Program Progression Guides

Disclaimer: The 2019-2020 Purdue West Lafayette catalog is considered the source for academic and programmatic requirements for students entering programs during the Fall 2019, Spring 2020, and Summer 2020 semesters. The Program Progression Guide assists students in the development of an individualized 8-semester plan. Students are encouraged to use this guide, MyPurduePlan* (online degree auditing tool) and the Student Educational Planner (SEP) as they work with their academic advisor towards the completion of their degree requirements.

Notification: Each student is ultimately responsible for knowing, monitoring and completing all degree requirements.

An undergraduate degree in the College of Science requires completion of the following degree requirements.

<table>
<thead>
<tr>
<th>University Degree Requirements</th>
<th>University Core Curriculum**</th>
<th>Required Major Program Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum 2.0 Cumulative GPA</td>
<td>Minimum 120 Credits that fulfill degree requirements</td>
<td>Minimum 2.0 cumulative GPA</td>
</tr>
<tr>
<td>Minimum 120 Credits that fulfill degree requirements</td>
<td>32 Residency Credits (30000 and above) at a Purdue University campus</td>
<td>Must have a 500-level BIOL course other than BIOL 54200.</td>
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</tbody>
</table>

** University Core Curriculum Outcomes may be met through completion of the College of Science Core curriculum. Students should consult with their academic advisors and MyPurdue Plan for course selections.

- Human Cultures: Behavioral/Social Science
- Human Cultures: Humanities
- Information Literacy
- Oral Communication
- Quantitative Reasoning
- Science
- Science, Technology & Society Selective
- Written Communication

University Core Curriculum Course Listing

Required Major Program Courses
Departmental specific requirements. 2.0 average GPA in classes required to fulfill biology requirements.
Minimum 2.0 cumulative GPA
Must have a 500-level BIOL course other than BIOL 54200.

College of Science Core Curriculum
- Freshman Composition – 3 credits
- Technical Writing and Presentation - 3 credits
- Teaming & Collaboration (NC)
- General Education - 9 credits
- Foreign Language & Culture – 9 credits
- Great Issues - 3 credits
- Laboratory Science - 8 credits
- Multidisciplinary - 3 credits
- Mathematics - 6-10 credits
- Statistics - 3 credits
- Computing - 3 credits

Degree Electives
Any Purdue or transfer course approved to meet degree requirements in accordance with individual departmental policies. Consult the No Count course list for courses, which may not be used to meet any College of Science degree requirement.

* This audit is not your academic transcript and it is not official notification of completion of degree or certificate requirements.

** University Core Curriculum Outcomes may be met through completion of the College of Science Core curriculum. Students should consult with their academic advisors and MyPurdue Plan for course selections.
The Department of Biological Sciences has suggested the following degree progression guide for the Biology Degree. Students will work with their academic advisors to determine their best path to degree completion. Course pre-requisites are specific to this degree plan.

### Credit Fall 1st Year | Prerequisite |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>2</td>
<td>BIOL 12100</td>
</tr>
<tr>
<td>5</td>
<td>CHM 12901</td>
</tr>
<tr>
<td>2</td>
<td>BIOL 13500 or 19500</td>
</tr>
<tr>
<td>3-5</td>
<td>Calculus I selective</td>
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<tr>
<td>3</td>
<td>Science Core Option</td>
</tr>
<tr>
<td>1</td>
<td>Elective (BIO1 11500 pref.)</td>
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<td>Total: 16-18</td>
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### Credit Fall 2nd Year | Prerequisite |
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<tr>
<td>3</td>
<td>BIOL 13100</td>
</tr>
<tr>
<td>4</td>
<td>Organic Chem I Selective</td>
</tr>
<tr>
<td>3</td>
<td>Science Core Option</td>
</tr>
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<td>Total: 16-19</td>
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### Credit Fall 3rd Year | Prerequisite |
<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td>3-4</td>
<td>Intermediate Biology Selective</td>
</tr>
<tr>
<td>2-3</td>
<td>Group A Selective</td>
</tr>
<tr>
<td>4</td>
<td>PHYS I Selective</td>
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<tr>
<td>3</td>
<td>Science Core Option</td>
</tr>
<tr>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>Total: 15-17</td>
<td></td>
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</table>

### Credit Fall 4th Year | Prerequisite |
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<tbody>
<tr>
<td>2-4</td>
<td>Base Lab Requirement</td>
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<tr>
<td>3</td>
<td>Science Core Option</td>
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<tr>
<td>1-3</td>
<td>Science Core Option</td>
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<tr>
<td>3</td>
<td>Elective</td>
</tr>
<tr>
<td>4</td>
<td>Elective</td>
</tr>
<tr>
<td>Total: 13-17</td>
<td></td>
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</tbody>
</table>

### Science Core Curriculum Options

- **Options recommended for first- and second-year students**
  - Freshman Composition\(^UC\)
  - General Education\(^UC\) (3 courses needed)
  - Foreign Language and Culture\(^UC\) (3 courses needed)
  - Multidisciplinary Experience\(^UC\) (BIOL 12100 satisfies)

- **Options recommended for third- and fourth-year students**
  - Technical Writing and Presentation\(^UC\) (COM 217 recommended)
  - Statistics (STAT 50300)
  - Computing (CS 17700 or CS 15900)
  - Great Issues

\(^UC\) Select courses may also satisfy a University Core Curriculum requirement; see the University Core Requirement course list for approved courses. Students must have 32 credits at the 30000 level or above taken at Purdue.
### 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)
2. **BIOL 13100** Biology II: Development, Structure, and Function of Organisms (3 cr.; spring)
3. **BIOL 13500** 1st Year Biology Lab (2 cr.; both) or
   - **BIOL 19500** Year I Bio Lab: Diet, Disease & the Immune System (2 cr.; alternate fall) or
   - **BIOL 19500** Year I Bio Lab: Disease Ecology (2 cr.; alternate fall) or
   - **ABE 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 32800** Principles of Physiology (4 cr.; spring)
   - **B. BIOL 36700** Principles of Development (2 cr.; spring) plus **BIOL 36701** Principles of Development Laboratory (1 cr.; spring)
   - **C. BIOL 39500** Macromolecules (3 cr.; fall)
   - **D. BIOL 41500** Intro. to Molecular Biology (3 cr.; spring)
   - **E. BIOL 41600** Viruses & Viral Diseases (3 cr.; spring)
   - **F. BIOL 42000** Eukaryotic Cell Biology (3 cr.; fall)
   - **G. BIOL 45600** Neurobiology (3 cr.; fall)
   - **H. BIOL 43800** General Microbiology (3 cr.; fall)

10. **Chemistry Selective**: Biology Lab (1 cr.; spring)

11. **Biology Selectives: Twelve credits** from the following: must choose at least one Group A Selective, at least one Group B Selective, and 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** Macromolecules (3 cr.; fall)
- **BIOL 41500** Intro. to Molecular Biology (3 cr.; spring)
- **BIOL 41600** Viruses & Viral Diseases (3 cr.; spring)
- **BIOL 42000** Eukaryotic Cell Biology (3 cr.; fall)
- **BIOL 43600** Neurobiology (3 cr.; fall)
- **BIOL 43800** General Microbiology (3 cr.; fall)
- **BIOL 43900** Microbiology Lab (2 cr.; fall)
- **BIOL 44400** Human Genetics (3 cr.; fall)
- **BIOL 44600** Molecular Biology of Pathogens (3 cr.; spring)
- **BIOL 47800** Intro to Bioinformatics (3 cr.; fall)
- **BIOL 48100** Eukaryotic Genetics (3 cr.; spring)
- **BIOL 51100** Intro. to X-Ray Crystallography (3 cr.; spring)
- **BIOL 51600** Molecular Biology of Cancer (3 cr.; fall)
- **BIOL 51700** Molecular Biology: Proteins (2 cr.; spring)
- **BIOL 52900** Bacterial Physiology (3 cr.; spring)
- **BIOL 53300** Medical Microbiology (3 cr.; fall)
- **BIOL 53601** Biological & Structural Aspects of Drug Design & Action (3 cr; spring)
- **BIOL 53800** Molecular, Cellular & Develop Neuro (3 cr.; spring)
- **BIOL 54100** Molecular Genetics of Bacteria (3 cr.; alt fall)

#### Group B Selective:

- **BIOL 30200** Human Anatomy & Physiology (3 cr.; spring)
- **BIOL 32800** Principles of Physiology (4 cr.; spring)
- **BIOL 36700** Principles of Development (2 cr.; spring)
- **BIOL 39500** Experimental Design & Quantitative Analysis (3 cr.; summer)
- **BIOL 43200** Reproductive Physiology (3 cr.; alt fall)
- **BIOL 48300** Environmental & Conservation Biol (3 cr.; alt spring)
- **BIOL 53700** Immunology (3 cr.; fall)
- **BIOL 55900** Endocrinology (3 cr.; fall)

### Lab Requirement:
Must meet Base Lab requirement as described on the back of this page. Only three credits of undergraduate research may count toward the 12 credit requirement. Any course(s) used for the Lab Requirement may also count toward the 12 credits.

### Other Credits:

- Research (BIOL 49400 or BIOL 49900, max of 3 credits)
- **BIOL 36701** Principles of Development Lab (1 cr.; spring)
- **BIOL 44100** Senior Seminar in Genetics (1 cr.; fall)
- Any BIOL 442xx or 54200 lab module (1-2 cr.; both)
- **BIOL 59500** Lab in Ecology (1 cr.; fall)

Footnotes and other requirements are on the next two pages.
1. Students must complete one of the Required courses in the chart below. Undergraduate research cannot be used to meet this requirement.
2. Students must also complete Objectives A and B as listed in the chart below with courses or research or a combination of the two.
3. Descriptions of Objectives A and B (not all tasks must be met to satisfy an objective):
   a. **Objective A** – Demonstrate the ability to plan and design hypothesis-driven experiments, simulations or discovery/observational experiments
      i. Conduct an appropriate literature review for a specific scientific topic.
      ii. Generate an applicable hypothesis (-es) for your research project
      iii. Identify techniques to be used in your project, with justification of those techniques.
      iv. Write a formal research proposal.
      v. Write a detailed outline of experiments
   b. **Objective B** - Develop the ability to appropriately analyze, critically evaluate, and depict data. Demonstrate the ability to effectively communicate scientific information orally and in writing, including synthesizing and evaluating scientific literature and putting experimental results in their appropriate scientific context.
      i. Analyze data
      ii. Use appropriate ways to depict and communicate data (e.g., graphs, movies, images, etc.). Present the research at lab meetings, in a talk, or at a poster session.
      iii. Write a summary (or summaries) of the data.
4. If research is used, the research director will be the one who decides if the research meets one or both objectives.
5. If research is used, it must include at least four credits of BIOL 49400 or 49900. BIOL 29400 research does not count toward this requirement.
6. Students who successfully complete a Biology Honors Research Thesis have successfully met Objectives A and B.
7. The Microbiology and Health & Disease majors require BIOL 43900 and the Ecology, Evolution and Environmental Biology major requires BIOL 59500, Laboratory in Ecology.

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**Base Laboratory Requirement Chart**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Required</th>
<th>Obj. A</th>
<th>Obj. B</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 39500</td>
<td>Exper Design &amp; Quant Analysis</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>BIOL 43900</td>
<td>Microbiology Lab</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>BIOL 44202</td>
<td>Animal Physiology (5 week module)</td>
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<td></td>
<td>X</td>
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<tr>
<td>BIOL 44205</td>
<td>LabView (5 week module)</td>
<td>X</td>
<td></td>
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<tr>
<td>BIOL 44207</td>
<td>Protein Structure (5 week module)</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>BIOL 44211</td>
<td>Anatomy &amp; Physiology (5 week module)</td>
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<tr>
<td>BIOL 44212</td>
<td>Microscopy &amp; Cell Bio (5 week module)</td>
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<td></td>
<td>X</td>
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<tr>
<td>BIOL 48300</td>
<td>Environmental &amp; Conservation Biology</td>
<td>X</td>
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<td>X</td>
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<td>BIOL 54200</td>
<td>Neurophysiology (5 week module)</td>
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<td>X</td>
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<td>BIOL 58210</td>
<td>Ecological Statistics</td>
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<td>BIOL 59100</td>
<td>Field Ecology</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>BIOL 59500</td>
<td>CryoEM 3D Reconstruction</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>BIOL 59500</td>
<td>Data Analysis in Neurosci (5 week module)</td>
<td>X</td>
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<tr>
<td>BIOL 59500</td>
<td>Laboratory in Ecology</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>BIOL 59500</td>
<td>Theory of Molecular Methods</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>
CHEMISTRY

1. **General Chemistry**
   A. CHM 12901 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 56100 General Biochemistry I (3 cr.; both) or CHM 33900 Biochemistry: A Molecular Approach (3 cr.; spring) or CHM 53300 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)
   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

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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 a Biology Selective, but not both.
6 This course may count for the Group B course and toward the Base Lab Requirement. However, you must still complete 12 total credits of biology selectives.
7 This course may count for a Group B course and toward the Base Lab Requirement. However, you must still complete 12 total credits of biology selectives.
8 Students who take CHM 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.
9 Students who do not take CHM 12901 for General Chemistry may use BIOL 44201 to satisfy this requirement and count as part of the 12 required credits of Biology Selectives. Credit is not allowed for both BIOL 44201 and CHM 33901.