BIOLOGY, B.S. (ALTOONA)

Begin Campus: Any Penn State Campus
End Campus: Altoona

Program Description

Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.

The curriculum in Biology is planned for preparation for professions requiring competence in biological science or for gaining an understanding of the world of living things. The professional group includes students who intend to secure advanced degrees through graduate study, students who are interested in work with various governmental agencies or industries having biological responsibilities, and students who want to prepare for careers in medicine or other health-related professions. Students whose interests are not professional select the curriculum because its broad approach can result in an educated view of the structure and function of living things. Achievement of these goals, including a special interest in a particular area of biology, can be met by selecting one of five options offered by the Department of Biology that will lead to the B.S. degree in Biology. The options and their key areas are:

Ecology Option
Available at the following campuses: Altoona, University Park
Behavior, and population and community biology of plants and animals.

General Biology Option
Available at the following campuses: Abington, Altoona, Beaver, Berks, Brandywine, Harrisburg, Schuylkill, Scranton, University Park, York
All aspects of modern biology.

Genetics and Developmental Biology Option
Available at the following campuses: Abington, Berks, Harrisburg, University Park, York
Genetics, genetic engineering, and plant and animal development.

Neuroscience Option
Available at the following campuses: University Park
Development, biochemistry, physiology and aging of the central and peripheral nervous system.

Plant Biology Option
Available at the following campuses: University Park
Morphology, systematics, and physiology of plants and fungi.

Vertebrate Physiology Option
Available at the following campuses: Abington, Altoona, Brandywine, University Park
Pre-medicine, pre-dentistry, pharmacology, and animal physiology.

What is Biology?

Biology is the scientific study of life: the diversity and organization of organisms, from single-celled bacteria to multi-cellular plants and animals, including humans. These different levels of biological organization range from the molecules and cells that compose an organism, to the interacting organisms that make up an ecosystem. Hands-on experiences, from designing and conducting lab experiments to making field observations using different procedures and instruments play an important role in gaining biological knowledge. Biologists explore ways to cure neurological diseases, conserve coral populations in tropical oceans, discover more efficient ways to use plants for food and bio-energy, develop vaccines for infectious diseases, and investigate many other facets of Biology.

You Might Like This Program If...

- You are interested in learning about aspects of the biology of organisms that live on Earth.
- You enjoy a dynamic field of study, with new discoveries being made every day.
- You are interested in hands-on experiences, including courses with integrated laboratories and conducting research with faculty.
- You plan to pursue a career in biology research, education or outreach, or attend professional school in areas including medicine and dentistry.

Entrance Requirements

In order to be eligible for entrance to the Biology major, a student must have:

1. attained at least a 2.00 cumulative grade point average;
2. completed BIOL 110, CHEM 110, MATH 140, and earned a grade of C or better in each of these courses; and
3. completed at least one of the following courses with a grade of C or better: BIOL 220W, BIOL 230W, or BIOL 240W.

Degree Requirements

For the Bachelor of Science degree in Biology, a minimum of 124 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>94</td>
</tr>
</tbody>
</table>

15 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses.

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (http://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.
Foundations (grade of C or better is required.)

- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Knowledge Domains

- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)

- Inter-Domain or Approved Linked Courses: 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 82-44). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44.

Common Requirements for the Major (All Options)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 111</td>
<td>Experimental Chemistry I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 113</td>
<td>Experimental Chemistry II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Calculus with Analytic Geometry II</td>
<td>4</td>
</tr>
</tbody>
</table>

Prescribed Courses: Require a grade of C or better

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 110</td>
<td>Biology: Basic Concepts and Biodiversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 220W</td>
<td>Biology: Populations and Communities</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 230W</td>
<td>Biology: Molecules and Cells</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 240W</td>
<td>Biology: Function and Development of Organisms</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>Chemical Principles I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>Chemical Principles II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td>4</td>
</tr>
</tbody>
</table>

Additional Courses

Select one of the following: 8-12

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 211</td>
<td>General Physics: Mechanics</td>
<td></td>
</tr>
<tr>
<td>&amp; PHYS 212</td>
<td>General Physics: Electricity and Magnetism</td>
<td></td>
</tr>
<tr>
<td>&amp; PHYS 213</td>
<td>General Physics: Fluids and Thermal Physics</td>
<td></td>
</tr>
<tr>
<td>&amp; PHYS 214</td>
<td>General Physics: Wave Motion and Quantum Physics</td>
<td></td>
</tr>
<tr>
<td>PHYS 250</td>
<td>Introductory Physics I</td>
<td></td>
</tr>
<tr>
<td>&amp; PHYS 251</td>
<td>Introductory Physics II</td>
<td></td>
</tr>
</tbody>
</table>

Requirements for the Option

Select an option 50-54

Requirements for the Option

Ecology Option (50-54 credits)

Available at the following campuses: Altoona, University Park

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 462</td>
<td>Applied Regression Analysis</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 464</td>
<td>Applied Nonparametric Statistics</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following: 6-8

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 202</td>
<td>Fundamentals of Organic Chemistry I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 203</td>
<td>Fundamentals of Organic Chemistry II</td>
<td></td>
</tr>
<tr>
<td>CHEM 210</td>
<td>Organic Chemistry I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 212</td>
<td>Organic Chemistry II</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 213</td>
<td>Laboratory in Organic Chemistry</td>
<td></td>
</tr>
</tbody>
</table>

Select 3-4 credits of the following: 3-4

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 200</td>
<td>Elementary Statistics</td>
<td></td>
</tr>
<tr>
<td>STAT 240</td>
<td>Introduction to Biometry</td>
<td></td>
</tr>
<tr>
<td>STAT 250</td>
<td>Introduction to Biostatistics</td>
<td></td>
</tr>
</tbody>
</table>

Groups

Select a minimum of 18 credits of 400-level biology courses, with at least 3 credits from each of the following groups: 1

Group I:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 412</td>
<td>Ecology of Infectious Diseases</td>
</tr>
<tr>
<td>BIOL 419</td>
<td>Ecological and Environmental Problem Solving</td>
</tr>
<tr>
<td>BIOL 435</td>
<td>Ecology of Lakes and Streams</td>
</tr>
<tr>
<td>BIOL 436</td>
<td>Population Ecology and Global Climate Change</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>BIOL 444</td>
<td>Field Ecology</td>
</tr>
<tr>
<td>BIOL 450W</td>
<td>Experimental Field Biology</td>
</tr>
<tr>
<td>BIOL 463</td>
<td>General Ecology</td>
</tr>
<tr>
<td>BIOL 482</td>
<td>Coastal Biology</td>
</tr>
<tr>
<td>BIOL 499A</td>
<td>Tropical Field Ecology</td>
</tr>
</tbody>
</table>

**Group II:**
- BIOL 414 - Taxonomy of Seed Plants
- BIOL 427 - Evolution
- BIOL 428 - Population Genetics
- BIOL 429 - Animal Behavior
- BIOL 448 - Ecology of Plant Reproduction
- BIOL 464 - Sociobiology
- BIOL 474 - Astrobiology

**Group III:**
- BIOL 405 - Symbiosis
- BIOL 415 - Ecotoxicology
- BIOL 417 - Invertebrate Zoology
- BIOL 446 - Physiological Ecology
- PPEM 425 - Biology of Fungi

**Group IV:**
- BIOL 414 - Taxonomy of Seed Plants
- BIOL 417 - Invertebrate Zoology
- BIOL 419 - Ecological and Environmental Problem Solving
- BIOL 444 - Field Ecology
- BIOL 482 - Coastal Biology
- BIOL 496 - Independent Studies (1-3 credits)
- BIOL 499A - Tropical Field Ecology
- PPEM 425 - Biology of Fungi
- SC 295 - Science Co-op Work Experience I
- SC 395 - Science Co-op Work Experience II
- SC 495 - Science Co-op Work Experience III

**Supporting Courses and Related Areas**
Select 17-24 credits from department list

**Additional Courses**
Select one of the following:
- 6-8 credits
  - CHEM 210 & CHEM 212 & CHEM 213 - Organic Chemistry I and Organic Chemistry II

Select 3-4 credits of the following:
- 3-4 credits
  - STAT 200 - Elementary Statistics
  - STAT 240 - Introduction to Biometry
  - STAT 250 - Introduction to Biostatistics

**Groups**
Select a minimum of 18 credits of 400-level biology courses, with at least 3 credits from each of the following groups:

**Group I:**
- BIOL 407 - Plant Developmental Anatomy
- BIOL 414 - Taxonomy of Seed Plants
- BIOL 443 - Evo-devo: Evolution of Developmental Mechanisms
- BIOL 444 - Field Ecology
- BIOL 446 - Physiological Ecology
- BIOL 448 - Ecology of Plant Reproduction
- BIOL 499A - Tropical Field Ecology
- HORT 407 - Plant Breeding
- PPEM 416 - Plant Virology: Molecules to Populations
- PPEM 425 - Biology of Fungi

**Group II:**
- BIOL 405 - Molecular Evolution
- BIOL 411 - Medical Embryology
- BIOL 414 - Taxonomy of Seed Plants
- BIOL 417 - Invertebrate Zoology
- BIOL 420 - Paleobotany
- BIOL 421 - Comparative Anatomy of Vertebrates
- BIOL 425 - Biology of Fungi
- BIOL 427 - Evolution
- BIOL 428 - Population Genetics
- BIOL 438 - Theoretical Population Ecology
- BIOL 443 - Evo-devo: Evolution of Developmental Mechanisms
- BIOL 460 - Human Genetics
- BIOL 474 - Astrobiology

**Group III:**
- BIOL 404 - Cellular Mechanisms in Vertebrate Physiology
- BIOL 405 - Molecular Evolution
- BIOL 407 - Plant Developmental Anatomy
- BIOL 411 - Medical Embryology
- BIOL 416 - Biology of Cancer
- BIOL 422 - Advanced Genetics
- BIOL 426 - Developmental Neurobiology
- BIOL 428 - Population Genetics
- BIOL 430 - Developmental Biology
- BIOL 432 - Developmental Genetics
- BIOL 439 - Practical Bioinformatics
- BIOL 443 - Evo-devo: Evolution of Developmental Mechanisms
- BIOL 448 - Ecology of Plant Reproduction
- BIOL 460 - Human Genetics
- BMB 499A - Tropical Field Ecology
- BMB 400 - Molecular Biology of the Gene
- BMB 450 - Microbial/Molecular Genetics
- HORT 407 - Plant Breeding

**Group IV:**
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 406</td>
<td>Symbiosis</td>
<td></td>
</tr>
<tr>
<td>BIOL 412</td>
<td>Ecology of Infectious Diseases</td>
<td></td>
</tr>
<tr>
<td>BIOL 414</td>
<td>Taxonomy of Seed Plants</td>
<td></td>
</tr>
<tr>
<td>BIOL 415</td>
<td>Ecotoxicology</td>
<td></td>
</tr>
<tr>
<td>BIOL 417</td>
<td>Invertebrate Zoology</td>
<td></td>
</tr>
<tr>
<td>BIOL 419</td>
<td>Ecological and Environmental Problem Solving</td>
<td></td>
</tr>
<tr>
<td>BIOL 428</td>
<td>Population Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOL 429</td>
<td>Animal Behavior</td>
<td></td>
</tr>
<tr>
<td>BIOL 435</td>
<td>Ecology of Lakes and Streams</td>
<td></td>
</tr>
<tr>
<td>BIOL 436</td>
<td>Population Ecology and Global Climate Change</td>
<td></td>
</tr>
<tr>
<td>BIOL 444</td>
<td>Field Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 446</td>
<td>Physiological Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 448</td>
<td>Ecology of Plant Reproduction</td>
<td></td>
</tr>
<tr>
<td>BIOL 450W</td>
<td>Experimental Field Biology</td>
<td></td>
</tr>
<tr>
<td>BIOL 463</td>
<td>General Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 464</td>
<td>Sociobiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 474</td>
<td>Astrobiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 499A</td>
<td>Tropical Field Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 404</td>
<td>Cellular Mechanisms in Vertebrate Physiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 406</td>
<td>Symbiosis</td>
<td></td>
</tr>
<tr>
<td>BIOL 409</td>
<td>Biology of Aging</td>
<td></td>
</tr>
<tr>
<td>BIOL 411</td>
<td>Medical Embryology</td>
<td></td>
</tr>
<tr>
<td>BIOL 413</td>
<td>Cell Signaling and Regulation</td>
<td></td>
</tr>
<tr>
<td>BIOL 416</td>
<td>Biology of Cancer</td>
<td></td>
</tr>
<tr>
<td>BIOL 421</td>
<td>Comparative Anatomy of Vertebrates</td>
<td></td>
</tr>
<tr>
<td>BIOL 426</td>
<td>Developmental Neurobiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 430</td>
<td>Developmental Biology</td>
<td></td>
</tr>
<tr>
<td>BIOL 432</td>
<td>Developmental Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOL 437</td>
<td>Histology</td>
<td></td>
</tr>
<tr>
<td>BIOL 443</td>
<td>Evo-devo: Evolution of Developmental Mechanisms</td>
<td></td>
</tr>
<tr>
<td>BIOL 446</td>
<td>Physiological Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 460</td>
<td>Human Genetics</td>
<td></td>
</tr>
<tr>
<td>BIOL 469</td>
<td>Neurobiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 470</td>
<td>Functional and Integrative Neuroscience</td>
<td></td>
</tr>
<tr>
<td>BIOL 472</td>
<td>Mammalian Physiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 479</td>
<td>General Endocrinology</td>
<td></td>
</tr>
<tr>
<td>BIOL 400</td>
<td>Teaching in Biology</td>
<td></td>
</tr>
<tr>
<td>BIOL 407</td>
<td>Plant Developmental Anatomy</td>
<td></td>
</tr>
<tr>
<td>BIOL 414</td>
<td>Taxonomy of Seed Plants</td>
<td></td>
</tr>
<tr>
<td>BIOL 417</td>
<td>Invertebrate Zoology</td>
<td></td>
</tr>
<tr>
<td>BIOL 419</td>
<td>Ecological and Environmental Problem Solving</td>
<td></td>
</tr>
<tr>
<td>BIOL 421</td>
<td>Comparative Anatomy of Vertebrates</td>
<td></td>
</tr>
<tr>
<td>BIOL 437</td>
<td>Histology</td>
<td></td>
</tr>
<tr>
<td>BIOL 439</td>
<td>Practical Bioinformatics</td>
<td></td>
</tr>
<tr>
<td>BIOL 444</td>
<td>Field Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 448</td>
<td>Ecology of Plant Reproduction</td>
<td></td>
</tr>
<tr>
<td>BIOL 450</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 461</td>
<td>Contemporary Issues in Science and Medicine</td>
<td></td>
</tr>
<tr>
<td>BIOL 473</td>
<td>Laboratory in Mammalian Physiology</td>
<td></td>
</tr>
<tr>
<td>BIOL 496</td>
<td>Independent Studies (1-3 credits)</td>
<td></td>
</tr>
<tr>
<td>PPEM 425</td>
<td>Biology of Fungi</td>
<td></td>
</tr>
<tr>
<td>SC 295</td>
<td>Science Co-op Work Experience I</td>
<td></td>
</tr>
<tr>
<td>SC 395</td>
<td>Science Co-op Work Experience II</td>
<td></td>
</tr>
<tr>
<td>SC 495</td>
<td>Science Co-op Work Experience III</td>
<td></td>
</tr>
</tbody>
</table>

**Supporting Courses and Related Areas**

Select 20-27 credits from department list

1. Each course may be used to satisfy a requirement in only one group.

**Genetics and Developmental Biology Option (50-54 credits)**

Available at the following campuses: Abington, Berks, Harrisburg, University Park, York

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 322</td>
<td>Genetic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 430</td>
<td>Developmental Biology</td>
<td>3</td>
</tr>
<tr>
<td>BMB 401</td>
<td>General Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BMB 402</td>
<td>General Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 210</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 212</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 213</td>
<td>Laboratory in Organic Chemistry</td>
<td>2</td>
</tr>
</tbody>
</table>

**Prescribed Courses**

Select 2-5 credits of the following:

- MATH 220 Matrices
- MATH 231 Calculus of Several Variables
- MICRB 201 Introductory Microbiology
- MICRB 202 Introductory Microbiology Laboratory

Select 3-4 credits of the following:

- STAT 200 Elementary Statistics
- STAT 240 Introduction to Biometry
- STAT 250 Introduction to Biostatistics
- STAT 319 Applied Statistics in Science

**Groups**

Select a minimum of 12 credits of 400-level courses, with at least 6 credits from Group I, 3 credits from Group II, and 3 credits from Group III:

**Group I:**

- BIOL 404 Cellular Mechanisms in Vertebrate Physiology
- BIOL 405 Molecular Evolution
- BIOL 407 Plant Developmental Anatomy
- BIOL 411 Medical Embryology
- BIOL 413 Cell Signaling and Regulation
- BIOL 416 Biology of Cancer
- BIOL 422 Advanced Genetics
- BIOL 426 Developmental Neurobiology
- BIOL 427 Evolution
- BIOL 428 Population Genetics
- BIOL 432 Developmental Genetics
- BIOL 437 Histology
- BIOL 439 Practical Bioinformatics
- BIOL 443 Evo-devo: Evolution of Developmental Mechanisms
- BIOL 448 Ecology of Plant Reproduction
- BIOL 460 Human Genetics
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 469</td>
<td>Neurobiology</td>
<td>3</td>
</tr>
<tr>
<td>BMB 400</td>
<td>Molecular Biology of the Gene</td>
<td></td>
</tr>
<tr>
<td>BMB 450</td>
<td>Microbial/Molecular Genetics</td>
<td></td>
</tr>
<tr>
<td>HORT 407</td>
<td>Plant Breeding</td>
<td></td>
</tr>
<tr>
<td>MICRB 410</td>
<td>Principles of Immunology</td>
<td></td>
</tr>
</tbody>
</table>

**Group II:**

- BIOL 405: Molecular Evolution
- BIOL 411: Medical Embryology
- BIOL 414: Taxonomy of Seed Plants
- BIOL 417: Invertebrate Zoology
- BIOL 420: Paleobotany
- BIOL 421: Comparative Anatomy of Vertebrates
- BIOL 425: Biology of Fungi
- BIOL 427: Evolution
- BIOL 428: Population Genetics
- BIOL 438: Theoretical Population Ecology
- BIOL 443: Evo-devo: Evolution of Developmental Mechanisms
- BIOL 460: Human Genetics
- BIOL 474: Astrobiology

**Group III:**

- BIOL 400: Teaching in Biology
- BIOL 407: Plant Developmental Anatomy
- BIOL 437: Histology
- BIOL 439: Practical Bioinformatics
- BIOL 448: Ecology of Plant Reproduction
- BIOL 461: Contemporary Issues in Science and Medicine
- BIOL 473: Laboratory in Mammalian Physiology
- BIOL 496: Independent Studies (1-3 credits)
- BIOL 499A: Tropical Field Ecology
- BMB 442: Laboratory in Proteins, Nucleic Acids, and Molecular Cloning
- PPEM 425: Biology of Fungi
- SC 295: Science Co-op Work Experience I
- SC 395: Science Co-op Work Experience II
- SC 495: Science Co-op Work Experience III

**Supporting Courses and Related Areas**

Select 9-17 credits from department list

**Neuroscience Option (50-54 credits)**

*Available at the following campuses: University Park*

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 469</td>
<td>Neurobiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 470</td>
<td>Functional and Integrative Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>BMB 401</td>
<td>General Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BMB 402</td>
<td>General Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 210</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 212</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 213</td>
<td>Laboratory in Organic Chemistry</td>
<td>2</td>
</tr>
</tbody>
</table>

**Additional Courses**

Select 3-4 credits of the following:

- STAT 200: Elementary Statistics
- BIOL 427: Evolution
- BIOL 439: Practical Bioinformatics
- BIOL 444: Field Ecology
- BIOL 448: Ecology of Plant Reproduction
- BIOL 450W: Experimental Field Biology
- BIOL 461: Contemporary Issues in Science and Medicine
- BIOL 473: Laboratory in Mammalian Physiology
- BIOL 496: Independent Studies (1-3 credits)
- BIOL 499A: Tropical Field Ecology
- SC 295: Science Co-op Work Experience I
- SC 395: Science Co-op Work Experience II

**Groups**

Select a minimum of 12 credits of 400-level biology courses, with at least 6 credits from Group I, 3 credits from Group II, and 3 credits from Group III:

**Group I:**

- BIOL 404: Cellular Mechanisms in Vertebrate Physiology
- BIOL 409: Biology of Aging
- BIOL 411: Medical Embryology
- BIOL 413: Cell Signaling and Regulation
- BIOL 421: Comparative Anatomy of Vertebrates
- BIOL 426: Developmental Neurobiology
- BIOL 430: Developmental Biology
- BIOL 437: Histology
- BIOL 443: Evo-devo: Evolution of Developmental Mechanisms
- BIOL 460: Human Genetics
- BIOL 472: Mammalian Physiology
- BIOL 473: Laboratory in Mammalian Physiology
- BIOL 479: General Endocrinology
- BMB 400: Molecular Biology of the Gene

**Group II:**

- BIOL 405: Molecular Evolution
- BIOL 411: Medical Embryology
- BIOL 414: Taxonomy of Seed Plants
- BIOL 417: Invertebrate Zoology
- BIOL 420: Paleobotany
- BIOL 421: Comparative Anatomy of Vertebrates
- BIOL 425: Biology of Fungi
- BIOL 427: Evolution
- BIOL 428: Population Genetics
- BIOL 438: Theoretical Population Ecology
- BIOL 443: Evo-devo: Evolution of Developmental Mechanisms
- BIOL 460: Human Genetics
- BIOL 474: Astrobiology

**Group III:**

- BIOL 400: Teaching in Biology
- BIOL 414: Taxonomy of Seed Plants
- BIOL 417: Invertebrate Zoology
- BIOL 419: Ecological and Environmental Problem Solving
- BIOL 421: Comparative Anatomy of Vertebrates
- BIOL 437: Histology
- BIOL 439: Practical Bioinformatics
- BIOL 444: Field Ecology
- BIOL 448: Ecology of Plant Reproduction
- BIOL 450W: Experimental Field Biology
- BIOL 461: Contemporary Issues in Science and Medicine
- BIOL 473: Laboratory in Mammalian Physiology
- BIOL 496: Independent Studies (1-3 credits)
- BIOL 499A: Tropical Field Ecology
- SC 295: Science Co-op Work Experience I
- SC 395: Science Co-op Work Experience II
### Plant Biology Option (50-54 credits)

**Available at the following campuses: University Park**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 407</td>
<td>Plant Developmental Anatomy</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 414</td>
<td>Taxonomy of Seed Plants</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 441</td>
<td>Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BMB 401</td>
<td>General Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BMB 402</td>
<td>General Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 210</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 212</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 213</td>
<td>Laboratory in Organic Chemistry</td>
<td>2</td>
</tr>
</tbody>
</table>

**Additional Courses**

Select 3-4 credits of the following:

- STAT 200  Elementary Statistics
- STAT 240  Introduction to Biometry
- STAT 250  Introduction to Biostatistics

**Groups**

Select a minimum of 9 credits of 400-level biology courses, with at least 6 credits from Group I and 3 credits from Group II:

**Group I:**
- BIOL 404  Cellular Mechanisms in Vertebrate Physiology
- BIOL 406  Symbiosis
- BIOL 409  Biology of Aging
- BIOL 411  Medical Embryology
- BIOL 412  Ecology of Infectious Diseases
- BIOL 413  Cell Signaling and Regulation
- BIOL 416  Biology of Cancer
- BIOL 421  Comparative Anatomy of Vertebrates
- BIOL 426  Developmental Neurobiology
- BIOL 430  Developmental Biology
- BIOL 432  Developmental Genetics
- BIOL 437  Histology
- BIOL 443  Evo-devo: Evolution of Developmental Mechanisms
- BIOL 446  Physiological Ecology
- BIOL 460  Human Genetics
- BIOL 469  Neurobiology
- BIOL 470  Functional and Integrative Neuroscience
- BIOL 479  General Endocrinology

**Group II:**
- BIOL 405  Molecular Evolution
- BIOL 411  Medical Embryology
- BIOL 414  Taxonomy of Seed Plants
- BIOL 417  Invertebrate Zoology
- BIOL 420  Paleobotany
- BIOL 421  Comparative Anatomy of Vertebrates
- BIOL 425  Biology of Fungi
- BIOL 427  Evolution

---

1. May select up to 6 credits from department list.
IUG students fulfill all degree requirements for a B.S. in the Eberly College of Science. If a student chooses to leave the program without completing the B.S. degree, those degrees, as described in the undergraduate and graduate curricula, will be awarded as of their admission date to the IUG program option. Note also updates and clarification about the specific requirements that affect certification requirements are common; students should check the Certification FAQ page at the Penn State Science Education website for updates and clarification about the specific requirements that affect them, based on their admission date to the IUG program option. Note also that students in the IUG program option are not required to complete all Penn State teacher certification requirements in order to receive their B.S. and M.Ed. degrees, as long as they have completed the requirements for those degrees, as described in the undergraduate and graduate Bulletins. For example, a student who has completed all degree requirements but has not yet received a score for the Pennsylvania-required Biology PRAXIS exam may be awarded both of his or her earned degrees.

Program Learning Objectives

1. Students should be able to explain the process of evolution and its underlying mechanisms;
2. Students should be able to explain the following core concepts, as discussed in Vision and Change: A Call to Action 2010 Report (American Association for the Advancement of Science):
   a. Structure and function (the basic units of biological structure that define the functions of living things)
   b. Information flow, exchange and storage (the influence of genetics on the growth and behavior of organisms)
   c. Pathways and transformations of energy and matter (the ways in which chemical transformation pathways and the laws of thermodynamics govern the growth and change of biological systems)
   d. Systems (the ways in which living things are interconnected and interact with one another)
e. Biodiversity at the genetic, organismal, community, and global scales

3. Students should be able to read and critically interpret primary scientific literature.

4. Students should be able to communicate results of biological research. Students should be able to: write reviews of scientific literature; write formal laboratory reports and/or research manuscripts; and give scientific presentations (talks, poster presentations, etc.).

5. Students should be able to recognize and apply ethical principles to basic and applied practice, and recognize the roles of science and scientists in society.

6. Students should be able to demonstrate appropriate laboratory skills, including: scientific technique; maintenance of a laboratory notebook; writing laboratory reports; and adhering to all laboratory safety procedures.

Academic Advising

The objectives of the university’s academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee’s unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy)

Altoona
Laura Palmer
Associate Professor of Biology
Hawthorn Building 109
3000 Ivyside Park
Altoona, PA 16601
814-949-5205
llkp3@psu.edu

Abington
Eric Ingersoll
Program Chair
1600 Woodland Road
Abington, PA 19001
215-881-7492
epi1@psu.edu

Beaver
Cassandra Miller-Butterworth
Associate Professor of Biology
100 University Drive
Monaca, PA 15061
724-773-3527
cmm48@psu.edu

Berks
Maureen Dunbar
Program Coordinator, Associate Professor
Luerssen 101H
Reading, PA 19610
640-396-6328
med18@psu.edu

Brandywine
Elizabeth Dudkin
Associate Professor of Biology
25 Yearsley Mill Road
Media, PA 19063
610-892-1459
ever9@psu.edu

Harrisburg
Richard C. Ciocci, Ph.D., P.E.
Interim Program Chair
Olmsted Building, W239
Middletown, PA 17057
717-948-6095
rcc102@psu.edu

Schuylkill
Rod Heisey
SET Program Coordinator
C204 200 University Drive
Schuylkill Haven, PA 17972
570-385-6063
rmh11@psu.edu

Scranton
Margret Hatch
Associate Professor
211 Dawson Building
Dunmore, PA 18512
570-963-2529
mih10@psu.edu

University Park
Barbara DeHart
Director, Undergraduate Biology Advising
227 Ritenour Building
University Park, PA 16802
814-865-2329
psubioadvising@psu.edu

York
Anne Vardo-Zalik
Associate Professor of Biology
1 Elias Science Building
York, PA 17403
717-718-6705
amv12@psu.edu

Suggested Academic Plan

General Biology Option at Altoona Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes
In policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 110†</td>
<td>4</td>
<td>BIL 220W or 240W*</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110‡†</td>
<td>3</td>
<td>CHEM 112‡</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 111†</td>
<td>1</td>
<td>CHEM 113‡</td>
<td>1</td>
</tr>
<tr>
<td>MATH 140B or 140 ‡†</td>
<td>4</td>
<td>MATH 141</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>ENGL 15, 30, or ESL 15‡</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>12.5-14</strong></td>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 230W*</td>
<td>4</td>
<td>BIL 220W or 240W*</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 210 or 202 (see adviser for alternative)</td>
<td>3</td>
<td>CHEM 212 or 203</td>
<td>3</td>
</tr>
<tr>
<td>STAT 200 or 250‡</td>
<td>4</td>
<td>PHYS 251</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>CAS 100‡</td>
<td>3</td>
</tr>
<tr>
<td>Elective Course - Supporting Course</td>
<td>1</td>
<td>General Education (GHW)</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>15.5</strong></td>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 400-level Course</td>
<td>3</td>
<td>Biology 400-level Course</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 213 (Elective - Supporting Course)</td>
<td>2-4</td>
<td>Elective Course - Supporting Course</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 251 or 212‡</td>
<td>4</td>
<td>PHYS 213 and PHYS 214 or Elective - Supporting Course</td>
<td>3 or 4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>General Education Course</td>
<td>3</td>
</tr>
<tr>
<td>Elective Course - Supporting Course</td>
<td>3</td>
<td>Elective Course - Supporting Course</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>15-17</strong></td>
<td><strong>15-16</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Fourth Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 400-level Course</td>
<td>3</td>
<td>Biology 400-level Course</td>
<td>3</td>
</tr>
<tr>
<td>Biology 400-level Course</td>
<td>3</td>
<td>Biology 400-level Course</td>
<td>3</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>General Education Course</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 202C</td>
<td>3</td>
<td>Elective - Supporting Course</td>
<td>3</td>
</tr>
<tr>
<td>Elective Course - Supporting Course</td>
<td>3 or 4</td>
<td>Elective Course - Supporting Course</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course (GHW)</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16.5-17.5</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 123-127

* Course requires a grade of C or better for the major
† Course requires a grade of C or better for General Education
‡ Course is an Entrance to Major requirement
‡‡ Course satisfies General Education and degree requirement

### University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

### Vertebrate Physiology Option at Altoona Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 110†</td>
<td>4</td>
<td>BIL 220W or 240W*</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110‡†</td>
<td>3</td>
<td>CHEM 112‡</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 111†</td>
<td>1</td>
<td>CHEM 113‡</td>
<td>1</td>
</tr>
<tr>
<td>MATH 140B or 140 ‡†</td>
<td>4</td>
<td>MATH 141</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>ENGL 15, 30, or ESL 15‡</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>12.5-14</strong></td>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 230W*</td>
<td>4</td>
<td>BIL 220W or 240W*</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 210 or 202 (see adviser for alternative)</td>
<td>3</td>
<td>CHEM 212 or 203</td>
<td>3</td>
</tr>
<tr>
<td>STAT 200 or 250‡</td>
<td>4</td>
<td>PHYS 251</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>CAS 100‡</td>
<td>3</td>
</tr>
<tr>
<td>Elective Course - Supporting Course</td>
<td>1</td>
<td>General Education (GHW)</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>15.5</strong></td>
<td><strong>15</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 400-level Course</td>
<td>3</td>
<td>Biology 400-level Course</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 213 (Elective - Supporting Course)</td>
<td>2-4</td>
<td>Elective Course - Supporting Course</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 251 or 212‡</td>
<td>4</td>
<td>PHYS 213 and PHYS 214 or Elective - Supporting Course</td>
<td>3 or 4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>General Education Course</td>
<td>3</td>
</tr>
<tr>
<td>Elective Course - Supporting Course</td>
<td>3</td>
<td>Elective Course - Supporting Course</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>15-17</strong></td>
<td><strong>15-16</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Fourth Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology 400-level Course</td>
<td>3</td>
<td>Biology 400-level Course</td>
<td>3</td>
</tr>
<tr>
<td>Biology 400-level Course</td>
<td>3</td>
<td>Biology 400-level Course</td>
<td>3</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>General Education Course</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 202C</td>
<td>3</td>
<td>Elective - Supporting Course</td>
<td>3</td>
</tr>
<tr>
<td>Elective Course - Supporting Course</td>
<td>3 or 4</td>
<td>Elective Course - Supporting Course</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course (GHW)</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>16.5-17.5</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>
The course series listed below provides

Ecology Option at Altoona Campus

Integrative Studies courses are required for the General Education program. Foundations (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

ECology Option at Altoona Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALL</td>
<td></td>
<td>MEASUREMENT</td>
<td></td>
</tr>
<tr>
<td>BIOL 110*#</td>
<td>4</td>
<td>BIOL 220W or 240W*</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 110*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 111†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 140B or 140*#†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Education Course</td>
<td>3 ENGL 15, 30, or ESL 15†</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>15.5-16.5</td>
<td></td>
<td>15-16</td>
</tr>
</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALL</td>
<td></td>
<td>MEASUREMENT</td>
<td></td>
</tr>
<tr>
<td>BIOL 230W*</td>
<td>4</td>
<td>BIOL 220W or 240W*</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 210 or 202</td>
<td>3</td>
<td>CHEM 212 or 203</td>
<td>3</td>
</tr>
<tr>
<td>STAT 200 or 250</td>
<td>4</td>
<td>PHYS 251</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3 CAS 100†</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total Credits</td>
<td>15-16</td>
<td></td>
<td>15-16</td>
</tr>
</tbody>
</table>

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

Career Paths

A Biology BS degree provides an excellent foundation and the skills required for a wide range of technical careers. While many majors use a Biology degree to prepare for entrance into health professional schools, others follow career paths in research, education, and business. Students
also pursue graduate study at universities both across the U.S. and internationally.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE BIOLOGY PROGRAM (http://bio.psu.edu/undergraduate-portal/after-graduation)

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (http://bio.psu.edu/graduate-portal)

Contact

Altoona
DIVISION OF MATHEMATICS AND NATURAL SCIENCES
Hawthorn Building 109
300 Ivyside Park
Altoona, PA 16601
814-949-5205
lpk3@psu.edu
http://altoona.psu.edu/academics/bachelors-degrees/biology/request-information

Abington
DIVISION OF SCIENCE AND ENGINEERING
1600 Woodland Road
Abington, PA 19001
215-881-7300
epl1@psu.edu
http://abington.psu.edu/biology

Beaver
100 University Drive
Monaca, PA 15061
724-773-3527
CMM48@psu.edu
http://beaver.psu.edu/biology

Berk
DIVISION OF SCIENCE
Luerssen Science Building
Reading, PA 19610
610-396-6328
MED18@psu.edu
http://berks.psu.edu/bs-biology

Brandywine
25 Yearsley Mill Road
Media, PA 19063
610-892-1459
EAD9@psu.edu
http://brandywine.psu.edu/biology

Harrisburg
SCHOOL OF SCIENCE, ENGINEERING, AND TECHNOLOGY
Science & Tech Building, 177 TL
Middletown, PA 17057
717-948-6358
tlh46@psu.edu

https://harrisburg.psu.edu/science-engineering-technology/biology-science/bachelor-science-biology

Schuylkill
ACADEMIC AFFAIRS
C204 200 University Drive
Schuylkill Haven, PA 17972
570-385-6063
RMH11@psu.edu
http://www.schuylkill.psu.edu/biology

Scranton
211 Dawson Building
Dunmore, PA 18512
570-963-2529
Mih10@psu.edu
http://worthingtonscranton.psu.edu/biology-degree

University Park
DEPARTMENT OF BIOLOGY
228 Ritenour Building
University Park, PA 16802
814-865-2329
PSUBIOADVISING@psu.edu
http://bio.psu.edu/about-us/contact-us

York
1 Elias Science Building
York, PA 17403
717-718-6705
AMV12@psu.edu
http://york.psu.edu/academics/baccalaureate/biology