit Hours: 3.00. This elective will allow senior students the opportunity to investigate a problem in clinical oncology. The problem and method of investigation will be defined by the student and instructor. Methods of investigation available could include: 1) prospective or retrospective studies relating to the diagnosis, biological behavior, and treatment of specific canine or feline neoplasms, and 2) in vitro evaluation of tumor cells (e.g. cell culture). Oncology rounds attendance and case responsibility in oncology will also be expected. The experience gained in this course may aid in preparing the student to enter graduate or residency training. An expanded course description for the specific problem to be investigated must be placed on file in the departmental office and in the office of the Associate Dean of Academic Affairs. Total clinic hours 129. Permission of instructor required. Typically offered Fall Spring Summer.

VCS 87105 - Pet Practice

Credit Hours: 6.00. Advanced instruction and clinical experience in dermatologic medicine. Students participate fully in diagnostics, therapeutics, patient management, drug studies, and research activities. Extensive self-study materials are available. Small Animal Community Practice: Students will receive training in primary care small animal and exotic pet medicine, behavior, theriogenology, client preventive medicine and overall pet wellness to promote the family-pet bond. Students will be required to write one paper as arranged with instructor. Typically offered Fall Spring Summer.

VCS 87201 - Clinical Veterinary Anesthesiology

Credit Hours: 3.00. This course will provide clinical training in anesthesiology. Students may focus on large animals, small animals, or a mixture of the both. The students will participate in daily rounds to discuss case work-up as well as advanced topics in anesthesia that are not covered in other courses. Topics may include mechanical ventilation, blood gas interpretation, neuromuscular blockade, and adjunctive anesthetic procedures (epidural analgesia, brachial plexus block, etc.) Typically offered Fall Spring Summer.

VCS 87202 - Small Animal Surgery - General II

Credit Hours: 3.00. Students will be expected to assume greater responsibility for evaluation, treatment, and care of patients while developing greater knowledge, clinical judgment, and diagnostic capabilities that enable them to manage more complex cases. Students will learn from clinical case material, reviewing topics, and reading the surgical literature and will be given more responsibility for case management. Students will perform elective neutering procedures as the primary surgeon and assist in other surgical procedures. Students will participate in surgery rounds at least once each day, with every student researching and leading case discussions, demonstrating more initiative and independence. Each student will make a formal case or topic presentation to other students and faculty at least once during the course. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 87203 - Small Animal Surgery - Orthopedic II

Credit Hours: 3.00. Students will be expected to assume greater responsibility for evaluation, treatment, and care of patients while developing greater knowledge, clinical judgment, and diagnostics capabilities that enable them to manage more complex cases. Students will be expected to learn from clinical case material, reviewing topics, and reading the surgical literature. Students will gain additional experience performing orthopedic examinations. Typically offered Fall Spring Summer.

VCS 87502 - Large Animal Medicine II

Credit Hours: 3.00. Advanced clinical training in problem-solving of medical diseases, performance of diagnostic procedures, treatment, and care. Students may be allowed to spend up to three working days off campus to work with a veterinarian engaged in practice in the student's area of interest. This off-campus experience should enhance the student's education by complementing experience gained on campus. Typically offered Fall Spring Summer.

VCS 87600 - Large Animal Surgery II

Credit Hours: 3.00. Students have advanced responsibility for large animal surgical patients with a species focus. Students are expected to conduct the appropriate presurgical physical examination, assist with the surgery, and be responsible for the postoperative care of most primary care-level patients and many secondary care-level patients. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 87700 - Large Animal Lameness

Credit Hours: 3.00. Students are exposed to, and responsible for, case-oriented problem-solving experiences with large animal lamenesses and orthopedic diseases. The case exposure is primarily equine, but lameness students are expected to help with food animal lamenesses and orthopedics, as a comparative biomedical approach to studying locomotion and the musculoskeletal system. Depending upon the availability of lameness cases, lameness students will participate with the general clinic responsibilities and emergency duty in the large animal surgery. Students may be allowed to spend up to three days off campus to work with a veterinarian engaged in practice in the student's area of interest. This off-campus experience should enhance the student's education by complementing experience gained on campus. Typically offered Fall Spring Summer.

VCS 87800 - Swine Production Medicine I

Credit Hours: 3.00. Advanced training and extensive experience in working with swine herds on a herd health management program. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 87900 - Bovine Theriogenology And Production Medicine I

Credit Hours: 3.00. Training and experience in working with reproductive management problems in dairy and beef herds. The importance of herd records in assessing performance and health is stressed, and training is provided in the use of computerized recording systems and ration formulation programs. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 87902 - Comparative Theriogenology

Credit Hours: 3.00. Training and experience in working with reproductive management problems in dairy and beef herds. The importance of herd records in assessing performance and health is stressed, and training is provided in the use of computerized recording systems and ration formulation programs. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 87903 - Bovine Theriogenology And Production Medicine II

Credit Hours: 3.00. Advanced training in the areas of embryo transfer, embryo grading, artificial insemination, oviduct patency tests, and ultrasound use in ambulatory food animal practice. Training will also focus on repeat breeder cows. Additional responsibilities will be designated in the areas of herd health, production medicine and the recognition of disease processes. Typically offered Fall Spring Summer.

VCS 87905 - Advanced Beef Cow-Calf Production Medicine

Credit Hours: 3.00. This course is designed to provide an intensive 3-week experiential clinical rotation that is focused on beef cow-calf production medicine. The students will spend about 50% of the time on herd visits and about 50% on research and writing up herd reports. Each student will be responsible for a specific area of focus on each herd visit. Purdue students taking the block will be available for back-up emergency duty on days when they are on campus. Typically offered Fall.

VCS 88000 - Ruminant (Dairy) Production Medicine I

Credit Hours: 3.00. Training and faculty-directed independent study in dairy production medicine. Emphasis is on health and management from the newborn calf to the lactating dairy cow. Particular attention is paid to nutritional management, herd monitoring, and herd records analysis. Additionally, vaccination programs, facilities, and welfare auditing will be covered. The block may be customized according to the interests of the students enrolled. A limited amount of time is spent on individual animal care. Farm visits to observe different management styles and to provide troubleshooting of herd problems will also be scheduled during the block. Students may be allowed to spend up to five working days off-campus to work with a veterinarian engaged in practice in the student's area of interest. This off-campus experience should enhance the student's education by complementing experience gained on campus. Typically offered Fall Spring Summer.

VCS 88001 - Ruminant (Dairy) Production Medicine II

Credit Hours: 3.00. This course is meant to build on the knowledge gained in VCS 88000 and is directed at students that are focused on future intensive dairy practice. The structure of the block will be similar to VCS 88000, but there will be more in-depth discussion of ration building, records analysis, and mild quality. Additional farm visits will also be performed to provide exposure to different types of dairy farms that will be encountered in dairy practice. Typically offered Fall Spring Summer.

VCS 88100 - Small Animal Medicine III

Credit Hours: 3.00. Further clinical exposure with emphasis on cases in the student's area of interest. A faculty mentor will be assigned to each student. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 88300 - Clinical Investigation In Theriogenology

Credit Hours: 3.00. Provides senior students an opportunity to investigate a clinical problem in a laboratory situation. The student is expected to apply one of the many research techniques available in the school to address the question. The experiences gained may allow the candidate to pursue graduate and residency training in theriogenology. An expanded course description for the specific problem to be investigated must be placed on file in the departmental office and in the office of the associate dean of academic affairs. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 88500 - Large Animal Medicine III

Credit Hours: 3.00. Advanced clinical training with focused interest in a specialized type of practice, in-depth training in internal medicine, or participation in large animal related research activities. Students may be allowed to spend up to three working days off campus to work with a veterinarian engaged in practice in the student's area of interest. This experience should enhance the student's education by complementing experience gained on campus. The short off-campus experience should be arranged with the professor of record of the course at least 30 days prior to the beginning of the block. Typically offered Fall Spring Summer.

VCS 88600 - Large Animal Surgery III

Credit Hours: 3.00. Students at this level are expected to function with greater independence, carrying out the history, physical examination, and postoperative care of all elective and certain emergency/intensive care patients of the species of their choice. Depending upon the capabilities and competence of the student, as determined by the surgery faculty and staff, he or she will have the opportunity to conduct supervised surgical procedures. Students may be allowed to spend up to three days off campus to work with a veterinarian engaged in practice in the student's area of interest. This off-campus experience should enhance the student's education by complementing experience gained on campus. Typically offered Fall Spring Summer.

VCS 88601 - Large Animal Surgery III Food Animal

Credit Hours: 3.00. This course will focus on food animal surgery and lameness and will only be offered 1-2 times per year. Students will be expected to function with greater independence than during LAS I and II, carrying out the history, physical examination and postoperative care of elective and certain emergency/intensive care patients. Depending upon the capabilities and competence of the student, as determined by the surgery faculty and staff, he/she will have the opportunity to conduct supervised surgical procedures. This block will focus on food animal surgical diseases through seminars, in-clinic hands-on laboratory sessions, rounds discussions and an emphasis on food animal clinical cases. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 88800 - Swine Production Medicine II

Credit Hours: 3.00. This course is a faculty-directed independent study. Students are expected to use campus, state, and national resources to deal with herd problems. The goal is to bring the knowledge base of the student to the entry level expected for a swine practitioner. Emphasis is placed on veterinary services needed to maintain top production efficiency in swine herds. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 89100 - Diagnostic Imaging

Credit Hours: 3.00. Clinical training and experience in radiology and ultrasound imaging as it contributes to the practice of veterinary medicine. Seminars are based on small animal imaging. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 89101 - Veterinary Diagnostic - Ultrasound

Credit Hours: 3.00. This rotation will provide opportunity for hands-on small animal ultrasound imaging. The student will have the opportunity to pre-scan the patients prior to actual scan by the radiologist. By doing so, the student will learn the ultrasound scanning techniques and real-time interpretation of ultrasonography. In addition, students will observe the scanning of veterinary patients by the radiologist and will be asked to participate in ultrasonography interpretation. Typically offered Fall Spring Summer.

VCS 89200 - Veterinary Forensic Medicine

Credit Hours: 1.00. Advanced study in the field of animal health and practice of veterinary medicine. Must have completed semesters 1 and 2 of the DVM curriculum. Typically offered Fall Spring Summer.

VCS 89300 - Shelter Animal Medicine

Credit Hours: 1.00. The Shelter Animal medicine course will be offered to second and third year veterinary students. The course will cover topics essential to understanding the complexity of population medicine in a shelter environment and related welfare issues. Topics to be covered include animal shelter models (no-kill/adoption guarantee, tradition, etc.), population medicine and disease control as it relates to the environment and the animals, critical care in a shelter environment, foster care, neonatal care of shelter animals, population statistics, animal behavior and relinquishment issues, abuse and cruelty, legal and ethical issues, euthanasia, and developing and implementing animal disaster plans. Typically offered Spring Summer.

VCS 89400 - Comparative Ophthalmology I

Credit Hours: 3.00. Students are given the opportunity to develop the technical skills needed to test for vision and examine each ocular structure for abnormalities. The rotation includes clinical experience and instruction in veterinary (comparative) ophthalmology with participation in the diagnosis, therapy, and management of clinical cases and various research activities. A seminar presentation and/or special project is required. Total clinic hours 129. Typically offered Fall Spring Summer.

VCS 89500 - Veterinary Teaching Hospital Practicum

Credit Hours: 0.00. Students will be assigned to work on a service in the Veterinary Teaching Hospital over one-half of the December-January holiday period. The student will gain hands-on practical experience in the diagnosis and treatment of patients presented to the VTH. The student will also gain some experience managing emergent cases. Total clinic hours 45. Typically offered Spring.

Veterinary Medicine

VM 10200 - Careers In Veterinary Medicine

Credit Hours: 1.00. Overview of the field of veterinary medicine presently and as anticipated for the future. Presentations will include descriptions and discussions of the nature of the professional activity, organization of veterinary medicine, career opportunities, issues confronting the profession, and the admission requirements of the profession. Typically offered Spring.

VM 10201 - Careers In Veterinary Medicine-DL

Credit Hours: 1.00. This course will present to undergraduate students an overview of the field of veterinary medicine, as it is manifest presently, and as it may develop in the future. Included will be descriptions and discussions of the many professional activities of veterinarians, the organization of the profession, and the admission procedures for veterinary education. Presentations will focus upon the people, principles and concepts of the veterinary profession. Permission of instructor required. Typically offered Fall Spring Summer.

VM 10500 - Introduction to Veterinary Technology-DL

Credit Hours: 1.00. An introduction to the profession of Veterinary Technology will be presented. It will include the many roles of veterinary technicians on the veterinary teams in practice and non-practice areas. Learning skills with an emphasis on medical terminology will be covered to help the student develop a foundation of medical vocabulary for future courses. Typically offered Fall Spring Summer.

VM 14000 - Introduction To Veterinary Technology

Credit Hours: 1.00. This course provides an orientation to the profession of Veterinary Technology. Typically offered Fall.

VM 20500 - Small Animal Nursing Clinical Mentorship I-DL

Credit Hours: 1.00. This is the first of three clinical mentorships in small animal nursing. This clinical mentorship will require the veterinary technician student to work with a small animal veterinary care facility to practice several tasks under the supervision of a clinical mentor. This clinical mentorship focuses on the principles of historytaking, physical examination, simple diagnostic sample collection, parenteral and oral administration of medication, and venipuncture. Permission of department required. Typically offered Fall Spring Summer.

VM 20600 - Small Animal Nursing Clinical Mentorship II-DL

Credit Hours: 1.00. This is the second of three clinical mentorships in small animal nursing. This mentorship requires the student to work with a small animal veterinary care facility to practice several tasks under the supervision of a clinical mentor. This clinical mentorship focuses on the principles of venipuncture, catheter placement, various methods of urine collection, vaginal cytology, dental prophylaxis, and ECG tracings. Permission of department required. Typically offered Fall Spring Summer.

VM 20700 - Small Animal Nursing Clinical Mentorship III-DL

Credit Hours: 1.00. This is the third of three clinical mentorships in small animal nursing. This mentorship will require the student to work with a small animal veterinary care facility to practice several tasks under the supervision of a clinical mentor. This clinical mentorship focuses on the principles of oncology, dermatology, ophthalmology, and emergency care procedures. Permission of department required. Typically offered Fall Spring Summer.

VM 20800 - Large Animal Medical Nursing Clinical Mentorship -DL

Credit Hours: 1.00. This clinical mentorship focuses on the principles of basic handling, nursing, and diagnostic techniques used in large animal medicine. Permission of department required. Typically offered Summer Fall Spring.

VM 20900 - Equine Medical Nursing Clinical Mentorship - DL

Credit Hours: 1.00. This clinical mentorship focuses on the principles of handling, restraint, and equine nursing care. Tasks to be documented include restraint and handling techniques, data collection, basic nursing care, and adminstration of medication and treatments. Permission of department required. Typically offered Summer Fall Spring.

VM 21000 - Small Animal Anesthesia-Clinical Mentorship-DL

Credit Hours: 2.00. This mentorship will require the student to work with a small animal veterinary care facility to practice several tasks under the supervision of a clinical mentor. This mentorship focuses on the principles of anesthesia from induction, maintenance to recovery. Permission of department required. Typically offered Summer Fall Spring.

VM 21100 - Food Animal and Equine Anesthesia-Clinical Mentorship-DL

Credit Hours: 1.00. This mentorship will require the student to work with a food animal or equine veterinary care facility to practice several tasks under the supervision of a clinical mentor. This mentorship focuses on the principles of large animal and equine anesthesia from induction and maintenance to recovery. Permission of department required. Typically offered Summer Fall Spring.

VM 21200 - Operating Room Techniques and Sterilization -Clinical Mentorship-DL

Credit Hours: 0.50. This clinical mentorship will require the student to work in a veterinary care facility to practice several tasks under the supervision of a clinical mentor. This mentorship focuses on the principles of operating room procedures, patient and instrument preparation for surgery and the duties of the circulating nurse and the scrub nurse. Permission of department required. Typically offered Summer Fall Spring.

VM 21500 - Small Animal Diag Imaging I-Clinical Mentorship-DL

Credit Hours: 1.00. This is the first of two clinical mentorships in diagnostic imaging. This mentorship will require the student to work with a small animal veterinary care facility to practice several tasks under the supervision of a clinical mentor. This mentorship focuses on the principles of film loading, processing, presentation for viewing radiographs, care and maintenance of processors, and imaging of the thorax and abdomen. Permission of department required. Typically offered Fall Spring Summer.

VM 21600 - Small Animal Diag Imaging II-Clinical Mentorship-DL

Credit Hours: 1.00. This is the second clinical mentorship in small animal diagnostic imaging. This mentorship requires the student to work with a small animal veterinary care facility to practice several tasks under the supervision of a clinical mentor. This mentorship focuses on the preparation of a technique chart, imaging of the shoulder, radius, ulna, stifle, spine, skull, and pelvis. Permission of department required. Typically offered Fall Spring Summer.

VM 21700 - Food Animal and Equine Diagnostic Imaging-Clinical Mentorship

Credit Hours: 0.50. This clinical mentorship will require the student to work with a food animal/equine veterinary care facility to practice several tasks under the supervision of a clinical mentor. This mentorship focuses on the imaging of the carpus, fetlock, tarsus, navicular projection, P3 views, and the dorsoproximal-palmarodistal view. Permission of department required. Typically offered Fall Spring Summer.

VM 22000 - Laboratory Animal Health I -DL

Credit Hours: 1.00. This course is the first of two courses that provide basic instruction in the concepts of laboratory animal health management to the veterinary technician student. This course will place an emphasis on the basics of care and nutrition of common laboratory animals, the issues of animal welfare as they apply to research, and safety and care procedures for working in the laboratory animal environment. Students are expected to achieve a level of understanding of laboratory animal care and management that will allow them to communicate effectively with the veterinarian. Typically offered Fall Spring Summer.

VM 22100 - Laboratory Animal Health II -DL

Credit Hours: 1.00. This course is the second of two courses that provide basic instruction in the concepts of laboratory animal health management to the veterinary technician student. This course will place an emphasis on the care of laboratory animals as well as specific procedures that are used in laboratory animal medicine. Typically offered Fall Spring Summer.

VM 22200 - Parsitology Microbiology Clinical Mentorship -DL

Credit Hours: 1.00. This clinical mentorship focuses on the motor skills required to sample, prepare specimens for examination, and for technician level diagnostic techniques. Tasks to be documented include collection of microbiological samples, techniques for staining and testing samples, techniques for collecting and testing common parasites. Permission of department required. Typically offered Summer Fall Spring.

VM 22300 - Pharmacy Clinical Mentorship-DL

Credit Hours: 0.50. This clinical mentorship will require the veterinary technician student to work with a veterinary care facility to practice tasks under the supervision of a clinical mentor. This clinical mentorship focuses on the principles of drug order fulfillment, reconstitution of medications, correct storage of medications (including controlled substances), safe handling of hazardous medications, and inventory control procedures. Permission of department required. Typically offered Fall Spring Summer.

VM 22400 - Necropsy Clinical Mentorship -DL

Credit Hours: 0.50. This clinical mentorship focuses on the motor skills and techniques in performing a basic prosection (necropsy). Tasks include basic necropsy technique, techniques for sample collection and storage, and safety issues related to handling animal specimens. Permission of department required. Typically offered Summer Fall Spring.

VM 22500 - Advanced Clinical Mentorship - DL

Credit Hours: 1.50. This clinical mentorship will require the student to complete 120 hours of additional work experience while completing a series of selected projects related to veterinary medicine. Permission of department required. Typically offered Summer Fall Spring.

VM 22600 - Laboratory Animal Clinical Mentorship -DL

Credit Hours: 0.50. This clinical mentorship focuses on the motor skills involved with the basic handling, restraint,

administration of medication and nursing care of laboratory animals. Permission of department required. Typically offered Summer Fall Spring.

VM 22700 - Clinical Pathology Clinical Mentorship-DL

Credit Hours: 2.00. This clinical mentorship will require the student to work with a laboratory, small or large animal veterinary care facility to practice several tasks under the supervision of a clinical mentor. This clinical mentorship focuses on the principles of blood film evaluation for different species, manual and automated CBCs, normal and abnormal cellular morphology, urinalysis, chemistry panels, and differentials. Permission of department required. Typically offered Fall Spring Summer.

VM 24100 - Safety, Prevention And Public Health

Credit Hours: 1.00. This course will cover selected zoonotic diseases, occupational hazards and safety issues, related to the veterinary health care team and veterinary facility. Typically offered Fall.

VM 24200 - Integrations I

Credit Hours: 1.00. An introduction to problem based learning of the nursing process (patient evaluations, interventions, and desired resolutions) using a case based approach. This course will integrate foundational knowledge from anatomy, physiology, with information in the veterinary nursing courses. Cases will involve different domestic animal species. Students will learn using a variety of teaching modalities (lecture, group work, problem based learning). Typically offered Fall.

VM 24300 - Clilnic Rotations I

Credit Hours: 1.50. This course will provide the basic learning situations for developing the techniques required of veterinary technicians in pharmacy, radiology, surgery, medical nursing, and ancillary areas. Total clinic hours 9/week. Typically offered Fall.

VM 24400 - Clinical Rotations II

Credit Hours: 1.5. This course will provide clinical learning situations for developing techniques required for veterinary technicians in surgery, medical nursing, clinical pathology, radiology, pharmacy, and ancillary areas. Typically offered Spring.

VM 24500 - Management Topics for Vet Techs I -DL

Credit Hours: 1.50. This course is the first of two courses that provide basic instruction in the concepts of a veterinary technician's role in the management of day-to-day operations of a veterinary clinic. This course will emphasize problems related to ethical and liability issues, medical records, inventory, marketing and fees, writing cover letters and resumes, and job interviews. Typically offered Fall Spring Summer.

VM 24600 - Management Topics for Vet Techs II-DL

Credit Hours: 1.50. This course is the second of two courses that provide basic instruction in the concepts of a veterinary technician's role in the management of day-to-day operations of a veterinary clinic. This course will place an emphasis on client interaction including active listening skills, effective client communication, handling emotional clients, and euthanasia and client grief. Typically offered Fall Spring Summer.

VM 24800 - Understanding Animal Disease-DL

Credit Hours: 2.00. This course is a survey of common small animal and large animal diseases, their clinical signs, and how these signs can be explained by physiology and pathophysiology. The zoonotic potential for the disease and the role of the veterinary technician in the treatment, management, and education of client/owner of the affected animal is also emphasized. Typically offered Fall Spring Summer.

VM 24900 - Clinical Rotations III

Credit Hours: 3.5. This course will provide clinical learning situations for developing techniques required for veterinary technicians in surgery, medical nursing, clinical pathology, radiology, pharmacy, and ancillary areas. Typically offered Summer.

VM 25100 - Medical Math And Terminology For Veterinary Technicians

Credit Hours: 0.50. This course will introduce students to fundamental medical terminology and basic math and dosage calculations commonly used in veterinary medicine. The course includes both classroom and on-line components. Typically offered Fall.

VM 25500 - Veterinary Technology Externship

Credit Hours: 2.00. A six-week, off-campus work experience in a facet of veterinary technology selected as a career goal by the student. Typically offered Summer.

VM 27700 - Management Topics For Veterinary Technicians

Credit Hours: 3.00. Management problems with veterinary ethics, law communication, finance, and hospital maintenance will be emphasized. Students will also research special interests directly related to a technician's duties and present informative seminars to their classmates. Typically offered Fall.

VM 29000 - Clinic Rotation

Credit Hours: 7.00. This course will provide clinical situations for practicing the techniques required of veterinary technicians in pharmacy, radiology, surgery, medical nursing, clinical pathology, and ancillary areas. Emphasis will be on performance proficiency. Total clinic hours 21/week. Typically offered Fall.

VM 30100 - Seminar For Veterinary Technologists I

Credit Hours: 1.00. Discussion of case situations that encourage development of decision making skills at the veterinary technologist level. Independent study time is allocated for selection and completion of prerequisite steps needed for participating in a practicum. Typically offered Spring.

VM 32300 - Laboratory Animals And Nursing Of Non-Traditional Pets

Credit Hours: 2.00. This course will cover the proper methods of restraint, daily care, nursing techniques, and housing needs for the common species of laboratory animals. Typically offered Spring.

VM 34200 - Integrations II

Credit Hours: 1.00. A continuation to problem based learning of the nursing process using a case based approach. This course will integrate foundational knowledge from anatomy, physiology, veterinary nursing courses, clinical pathology, pharmacology, anesthesia diagnostic imaging, microbiology and parasitology. Cases will involve different domestic animal species and laboratory animals. Students will learn using a variety of teaching modalities (lecture, group work, problem-based learning). Typically offered Spring.

VM 34300 - Clinical Rotations IV

Credit Hours: 5.00. This course will provide clinical learning situations for developing techniques required for veterinary technicians in surgery, medical nursing, clinical pathology, radiology, pharmacy, and ancillary areas. Typically offered Fall.

VM 34400 - Clinic Rotations V

Credit Hours: 5.00. This course will provide clinical learning situations for developing techniques required for veterinary technicians in surgery, medical nursing, clinical radiology, pharmacy, and ancillary areas. Typically offered Spring.

VM 34500 - Management I

Credit Hours: 1.50. The course will introduce students to concepts related to working in and managing a veterinary practice. Emphasis will be on client communication and education as well as facilitating a job search, interviewing and cover letter and resume creation. Typically offered Spring.

VM 36500 - Laboratory Animal Management

Credit Hours: 3.00. This course will cover the principles of laboratory animal science for the technologist (veterinary and LATG). Concepts of facility management, animal health and diseases, regulatory issues, compliance, and instrumentation will be presented. Typically offered Fall.

VM 36600 - Concepts Of Veterinary Hospital Management

Credit Hours: 3.00. Principles of management of the veterinary hospital, including human resources, inventory, clientele, and finances. Emphasis will be on the role of the veterinary hospital manager. Method of delivery is blended and will consist of one face-to-face meeting per week (75 minutes) and online discussions/activities. Typically offered Spring.

VM 36700 - Foundations Of Instruction For Allied Health Professionals

Credit Hours: 1.00. Introduction to assessing student learning needs and applying teaching methods to the education of allied health, veterinary, pharmacy, and graduate students. Typically offered Spring.

VM 39000 - Practicum

Credit Hours: 4.00. Veterinary technologist level off-campus experience in one area of interest totaling 480 hours over 12 weeks. Typically offered Fall Spring Summer.

VM 41400 - Seminar For Veterinary Technologists II

Credit Hours: 1.00. Case studies from practicums will be presented in seminar format to illustrate problem analysis at the technologist level. Typically offered Fall.

VM 42500 - Veterinary Technician Grand Rounds

Credit Hours: 0.00. Provides a regular forum to bring those in the college together, focused around their common interest in veterinary medicine. Case-based presentations emphasize the basic pathophysiology of disease and clinical investigation and demonstrate the interactions between the clinical and basic sciences. Typically offered Fall Spring Summer.

VM 44100 - Occupational And Public Health For Veterinary Technicians

Credit Hours: 1.00. The course covers selected aspects of public health and safety related to the veterinary health care team, patient, client and public. Typically offered Fall.

VM 44200 - Management II

Credit Hours: 1.50. This course is a continuation of the first veterinary practice management course. It will introduce students to concepts related to leading a veterinary medical team and managing the day-to-day management of the veterinary practice. Emphasis will be on human resources, marketing and financial management. Typically offered Fall.

VM 44300 - Clinic Rotations VI

Credit Hours: 2.00. This course will provide clinical learning situations for developing techniques required for veterinary technicians in surgery, medical nursing, clinical pathology, radiology, pharmacy, and ancillary areas. Typically offered Spring.

VM 44400 - Veterinary Technology Clinical Orientation

Credit Hours: 3.00. This course is an intensive experience and clinical orientation to the Veterinary Teaching Hospital for graduates from another AVMA accredited Veterinary Technology program who wish to complete a BS degree at Purdue University. This course is a four week long, full day rotation (40 hours per week). Typically offered Summer.

VM 44500 - Veterinary Technology Senior Project

Credit Hours: 4.00. This is an independent study course in which the student engages in learning activities to enhance their knowledge in a particular area of veterinary technology of their choosing, demonstrate effective oral and written communication, and apply analysis, integration, and syntheses to achieve a solution. Typically offered Spring.

VM 45000 - Animals In Emergencies-Disaster Management

Credit Hours: 1.00. The course is intended to assist animal care providers in understanding the incident command system and developing plans that improve the care of and mitigating the impact of disasters on livestock and pets. Typically offered Fall Spring.

VM 45100 - Contemporary Topics In Life Skills

Credit Hours: 1.00. This course will introduce the student to a variety of different skills needed to be successful after graduating from college. It will introduce students to concepts related to managing a job search and evaluating job offers, establishing and using credit, investing, saving, risk assessment and managing college debt. Typically offered Fall Spring.

VM 45200 - Managing Human Resources In Veterinary Medicine

Credit Hours: 1.00. This course will focus on a variety of different topics specifically related to human resources management in the veterinary clinic and will build upon the concepts presented in VM 44200. It will introduce students to concepts related to the interviewing and hiring process, motivating employees, using rewards and incentives, leadership and power, training employees, EEOC and employment laws, performance appraisals, progressive discipline and harassment in the workplace. Typically offered Spring.

VM 45300 - The Role Of The Clinical Research Technician

Credit Hours: 1.00. This course is aimed for the student with a strong interest in clinical trial research. The student will gain a broader knowledge of regulatory bodies involved in research and the vital team role the clinical research technician/nurse plays during clinical trials. The student will gain exposure to histology preparations, microtome use and immuno-histological staining procedures as well as receiving clinical cases from current oncology trials. Enrollment will be capped to four students per semester. Typically offered Fall Spring.

VM 45400 - Animal Rehabilitation And Physiotherapy

Credit Hours: 1.00. This course is an introduction to physical rehabilitation of the veterinary patient. It is designed to instruct students in the basic principles of rehabilitation. This course will introduce the fundamentals needed in clinical practice. Typically offered Fall Spring Summer.

VM 45500 - Equine Behavior For The Veterinary Technician

Credit Hours: 1.00. This course is an in-depth look at equine behavior beyond the basics covered in the nursing courses. It is designed to show how the environment in which the horse is kept can affect its behavior. This course will also demonstrate how the study of behavior is applied in equine welfare and to the solution of practical problems and problem behavior in the equine patient. Typically offered Fall Spring Summer.

VM 45600 - Advanced Ophthalmology For Veterinary Technicians

Credit Hours: 1.00. This course is an in-depth look at ocular anatomy and physiology, use of exam equipment, diagnostic techniques, imaging, pharmacology, surgical instrument identification, cleaning, and care of instruments, surgical nursing, surgical procedures, anesthesia protocols and concerns that are associated with these procedures. Typically offered Spring.

VM 45700 - Advanced Neurology For Veterinary Medicine

Credit Hours: 1.00. This course will focus on neuroanatomy and neurophysiology as well as explore a variety of common neurologic diseases and the basic pathophysiology behind those disease processes. Students will also learn proper nursing care techniques associated with patients with these diseases. Typically offered Spring.

VM 46300 - Special Project

Credit Hours: 1.00. Research paper in the student's focus of career interest will be presented in a seminar format. Typically offered Fall.

VM 49000 - Topics In Veterinary Medicine

Credit Hours: 0.50 to 5.00. Advanced study in the field of animal health and practice of veterinary medicine. Permission of instructor required. Typically offered Spring.

VM 80900 - International Veterinary Medicine

Credit Hours: 0.5. The course will consist of eight lectures addressing international aspects of the following topics: zoonotic diseases, food hygiene, biosecurity, animal welfare, animal husbandry, infectious diseases, cultural competence, veterinary medical education, and role of international organizations in animal health. Participating students will be required to choose an internationally relevant topic of interest to research. The last session of the course will be a poster session in which each student will present and discuss a poster. The posters will be evaluated by a panel of 3-4 faculty members and a grade assessed. Permission of Department required. Typically offered Spring.

VM 81000 - Veterinary Externship

Credit Hours: 6.00. A six-week or 280-contact-hour work experience, under the direct supervision of a veterinarian, in a facet of veterinary medicine selected as a career goal by the student. Typically offered Fall Spring Summer.

VM 81001 - International Externship

Credit Hours: 1.00 to 6.00. This course will allow veterinary students to establish a unique veterinary learning experience in their area of interest in an international location. Each veterinary learning experience will be designed by the student with input from faculty advisor and the professor of record. Permission of instructor required. Typically offered Fall Spring Summer.

VM 81002 - Veterinary Medicine Service Learning-VIDA

Credit Hours: 2.00. This 10 day service learning study abroad program is designed for veterinary students to gain practical experience by performing spay neuters of small animals as well as addressing wellness needs of both small and large animals. Typically offered Summer.

VM 81003 - International Veterinary Medicine- Directed Experience

Credit Hours: 1.00 to 6.00. This course allows veterinary students to participate in a unique faculty-led veterinary learning experience in an international location. Credit will be assigned on the basis of 1 credit for each 45-50 hours of student effort up to a maximum of 6 credits. In most instances, one week of experience will equal one credit. Each veterinary learning experience will be designed by the faculty leader to accomplish specific learning goals in the focuses area of study. The course will be offered in the summer and will vary in length from 1-6 weeks depending on the specific experience. Typically offered Summer.

VM 82000 - Applications And Integrations I

Credit Hours: 3.00. Small group tutorial, problem-oriented approach to understanding how basic science concepts are integrated into clinical aspects of veterinary medicine. Students are expected to identify learning issues, resolve identified gaps in their

knowledge base, integrate information across disciplines, and practice/develop problem-solving skills using simulated case materials and research problems. Evaluation of students will be based upon, but not limited to, tutorial group evaluation, peer evaluation, self-evaluation, and a comprehensive content and process examination. Typically offered Fall.

VM 82500 - Grand Rounds

Credit Hours: 0.00. Provides a regular forum to bring those in the school together, focused around their common interest in veterinary medicine. Case-based presentations emphasize the basic pathophysiology of disease and clinical investigation and demonstrate the interactions between the clinical and basic sciences. Typically offered Fall Spring.

VM 83000 - Applications And Integrations II

Credit Hours: 3.00. Small group tutorial, problem-oriented approach to understanding how basic science concepts are integrated into clinical aspects of veterinary medicine. Students are expected to identify learning issues, resolve identified gaps in their knowledge base, integrate information across disciplines, and practice/develop problem-solving skills using simulated case materials and research problems at a higher level of performance than in VM 82000. Evaluation of students will be based upon, but not limited to, tutorial group evaluation, peer evaluation, self-evaluation, and a comprehensive content and process examination that will include material from VM 82000. Typically offered Spring.

VM 84000 - Applications And Integrations III

Credit Hours: 3.00. Small group tutorial, problem-oriented approach to understanding how basic science concepts are integrated into clinical aspects of veterinary medicine. Students are expected to identify learning issues, resolve identified gaps in their knowledge base, integrate information across disciplines, and practice/develop problem-solving skills using simulated case materials and research problems at a higher level of performance than in VM 83000. Evaluation of students will be based upon, but not limited to, tutorial group evaluation, peer evaluation, self-evaluation, and a comprehensive content and process examination that will include material from the two previous semesters of this course. Typically offered Fall.

VM 85000 - Applications and Integrations IV

Credit Hours: 2.00. Small group tutorial, problem-oriented approach to understanding how basic science concepts are integrated into clinical aspects of veterinary medicine. Students are expected to identify learning issues, resolve identified gaps in their knowledge base, integrate information across disciplines, and practice/develop problem-solving skills using simulated case materials and research problems at a higher level of performance than in VM 82000, VM 83000, and VM 84000. Evaluation of students will be based upon, but not limited to, tutorial group evaluation, peer evaluation, self-evaluation, and a comprehensive content and process examination that will include material fromVM 82000, VM 83000, and VM 84000. The final examination will contain an oral component. Typically offered Spring.

VM 86000 - Early Origins Of Veterinary Medicine Seminar

Credit Hours: 1.00. Students will study the very early origins of man's fascination with animals from the Paleolithic era, and the roots of veterinary medicine in Mesopotamia, Ancient Egypt, and East and South Asia. Particular attention will be paid to works of art that help demonstrate man's fascination with animals and their well-being. This course is appropriate for students with no previous study of history or art history. Typically offered Fall Spring.

VM 86500 - History Of Veterinary Medicine From Marshals, Horse Doctors, Cow Leeches, The First Schools Of VM

Credit Hours: 1.00. The students will study the history of marshals, horse doctors, cow leeches, and authors, an emphasis on the launching of European veterinary education with a rationale for a veterinary profession, and the history of the first official schools of veterinary medicine in France (Lyon and Alfort), concluding with the history of the increasing demand for veterinary schools. Particular attention will be paid to works that help demonstrate man's fascination with animals and their well-being. This course is appropriate for students with no previous study of history or art history. Special note: This syllabus and course schedule is subject to revisions as needed throughout the semester. Students will be given advance notice of any change. Typically offered Fall.

VM 87000 - History Of Veterinary Medicine From The Ancient Greeks Through The Renaissance Seminar

Credit Hours: 1.00. The students will study the contributions of the ancient Greeks and Romans to the development of animal doctors. The veterinary highpoint during the Byzantine Empire and Arabian medical and veterinary progress will also be studied. Animals in the Dark Ages, equine and canine medicine in Medieval Europe, and the Italian roots of the Renaissance in medical sciences will be studied. Particular attention will be paid to works of art that help demonstrate man's fascination with animals and their well-being. This course is appropriate for students with no previous study of history or art history. Typically offered Fall.

VM 87800 - Swine Herd Health And Diagnostic Pathology

Credit Hours: 3.00. Arrange total clinic hours 129. Advanced training and experience in working with swine herds on a herd health management program (see VCS 87800, 129 clinic hours) and advanced training in diagnostic approaches to identification of the causes and pathogenesis of disease of mammals (see VCS 88600, 129 clinic hours). Typically offered Fall Spring Summer.

VM 89000 - Topics In Veterinary Medicine

Credit Hours: 0.50 to 5.00. Advanced study in the field of animal health and practice of veterinary medicine. Permission of instructor required. Typically offered Fall Spring Summer.

VM 89100 - Special Topics In Veterinary Medicine Arranged

Credit Hours: 3.00. Opportunities for as many as 50 off-campus, three-week blocks are available for each fourth-year class. Only educational experiences that have no comparable coverage in the Purdue DVM curriculum will be acceptable. Permission of instructor required. Typically offered Fall Spring Summer.

VM 89200 - Principles Of Professionalism, Jurisprudence, And Ethics

Credit Hours: 1.00. Presentation/discussion format dealing with a broad spectrum of ethical, legal, and professional issues that impact the veterinary profession. Students are challenged to analyze the role they play as responsible members of the veterinary professional community. Typically offered Fall Summer.

VM 89400 - International Veterinary Medicine- Directed Clinical Experience

Credit Hours: 1.00 to 3.00. This course allows veterinary students to participate in a unique faculty-led veterinary learning experience in an international location. Credit will be assigned on the basis of 1 credit for each 45-50 hours of student effort up to a maximum of 3 credits. In most instances, one week of experience will equal one credit. Each veterinary learning experience will be designed by the faculty leader to accomplish specific learning goals in the focuses area of study. The course will be offered at various times during the clinical year and will vary in length from 1-3 weeks depending on the specific experience. Typically offered Fall Spring Summer.

VM 89500 - Clinical Applications

Credit Hours: 2.00. Introduction to the Veterinary Teaching Hospital (VTH) and the Animal Disease Diagnostic Laboratory. Students rotate through various sections of the VTH and participate in the evaluation and management of patients. Problem-solving skills and application of material from the basic sciences are emphasized. Typically offered Fall.

Women's Gender and Sexuality Studies

WGSS 28000 - Women's Studies: An Introduction

Credit Hours: 3.00. An introductory survey of the concepts and research data in the new scholarship on women. Topics covered include biology, sexuality, socialization, family and work, creativity, and politics. Typically offered Summer Fall Spring.

WGSS 28100 - Topics In Gender Studies

Credit Hours: 3.00. This course examines in-depth particular topics from the introductory course in Women's Studies. It addresses gender issues for both men and women. Possible topics include gender and popular culture, women's bodies, body image, and health, masculinities, queering gender and gender transgression. Typically offered Summer Fall Spring.

WGSS 28200 - Introduction To LGBT Studies

Credit Hours: 3.00. (ANTH 28200) This course offers students an introduction to the interdisciplinary study of lesbian, gay, bisexual, transgender and queer lives. It provides a basic grounding in theories of sexuality and LGBT histories, identities and movements in the U.S. and globally. Typically offered Fall Spring.

WGSS 38000 - Gender And Multiculturalism

Credit Hours: 3.00. This course expands students' understanding of gender issues by exploring the multicultural diversity of women's lives. It examines how race, class, sexuality, and culture interact and shape society and ecology in the United States and in a global context. Typically offered Fall Spring.

WGSS 38100 - Women Of Color In The United States

Credit Hours: 3.00. Explores the diversity of racial and ethnic groups in the United States with a particular emphasis on the histories, experiences, and cultural contributions of women of color. Provides a broad introduction to the intersections of gender, race and ethnicity. Typically offered Fall Spring.

WGSS 38200 - History Of Love And Marriage

Credit Hours: 3.00. Explores intimate relationships and marriage practices in Western and non-Western societies from a historical and comparative perspective. Examines the changes in love and marriage in Greco-Roman societies, medieval and modern Europe, China, India and the Muslim world, among others. Typically offered Fall Spring.

WGSS 38300 - Women And Work

Credit Hours: 3.00. Examines race, class and gender issues as they affect working women in America. Covering women's work from domestic labor to informal economies to factories, topics include women's participation in trade unions, wage inequalities, family leave policies and sexual harrassment. Typically offered Fall Spring.

WGSS 43000 - Women In African History

Credit Hours: 3.00. (HIST 43000) African women's history is rich and deeply layered. In this course, we will examine the social, political, economic, religious, and cultural experiences of women living in Africa. Although we look at women in the pre-colonial and slave trade eras, the focus will be on women during the nineteenth and twentieth centuries. Much of our reading and discussion will consider not only women, but also gender as we think about women's interactions with men and children. This course is concerned with the historical forces shaping African women's lives, as well as with ways in which women have been active agents in the making of their own histories. Students can expect to engage with a number of different types of texts (e.g. firms, novels, scholarly analyses, and primary sources.) Typically offered Fall, Spring.

WGSS 48000 - Feminist Theory

Credit Hours: 3.00. Intensive study of a variety of contemporary and international feminist theories from an interdisciplinary perspective. Provides an overview of major trends, critical approaches, and diverse viewpoints in the field of feminist theory. Typically offered Fall Spring.

WGSS 48200 - Interdisciplinary Studies In Sexuality: Scholarship On Lesbian And Gay Issues

Credit Hours: 3.00. This course offers an interdisciplinary introduction to recent work in lesbian and gay studies in various fields, including literature, history, film, cultural theory, medicine, law, and studies of sexuality. Typically offered Fall Spring.

WGSS 48300 - Global Feminisms

Credit Hours: 3.00. Explores feminist struggles through the writings of First and Third World feminist scholars. Focuses on feminist projects within and against colonial, nationalist, religious and global contexts. Includes Third World feminist critiques of Western feminisms. Typically offered Summer Fall Spring.

WGSS 49200 - Practicum In Women's Studies

Credit Hours: 2.00 to 4.00. This course is designed to integrate knowledge derived from women's studies scholarship with practical experience. Students will define their own projects in consultation with women's studies faculty. Periodic conferences and written reports required. Permission of instructor required. Typically offered Fall Spring Summer.

WGSS 49900 - Independent Study In Women's, Gender And Sexuality Studies

Credit Hours: 1.00 to 4.00. Special topics or projects under the direction of the instructor in a particular field of specialization. Permission of instructor required. Typically offered Fall Spring Summer.

WGSS 58500 - Feminist Art Criticism

Credit Hours: 3.00. (AD 58500) Analysis and discussion of feminist approaches in judging art, the representation of women in art and the concept of a female aesthetic, the role of gender, race, and class in the art criticism discourse, and the impact of feminism on women artists. Typically offered Summer Fall Spring.

WGSS 59900 - Selected Topics In Women's Gender And Sexuality Studies

Credit Hours: 3.00. A study of selected topics taught by an instructor in whose particular field of specialization the content of the course falls. Permission of instructor required. Typically offered Fall Spring Summer.

WGSS 68000 - Feminist Theory

Credit Hours: 3.00. This course focuses on feminist theories at an advanced level and in a global perspective. Graduate students engage with key theoretical issues in contemporary feminist studies, and examine how feminist scholars have theorized women and gender issues across disciplines. Typically offered Fall Spring.

WGSS 68100 - Contemporary Issues In Feminist Scholarship

Credit Hours: 3.00. Applies feminist theory, knowledge, and methods to the examination of selected contemporary issues. Emphasizes ways in which theory and practice interact in feminist scholarship. Content may vary according to the issues examined. Prerequisite: WGSS 68000. Typically offered Fall Spring.

WGSS 68200 - Issues In Feminist Research And Methodology

Credit Hours: 3.00. This course provides a methodological framework for theorizing, constructing and executing research from a feminist perspective. Students acquire knowledge of the diversity of feminist research projects and methods; they learn to pose research questions; and they will be able to prepare a research or grant proposal drawing on interdisciplinary methods. The course is designed to meet the needs of graduate students in Women's Studies and is open to students in other programs who are interested in feminist research. The course deals with both theoretical and practical issues in methodology. Prerequisites: WGSS 68000. Typically offered Spring.

Youth Development and Agricultural Education

YDAE 15200 - Agricultural Communication Seminar

Credit Hours: 3.00. This course provides an introduction to agricultural communication as a professional field, including its current status and role within the larger U.S. mass media system. The course will also provide an overview of career options and professional skills and competencies required of agricultural communicators. Typically offered Fall.

YDAE 24000 - Seminar In Agricultural Education

Credit Hours: 1.00. Development of an understanding of the origin, scope, and objectives of agricultural education; role of the agricultural science and business teacher as a professional educator; basic responsibilities of a teacher of agricultural science and business; and significance of legislation affecting agricultural education. Typically offered Fall Spring.

YDAE 29000 - Special Problems In Youth Development And Agricultural Education

Credit Hours: 1.00 to 6.00. Open primarily to freshmen and sophomores who desire to study special problems in agricultural communication, agricultural education, life science education, extension education, leadership education or youth development not covered in regular coursework. To be arranged with instructor or departmental representative prior to registering. Permission of instructor required. Typically offered Fall Spring Summer.

YDAE 31800 - Coordination Of Supervised Agricultural Experience Programs

Credit Hours: 3.00. Record keeping and supervisory skills needed to advise and coordinate supervised agricultural experience programs for secondary agricultural science and business students. Integration of supervised agricultural experiences with programming in youth organizations and classroom instruction for secondary agricultural science and business classrooms. Typically offered Fall.

YDAE 31900 - Planning Agricultural Science And Business Programs

Credit Hours: 3.00. Development of course content plans that coordinate and utilize agricultural science and business, community resources, FFA, and supervised agricultural experience programs. Typically offered Spring.

YDAE 35900 - Leadership In Developing The Agricultural Professional

Credit Hours: 3.00. Leadership skills that enhance effectiveness of the agricultural professional. Students develop leadership skills through course activities and content that concentrate on team building, understanding communicating, time management, motivational skills, and goal setting. Typically offered Fall Spring.

YDAE 38500 - Urban Service-Learning

Credit Hours: 2.00 or 3.00. Using service-learning as a pedagogy, students will have the opportunity to deepen and expand classroom learning through thoughtful, collaborative engagement with community, organizations, agencies and/or educational institutions and the people they serve. This course will offer opportunities to engage complex, real-world problems and to test the efficacy of disciplinary and interdisciplinary approaches to finding solutions. Typically offered Spring Fall.

YDAE 40000 - Agricultural Education Study Abroad

Credit Hours: 0.00 to 8.00. Utilized to record credits earned through participation in Purdue study abroad programs with cooperating foreign universities. Typically offered Fall Spring Summer.

YDAE 44000 - Methods Of Teaching Agricultural Education

Credit Hours: 3.00. Principles and procedures for teaching agricultural science and business in public schools. Must be admitted to teacher education program. Typically offered Fall.

YDAE 44100 - Field Experience In Agricultural Education Programs

Credit Hours: 1.00 to 3.00. Field experience in agricultural science and business programs to include observation and participation in the teaching process and program development activities. Typically offered Fall Spring.

YDAE 46000 - Agricultural Publishing

Credit Hours: 3.00. Learning experiences in all phases of agricultural publishing, including audience analysis, generating story ideas, researching, interviewing, writing, editing, photography, page design, desktop publishing, printing specifications and estimates, and distribution. Typically offered Fall Spring Summer.

YDAE 48000 - Agricultural Communication Capstone Seminar

Credit Hours: 3.00. Prepares graduating students for entry to the workplace, assesses and enhances their communication knowledge and skills, and provides project experiences that will demonstrate their ability to communicate scientific and technical information through a variety of media. Projects will include student presentations and magazine style articles on issues of concern to agricultural and general audiences; and a final project that requires students to conceive and create a web site that uses converging media to communicate effectively a topical issue. Typically offered Fall.

YDAE 49000 - Special Problems

Credit Hours: 1.00 to 6.00. Open to undergraduates who desire to study special problems in agricultural communications, agricultural education, or youth development not covered in regular coursework. To be arranged with the instructor or departmental representative prior to registering. Permission of instructor required. Typically offered Summer Fall Spring.

YDAE 49100 - Special Topics In Youth Development And Agricultural Education

Credit Hours: 1.00 to 3.00. Designed for specialized topic areas for which there is no specific course, but have enough student interest to justify formalized teaching of an undergraduate-level course. The course may be repeated by a student as long as the topic being taught is not repeated. The specific topic that is offered will be indicated on the student's record. To be arranged with the instructor or departmental representative prior to registering. Permission of instructor required. Typically offered Summer Fall Spring.

YDAE 49700 - Thesis Research

Credit Hours: 1.00 to 6.00. For Honors students only doing specialized youth development and agricultural education research. Arrange with academic advisor and honors research coordinator before registering. Typically offered Summer Fall Spring.

YDAE 49900 - Special Problems In Agricultural Communication

Credit Hours: 1.00 to 3.00. Application of principles of mass communication in the production of agriculturally related news, feature, and magazine articles, radio and television reports, photographs, and publications in the Department of Agricultural Communication Service. Permission of instructor required. Typically offered Fall Spring Summer.

YDAE 54000 - Program Development In Agricultural And Extension Education

Credit Hours: 3.00. Application of principles of agricultural and extension education. Emphasis on program development,

supervised experience programs, and effective organization of an agricultural and extension education program. Typically offered Fall.

YDAE 54200 - Introduction To Agricultural Biotechnology For Educators

Credit Hours: 3.00. (HORT 54200) This course is offered, via distance education, to help formal and informal educators understand how transgenic organisms are produced, as well as to enable them to teach science and issues surrounding agricultural biotechnology. Typically offered Summer.

YDAE 55500 - Principles Of Extension Education

Credit Hours: 3.00. An overview of the origin, scope, function, objectives, and organization of the cooperative extension service, including a thorough analysis of the work of the extension educator and career opportunities. Typically offered Spring.

YDAE 56500 - Principles Of Adult Education

Credit Hours: 3.00. (EDCI 56500) Principles of adult education applied to helping adults learn, evaluating their performance, and determining their needs. Examines history, philosophy, and research of adult education. Explores techniques required in design and delivery of instruction for adults. Typically offered Spring.

YDAE 59000 - Special Problems

Credit Hours: 1.00 to 6.00. A study of special problems in agricultural communications, agricultural education, or youth development not covered in regular coursework. To be arranged with the instructor or departmental representative prior to registering. Permission of instructor required. Typically offered Summer Fall Spring.

YDAE 59100 - Special Topics

Credit Hours: 1.00 to 4.00. Specialized topics not covered in other courses. Topics, requirements, and credits to be determined yearly. To be arranged with the instructor or departmental representative prior to registering. Permission of instructor required. Typically offered Summer Fall Spring.

YDAE 59500 - Internship In Agricultural And Extension Education

Credit Hours: 1.00 to 10.00. A special course designed to provide practical field experience under professional supervision in selected situation related to the student's area of specialization. Amount of credit to be determined by the nature and extent of the assignment. To be arranged with the instructor of departmental representative prior to registering. Permission of instructor required. Typically offered Summer Fall Spring.

YDAE 62000 - Adolescent Development In Context

Credit Hours: 3.00. This course is a graduate level seminar of major issues concerning adolescents, with attention to developmental perspective. The social ecology of adolescent development-an understanding of adolescents in their social contexts- is emphasized. Typically offered Fall Spring.

YDAE 64000 - Courses Of Study In Agricultural Education Programs

Credit Hours: 2.00 to 4.00. Principles and procedures of curriculum construction applied to development and organization for courses of study in agricultural science and business. Typically offered Summer Spring.

YDAE 64200 - Seminar In Agricultural And Extension Education

Credit Hours: 1.00 to 4.00. Identification and analysis of contemporary programs used in agricultural and extension education. Prerequisite: 12 credit hours in Education. Typically offered Fall Spring Summer.

YDAE 64300 - Current Issues In Agricultural And Extension Education

Credit Hours: 2.00 or 3.00. Examination of current issues in agricultural and extension education. Prerequisite: 12 credit hours in Education. Typically offered Fall Spring Summer.

YDAE 64400 - YDAE Graduate Seminar

Credit Hours: 1.00. Students are familiarized with planning and presenting YDAE research through written and oral presentations based on the student's proposed thesis topic. Weekly attendance and participation at seminars help graduate students use appropriate and effective presentation skills, understand expectations regarding responsible conduct of research, and learn about current topics in YDAE related research areas. Typically offered Fall.

YDAE 69800 - Research MS Thesis

Credit Hours: 1.00 to 18.00. Research MS Thesis. Permission of instructor required. Typically offered Summer Fall Spring.

YDAE 69900 - Research PhD Thesis

Credit Hours: 1.0 to 18.0. Research PhD Thesis. Permission of instructor required. Typically offered Fall Spring Summer.