

Departmental/Program Major Courses (34-37 credits) *A 2.0 average is required in these courses

***Required Major Courses (19 credits)**

- _____ (2) BIOL 12100 Biology I: Diversity, Ecology and Behavior (*satisfies Science, Technology & Society Selective for core*) [may also meet Multidisciplinary requirement for Science core]
- _____ (3) BIOL 13100 Biology II: Development, Structure, and Function of Organisms
- _____ (2) Fr. Lab: BIOL 13500 First Year Biology Lab or BIOL 14501 First Yr Lab Neuro Res Project or IT 22600 Biotechnology Lab I
- _____ (3) BIOL 23100 Biology III: Cell Structure & Function
- _____ (2) BIOL 23200 Lab in Cell Structure & Function
- _____ (3) BIOL 24100 Biology IV: Genetics & Molecular Biology
- _____ (2) BIOL 24200 Lab in Genetics & Molecular Biology
- _____ (2) BIOL 28600 Intro to Ecology & Evolution

***Intermediate Biology Selective - Select one; cannot also be used for Major Selectives below (3-4 credits)**

- _____ (3-4) Intermediate Biology Selective (Req #9)

***Biology Selectives - Can use one course for multiple requirements (must total at least 12 credits)**

- _____ (2-3) Group A Selective (Req #10)
- _____ (2-3) Group B Selective (Req #10)
- _____ (2-4) 500 Level Biology Selective (Req #10)
- _____ (2-4) Base Lab Requirement (Req #10)

Other Departmental /Program Course Requirements (64-76 credits)

- _____ (5) CHM 12901 General Chemistry
- _____ (4) Organic CHM 1 Selective
- _____ (4) Organic CHM 2 Selective
- _____ (3-4) Chemistry Selective
- _____ (4) PHYS 1 Selective - Select from PHYS 23300 or 17200 (*satisfies Science Selective for core*)
- _____ (4) PHYS 2 Selective - Select from PHYS 23400 or 27200
- _____ (3-5) Calculus 1 Selective - Select from MA 16010, 16100, or 16500 (*satisfies Quantitative Reasoning Selective for core*)
- _____ (3-5) Calculus 2 Selective- Select from MA 16020, 16200, 16600 or 17300
- _____ (3) STAT 50300
- _____ (3-4) Computer Science Selective (may also meet Teambuilding & Collaboration for Science core)
- _____ (3-4) ENGL 10600 or 10800 (*satisfies Written Communication and Information Literacy for core*)
- _____ (3) Language & Culture 1 Selective
- _____ (3) Language & Culture 2 Selective
- _____ (3) Language & Culture 3 Selective
- _____ (3) COM 21700 (*satisfies Oral Communication for core*)
- _____ (3) General Education 1 Selective (*may satisfy Human Culture Behavioral/Social Science for core*)
- _____ (3) General Education 2 Selective (*may satisfy Human Cultures Humanities for core*)
- _____ (3) General Education 3 Selective
- _____ (3) Great Issues Selective (may also meet Teambuilding & Collaboration for Science core)
- _____ (1-3) Multidisciplinary Selective

Electives (7-22 credits)

- _____ () _____
- _____ () _____
- _____ () _____
- _____ () _____
- _____ () _____
- _____ () _____
- _____ () _____
- _____ () _____

University Core Requirements

Human Cultures Humanities	<input type="checkbox"/>	_____	Science, Technology & Society Selective	<input type="checkbox"/>	_____
Human Cultures Behavioral/Social Science	<input type="checkbox"/>	_____	Written Communication	<input type="checkbox"/>	_____
Information Literacy	<input type="checkbox"/>	_____	Oral Communication	<input type="checkbox"/>	_____
Science Selective	<input type="checkbox"/>	_____	Quantitative Reasoning	<input type="checkbox"/>	_____
Science Selective	<input type="checkbox"/>	_____			

The student is ultimately responsible for knowing and completing all degree requirements.

Biology

Suggested Arrangement of Courses:

Credits	Fall 1st Year	Prerequisite	Credits	Spring 1st Year	Prerequisite
2	BIOL 12100		3	BIOL 13100	
2	Fr. Lab	CHM 12901 coreq	4	Organic Chem 1 Selective	CHM 11600 or 12901
5	CHM 12901	ALEKS score of 85	3-5	Calculus II Selective	Calc I
3-5	Calculus I Selective		3	Language/Culture 2 Selective	Lang 10100
3	Language/Culture 1 Selective		3-4	ENGL 10600 or 10800	
1	Elective: (BIOL 11500 pref)				
16-18			16-17		

Credits	Fall 2nd Year	Prerequisite	Credits	Spring 2nd Year	Prerequisite
3	BIOL 23100	CHM 12901 prereq; BIOL 13100	3	BIOL 24100	BIOL 23100
2	BIOL 23200		2	BIOL 24200	
4	Organic Chem 2 Selective	Organic I lecture	3-4	Chemistry Selective	Organic II lecture
3	Language/Culture 3 Selective	varies	2	BIOL 28600	BIOL 12100
3	COM 21700		1	Elective: (BIOL 29300 pref)	
			3	General Education 1 Selective	
15			14-15		

Credits	Fall 3rd Year	Prerequisite	Credits	Spring 3rd Year	Prerequisite
3	Intermediate Biology Selective (Req #9)	varies	3	Group B Selective (Req #10)	
2-3	Group A Selective (Req #10)	varies	4	PHYS 2 Selective	
4	PHYS 1 Selective		3-4	Computer Science Selective	
3	General Education 2 Selective		1	Elective: (BIOL 39300 pref)	
3	Elective		3	General Education 3 Selective	
15-16			14-15		

Credits	Fall 4th Year	Prerequisite	Credits	Spring 4th Year	Prerequisite
2-4	Base Lab Requirement (Req #10)		3	500 Level Biology Selective (Req #10)	varies
3	STAT 50300		3	Biology Selective (Req #10)	
1-3	Multidisciplinary Selective		3	Great Issues Selective	
3	Elective		3	Elective	
5	Elective		3	Elective	
14-17			15		

**120 semester credits required for Bachelor of Science degree.
2.0 Graduation GPA required for Bachelor of Science degree.**

The student is ultimately responsible for knowing and completing all degree requirements.

BIOLOGY

Fall 2016

Graduation Requirements:

- A minimum 2.0 average in all biology courses required for this major
- A minimum of 32 credits at or above the 300-level completed at a Purdue campus
- At least one 500-level Biology course other than BIOL 54200

- 120 Total Credits

BIOLOGY:

1. BIOL 12100 Biology I: Diversity, Ecology and Behavior (2 cr.; fall) **or**
BIOL 19500 Biodiversity, Ecology & Evolution (3 cr.; fall)
2. BIOL 13100 Biology II: Development, Structure, and Function of Organisms (3 cr.; spring) **or**
BIOL 19500 Organismal Development & Physiology (3 cr.; spring)
3. BIOL 13500 1st Year Biology Lab (2 cr.; both) **or**
BIOL 14501 1st Year Biology Lab w/Neuro Research Project (2 cr.; fall) **or**
IT 22600 Biotechnology Lab (2 cr.; fall)
4. BIOL 23100 Biology III: Cell Structure and Function (3 cr.; fall)
5. BIOL 23200 Laboratory in Biology III: Cell Structure and Function (2 cr.; fall)
6. BIOL 24100 Biology IV: Genetics and Molecular Biology (3 cr.; spring)
7. BIOL 24200 Laboratory in Genetics and Molecular Biology (2 cr.; spring)
8. BIOL 28600 Intro. to Ecology & Evolution (2 cr.; spring)
9. **Intermediate Biology Selective: Choose one of these eight options:**
 - A. BIOL 32800¹ Principles of Physiology (4 cr.; spring)
 - B. BIOL 36700² Principles of Development (2 cr.; spring) **plus** BIOL 36701² Principles of Development Laboratory (1 cr.; spring)
 - C. BIOL 39500² Macromolecules (3 cr.; fall)
 - D. BIOL 41500² Intro. to Molecular Biology (3 cr.; spring)
 - E. BIOL 41600² Viruses & Viral Diseases (3 cr.; spring)
 - F. BIOL 42000² Eukaryotic Cell Biology (3 cr.; fall)
 - G. BIOL 43600² Neurobiology (3 cr.; fall)
 - H. BIOL 43800² General Microbiology (3 cr.; fall)
10. **Biology Selectives: Twelve credits** from the following: must choose at least **one** Group A Selective, at least **one** Group B Selective, at least **one** option from the Biology Lab Selective list, and at least **one** 500-level course from the Group A Selectives or Group B Selectives. Overlap (A, B, 500, Lab) is allowed, but 12 credits must still be earned.

Group A Selective:

- | | |
|--|---|
| BIOL 39500 ² Macromolecules (3 cr.; fall) | BIOL 54100 Molecular Genetics of Bacteria (3 cr.; fall) |
| BIOL 41500 ² Intro. to Molecular Biology (3 cr.; spring) | BIOL 54900 Microbial Ecology (2 cr.; alternate spring) |
| BIOL 41600 ² Viruses and Viral Diseases (3 cr.; spring) | BIOL 55001 Eukaryotic Molecular Biology (3 cr.; fall) |
| BIOL 42000 ² Eukaryotic Cell Biology (3 cr.; fall) | BIOL 56200 ⁴ Neural Systems (3 cr.; spring) |
| BIOL 43600 ² Neurobiology (3 cr.; fall) | BIOL 56310 Protein Bioinformatics (2 cr.; spring) |
| BIOL 43800 ² General Microbiology (3 cr.; fall) | BIOL 59500 Cellular Biology of Plants (3 cr.; alternate fall) |
| BIOL 43900 ³ Microbiology Lab (2 cr.; fall) | BIOL 59500 Epigenetics in Human Disease (3 cr.; fall) |
| BIOL 44400 Human Genetics (3 cr.; fall) | BIOL 59500 Genetics & –Omics of Host-Microbe Interactions (3 cr.; fall) |
| BIOL 44600 Molecular Biology of Pathogens (3 cr.; spring) | BIOL 59500 Methods & Measurement in Physical Biochemistry (3 cr.; fall) |
| BIOL 47800 ⁴ Intro to Bioinformatics (3 cr.; fall) | BIOL 59500 Neural Mechanisms in Health & Disease (3 cr.; fall) |
| BIOL 48100 Eukaryotic Genetics (3 cr.; spring) | BIOL 59500 Neurobiology of Learning and Memory (3 cr.; fall) |
| BIOL 49500 Biological & Structural Aspects of Drug Design & Action (3 cr.; spring) | BIOL 59500 Practical Biocomputing (3 cr.; spring) |
| BIOL 51100 Intro. to X-Ray Crystallography (3 cr.; spring) | BIOL 59500 Theory of Molecular Methods (3 cr.; spring) |
| BIOL 51600 Molecular Biology of Cancer (3 cr.; spring) | BCHM 56100 ⁵ General Biochemistry I (3 cr.; fall) |
| BIOL 51700 Molecular Biology: Proteins (2 cr.; spring) | BCHM 56200 General Biochemistry II (3 cr.; spring) |
| BIOL 52900 Bacterial Physiology (3 cr.; spring) | CHM 33900 ^{5,9} Biochemistry: A Molecular Approach (3 cr.; spring) |
| BIOL 53300 Medical Microbiology (3 cr.; fall) | CHM 53300 ⁵ Introductory Biochemistry (3 cr.; fall) |
| BIOL 53800 Molecular, Cellular & Developmental Neurobiology (3 cr.; spring) | |

Group B Selective:

- | | |
|--|---|
| BIOL 30100 ⁶ Human Anatomy & Physiology (3 cr.; fall) | BIOL 58000 Evolution (3 cr.; spring) |
| BIOL 30200 ⁶ Human Anatomy & Physiology (3 cr.; spring) | BIOL 58210 Ecological Statistics (3 cr.; fall) |
| BIOL 32800 ¹ Principles of Physiology (4 cr.; spring) | BIOL 58500 Ecology (3 cr.; fall) |
| BIOL 36700 ² Principles of Development (2 cr.; spring) | BIOL 58705 Animal Communication (3 cr.; alternate fall) |
| BIOL 43200 Reproductive Physiology (3 cr.; alternate fall) | BIOL 59100 ⁸ Field Ecology (4 cr.; alternate fall) |
| BIOL 48300 ⁷ Environmental & Conservation Biology (3 cr.; alternate spring) | BIOL 59200 Evolution of Behavior (3 cr.; alternate spring) |
| BIOL 53700 Immunology (3 cr.; spring) | BIOL 59500 Sensory Ecology (3 cr.; alternate spring) |
| BIOL 55900 Endocrinology (3 cr.; fall) | HORT 30100 Plant Physiology (4 cr.; fall) |

Base Lab Requirement: Must meet Base Lab requirement as described on the back of this page. If undergraduate research is used to meet this requirement, only three credits may count toward the 12 credit requirement.

Other Credits that will count toward the 12 credits but not toward the A or B requirement:

1. Undergraduate Research (BIOL 49400 or BIOL 49900, maximum of 3 credits)
2. BIOL 36701² Principles of Development Lab (1 cr.; spring)
3. BIOL 44100 Senior Seminar in Genetics (1 cr.; both)
4. BIOL 49500 Current Topics in Non-coding RNA (1 cr.; spring)

Footnotes and other requirements are on the back of this page.

Base Laboratory Requirement for all Biology Majors

1. Each student will satisfy each of the following three learning objectives:

Objective 1 – Research planning, literature review, and writing

Objective 2 – Observation, experimentation

Objective 3 – Analysis, simulation, and presentation

2. Objectives may be met by taking courses according the following chart:

Courses	Title	Objective 1	Objective 2	Objective 3
BIOL 43900 ³	Microbiology Lab	X	X	X
BIOL 44201	Protein Expression		X	X
BIOL 44202	Animal Physiology		X	X
BIOL 44205	LabView		X	X
BIOL 44207	Protein Structure		X	
BIOL 44211	Anatomy & Physiology		X	
BIOL 44212	Microscopy & Cell Bio		X	X
BIOL 44215	Physiology Measurements	X		X
BIOL 54200	Neurophysiology		X	X
BIOL 58210 ⁸	Ecological Statistics	X		X
BIOL 59100 ⁸	Field Ecology	X	X	X
BIOL 59500	CryoEM 3D Reconstruction		X	X
BIOL 59500	Data Analysis in Neurosci			X
BIOL 59500 ³	Theory of Molecular Methods	X		X
BIOL 59500 ³	Neural Mech in Hlth Disease	X		X

3. Students who successfully complete a Biology Honors Research Thesis have successfully met all three objectives.
4. Undergraduate Research may be used to meet these objectives. Student must get Research Mentor approval for each objective after that objective is completed. Student must also earn at least four credits of BIOL 49400 or 49900 research. Consult with your academic advisor for the forms used to obtain Research Mentor for each objective.
5. A combination of courses and research may be used to meet this requirement.

CHEMISTRY

1. General Chemistry:

- A. CHM 12901⁹ General Chemistry with a Biological Focus (5 cr.; fall)

2. Organic Chemistry Selectives: (Must choose one option)

- A. CHM 25500 Organic Chemistry (3 cr.; both) and CHM 25501 Organic Chemistry Lab (1 cr.; both) and CHM 25600 Organic Chemistry (3 cr.; both) and CHM 25601 Organic Chemistry Lab (1 cr.; both)
- B. CHM 26505 Organic Chemistry (3 cr.; fall) and CHM 26300 Organic Chemistry Lab (1 cr.; fall) and CHM 26605 Organic Chemistry (3 cr.; spring) and CHM 26400 Organic Chemistry Lab (1 cr.; spring)

3. Chemistry Selectives: (must choose one of the following options)

- A. Analytical Chemistry: BCHM 22100 Analytical Biochemistry (3 cr.; both) or CHM 32100 Analytical Chemistry I (4 cr.; fall)
- B. Biochemistry: BCHM 56100⁵ General Biochemistry I (3 cr.; both) or CHM 33900^{5,9} Biochemistry: A Molecular Approach (3 cr.; spring) or CHM 53300⁵ Introductory Biochemistry (3 cr.; fall)
- C. Physical Chemistry: CHM 37200 Physical Chemistry (4 cr.; spring) or CHM 37300 Physical Chemistry (3 cr.; fall)

PHYSICS Selectives: One of these two options:

1. PHYS 23300 Physics for Life Sciences I (4 cr.; both) and PHYS 23400 Physics for Life Sciences II (4 cr.; both)
2. PHYS 17200 Modern Mechanics (4 cr.; both) and one of the following two choices:
 - A. PHYS 27200 Electric and Magnetic Interactions (4 cr.; both) or
 - B. PHYS 24100 Electricity and Optics (3 cr.; both) and PHYS 25200 Electricity and Optics Laboratory (1 cr.; spring)

UNIVERSITY CORE and COLLEGE OF SCIENCE CORE REQUIREMENTS

Composition and Presentation; Teambuilding and Collaboration; Language and Culture; Great Issues; General Education; Multidisciplinary Experience; Mathematics; Statistics; Computing (see handout).

FREE ELECTIVES Approximately 14-26 credits

BIOL 2/16

¹ This course may count for the Intermediate Biology Selective or as a Group B course (not both). It may also count as the College of Science Teambuilding & Collaboration requirement.

² Credits chosen for the Intermediate Requirement may satisfy #9 OR count as part of the 12 credit requirement (#10), but not both.

³ This course may count for a Group A course and as the Base Lab Requirement. You must still complete 12 total credits of biology selectives.

⁴ This course may count for a Group A course and as the College of Science Multidisciplinary requirement.

⁵ BCHM 56100 or CHM 33900 or CHM 53300 may count as a Chemistry Selective or as Biology Selective, but not both.

⁶ If both BIOL 30100 & 30200 are completed, one of the two courses will count toward 12 credit biology elective requirement. The other course will count as free elective. If only BIOL 30100 or 30200 is completed, the credits will count only as free elective credit.

⁷ This course may count for the Group B course and as the College of Science Great Issues requirement.

⁸ This course may count for a Group B course and as the Biology Lab Selective. However, you must still complete 12 total credits of biology selectives.

⁹ Students who select 12901 for General Chemistry must take CHM 33900 and 33901. Students who end up with Special Case approval for some other Gen Chem courses may choose the other Chem Selective options. Credit is not allowed for both BIOL 44201 and CHM 33901.