Disclaimer: The 2023–24 Purdue West Lafayette catalog is considered the source for academic and programmatic requirements for students entering programs during the Fall 2023, Spring 2024, and Summer 2024 semesters. The Program Progression Guide assists students in the development of an individualized 8-semester plan. Students are encouraged to use this guide and MyPurduePlan* (an online degree auditing tool) 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.

### University Degree Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Minimum 120 Credits that fulfill degree requirements.</th>
<th>32 Residency Credits (30000-level and above) at a Purdue University campus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum 2.0 Cumulative GPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum 120 Credits that fulfill degree requirements.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### University Core Curriculum**

https://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html

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

### Civic Literacy Proficiency

https://www.purdue.edu/provost/about/provostInitiatives/civics/

### Required Major Program Courses (see following pages)

Departmental specific requirements, including 2.0 average GPA in classes required to fulfill biology requirements. Minimum 2.0 cumulative GPA

Must have a 500-level BIOL course (2-3 credit approved BIOL lecture)

### College of Science Core Curriculum

https://www.purdue.edu/science/Current_Students/curriculum_and_degree_requirements/college-of-science-core-requirements.html?

- 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
- STS (Science, Tech & Society) - 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.
# 2023-24 Biology
## Degree Progression Guide
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 listed are notes specific to this degree plan (not all pre-requisites are listed for every course).

### Fall 1st Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>BIOL 12100</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>BIOL 13100</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

### Spring 2nd Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>BIOL 13100</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>BIOL 13500 or 19500</th>
<th>CHM 12901 or Calc Placement</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

### Fall 2nd Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>BIOL 23200</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>BIOL 23100</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

### Spring 2nd Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>BIOL 23100</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>BIOL 24200</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

### Fall 3rd Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>BIOL 23200</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>BIOL 24200</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

### Spring 3rd Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>BIOL 28600</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>Free Elective (BIOL 29300 pref.)</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

### Fall 4th Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>Base Lab Requirement</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>Biology 500 Level Selective</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

### Spring 4th Year
<table>
<thead>
<tr>
<th>Credit</th>
<th>Biology Selective</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>Elective</th>
<th>Prerequisite</th>
</tr>
</thead>
</table>

## Science Core Curriculum Options
(One course needed for each requirement unless otherwise noted)

<table>
<thead>
<tr>
<th>Options recommended for first- and second-year students</th>
<th>Options recommended for third- and fourth-year students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman Composition&lt;sup&gt;UC&lt;/sup&gt;</td>
<td>Technical Writing and Presentation&lt;sup&gt;UC&lt;/sup&gt; (COM 217 recommended)</td>
</tr>
<tr>
<td>General Education&lt;sup&gt;UC&lt;/sup&gt; (3 courses needed)</td>
<td>Statistics (STAT 50300)</td>
</tr>
<tr>
<td>Foreign Language and Culture&lt;sup&gt;UC&lt;/sup&gt; (3 courses needed)</td>
<td>Computing (CS 17700 or CS 18000 also meet Teambuilding)</td>
</tr>
<tr>
<td>STS&lt;sup&gt;UC&lt;/sup&gt; (BIOL 12100)</td>
<td>Great Issues</td>
</tr>
</tbody>
</table>

<sup>UC</sup> Select courses may also satisfy a University Core Curriculum requirement; see the University Core Requirement <a>course list</a> for approved courses. Students must have 32 credits at the 30000 level or above taken at Purdue.
BIOLOGY (BIOL)  
Fall 2023

Graduation Requirements:
- A minimum 2.0 average in all biology courses required for this major.
- At least one approved 2-3 credit 500-level Biology course is required (excludes lab only courses such as BIOL 54200 & 5xxxx lab modules)
- A minimum of 32 credits at or above the 300-level completed at a Purdue campus
- 120 Total Credits Minimum

BIOLOGY CORE (19 credits):
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 or)
   BIOL 19500 Year I Bio Lab: Diet, Disease & the Immune System (2 cr.; spring) or
   BIOL 19500 Year I Bio Lab: Disease Ecology (2 cr.; alternate fall) or
   BIOL 19500 Year I Bio Lab: Phages to Folds (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)

UPPER-LEVEL BIOLOGY COURSEWORK (14-16 credits):
Must have at least 14 credits of coursework, including courses which meet each of the following categories: “Intermediate,” “Group A,” “Group B,” “BIOL 500-level,” and “Base Lab Requirement.” Courses may double-dip among requirements. If a course is used multiple places, the credits will only count once towards the required 14 credits of Upper-Level Biology Coursework. Excess Upper-Level Biology coursework beyond 16 credits will count as “free electives.” (also see Footnotes on the last page).

9. Intermediate Biology Selective -- complete ONE of these:
   A. BIOL 32800 Principles of Physiology (4 cr.; spring)
   B. BIOL 36700 Principles of Development (2 cr.; fall)
   C. BIOL 39500 Macromolecules (2 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 43600 Neurobiology (3 cr.; fall)
   H. BIOL 43800 General Microbiology (3 cr.; fall)

10. Biology Selectives: see note above for “Upper-Level Biology Coursework”

Group A Selectives:
- BIOL 39500 Macromolecules (2 cr.; fall)
- BIOL 41500 Intro. to Molecular Biology (3 cr.; spring)
- BIOL 41600 Viruses and 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 44400 Human Medical Genetics
- BIOL 44600 Molecular Biology of Pathogens (3 cr.; alt spring)
- BIOL 47800 Intro to Bioinformatics (3 cr.; fall)
- BIOL 48100 Eukaryotic Genetics (3 cr.; spring)
- BIOL 49500 The RNA World, CRISPR & Coronavirus (2 cr.; spring)
- BIOL 51600 Molecular Biology of Cancer (3 cr.; spring)
- BIOL 51700 Molecular Biology: Proteins (2 cr.; alt spring)
- BIOL 52900 Bacterial Physiology (3 cr.; spring)
- BIOL 53300 Medical Microbiology (3 cr.; fall)
- BIOL 53800 Molecular, Cellular & Develop Neuro (3 cr.; spring)
- BIOL 58210 Ecological Statistics (3 cr.; fall)
- BIOL 58705 Animal Communication (3 cr.; alt fall)
- BIOL 59100 Field Ecology (3 cr.; alt fall)
- BIOL 59200 The Evolution of Behavior (3 cr.; spring)
- BIOL 59500 Building the Tree of Life: Phylogenetics (3 cr.; spring)
- BIOL 59500 Disease Ecology (3 cr.; spring)
- BIOL 59500 Ecology (3 cr.; fall)
- BCHM 43400 Medical Topics in Biochemistry (3 cr.; spring)
- BCHM 56200 General Biochemistry II (3 cr.; spring)

Group B Selectives:
- BIOL 20400 Human Anatomy & Physiology II (4 cr.; spring)
- BIOL 32800 Principles of Physiology (4 cr.; spring)
- BIOL 36700 Principles of Development (2 cr.; fall)
- BIOL 39500 Experimental Design & Quantitative Analysis (3 cr.; summer)
- BIOL 48300 Environmental & Conservation Biol (3 cr.; alt spring)
- BIOL 49500 Biodiversity & Museum Research (3 cr.; fall)
- BIOL 49500 Data Science for Biologists (3 cr.; fall)
- BIOL 53700 Immunobiology (3 cr.; fall)
- BIOL 58000 Evolution (3 cr.; spring)
- BCHM 58210 Ecological Statistics (3 cr.; fall)
- BIOL 58705 Animal Communication (3 cr.; alt fall)
- BIOL 59100 Field Ecology (3 cr.; alt fall)
- BIOL 59200 The Evolution of Behavior (3 cr.; spring)
- BIOL 59500 Building the Tree of Life: Phylogenetics (3 cr.; spring)
- BIOL 59500 Disease Ecology (3 cr.; spring)
- BIOL 59500 Ecology (3 cr.; fall)
- BCHM 56200 General Biochemistry II (3 cr.; spring)

Additional Selectives (optional): can count toward the 14-16 cr. of Upper-Level Biol Coursework but not as Group A or Group B requirement:
- BIOL 49400 or BIOL 49900 Research - max of 3 credits counts for
- BIOL 44100 Senior Seminar in Genetics (1 cr.; fall)
- BCHM 52100 Comparative Genomics (3 cr.; spring)

11. Base Lab Requirement: see “Base Lab Requirement (BLR) for all Biology Majors” as described on the next page.
### Base Laboratory Requirement (BLR) for all Biology Majors

1. Each student must complete one course from the “Required Course” list in the chart below. Undergraduate research cannot be used to meet this requirement.
2. Students must also satisfy Objectives A and B as listed in the chart below, which can be met by courses, 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 Obj A and/or Obj B.
5. If research is used, it must include at least four credits of BIOL 49400 and/or 49900. (BIOL 29400, non-BIOL research, and research for pay will not count toward the BLR.)
6. Students who successfully complete a Biology Honors Research Thesis automatically meet Objectives A and B with the approved thesis but must still complete a “Required Course.”
7. The “Microbiology” and the “Health & Disease” majors must use BIOL 43900 Micro Lab for the BLR; the “Ecology, Evolution and Environmental Biology” majors must use BIOL 59500 Laboratory in Ecology for the BLR.

### Base Laboratory Requirement Chart

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Required Course</th>
<th>Obj. A</th>
<th>Obj. B</th>
<th>Usually Offered</th>
<th>Format</th>
<th>Pre-Req (PR) or Co-Req (CR) beyond core courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 32800</td>
<td>Principles of Physiology (4cr)</td>
<td>X</td>
<td></td>
<td></td>
<td>Spring</td>
<td></td>
<td>PR=32800 or CR=43600</td>
</tr>
<tr>
<td>BIOL 39500DIST</td>
<td>Exper Design &amp; Quant Analysis (3cr)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Summer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 43900</td>
<td>Microbiology Lab (2cr)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Fall</td>
<td>PR/CR=43800</td>
<td></td>
</tr>
<tr>
<td>BIOL 44212</td>
<td>Microscopy &amp; Cell Bio (1cr)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Spring</td>
<td>5-wk module</td>
<td></td>
</tr>
<tr>
<td>BIOL 48300</td>
<td>Environmental &amp; Conservation Biology (3cr)</td>
<td>X</td>
<td></td>
<td></td>
<td>alt Spring ’24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 49500BM</td>
<td>Biodiversity &amp; Museum Research (3cr)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 49500DSB</td>
<td>Data Science for Biologists (3cr)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Fall</td>
<td>PR=28600</td>
<td></td>
</tr>
<tr>
<td>BIOL 49500TEC</td>
<td>Topics in Endocrinology &amp; Cancer (2cr)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 54200</td>
<td>Neurophysiology (1cr)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Fall</td>
<td>5-wk module</td>
<td>PR=32800 or CR=43600</td>
</tr>
<tr>
<td>BIOL 58210</td>
<td>Ecological Statistics (3cr)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Fall</td>
<td>PR=STAT 50300</td>
<td></td>
</tr>
<tr>
<td>BIOL 59100</td>
<td>Field Ecology (4cr)</td>
<td>X</td>
<td></td>
<td>X</td>
<td>alt Fall ’23</td>
<td>CR/PR=59500EL</td>
<td></td>
</tr>
<tr>
<td>BIOL 59500BTL</td>
<td>Building the Tree of Life: Phylogenetics (3cr)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Spring</td>
<td>research experience recommended</td>
<td>PR=PHYS 23300 or 17200</td>
</tr>
<tr>
<td>BIOL 59500CRYO</td>
<td>CryoEM 3D Reconstruction (3cr)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Fall</td>
<td>PR=PHYS 23300 or 17200</td>
<td></td>
</tr>
<tr>
<td>BIOL 59500BN</td>
<td>Data Analysis in Neuroscience (1cr)</td>
<td></td>
<td>X</td>
<td></td>
<td>Spring</td>
<td>5-wk module</td>
<td></td>
</tr>
<tr>
<td>BIOL 59500EL</td>
<td>Laboratory in Ecology (1cr)</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Fall</td>
<td>PR/CR=59500 Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOL 59500</td>
<td>Neural Mechanisms in Health &amp; Disease (3cr)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>alt Spring ’23</td>
<td>PR=32800 or 43600; CR=56200</td>
<td></td>
</tr>
<tr>
<td>BIOL 59500SBL</td>
<td>Structural Biology Lab (1cr)</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Spring</td>
<td>5-wk module</td>
<td></td>
</tr>
<tr>
<td>BIOL 59500TMM</td>
<td>Theory of Molecular Methods (3cr)</td>
<td></td>
<td>X</td>
<td>X</td>
<td>alt Spring</td>
<td>BIOL 415 or other molecular biology</td>
<td></td>
</tr>
</tbody>
</table>
CHEMISTRY (17 credits) -- complete all of the following:

1. General Chemistry (5 credits):
   CHM 12901 General Chemistry with a Biological Focus (5 cr.; fall)

2. Organic Chemistry (8 credits):
   CHM 25500 Organic Chemistry I (3 cr.; both) and
   CHM 25501 Organic Chemistry Lab I (1 cr.; both) and
   CHM 25600 Organic Chemistry II (3 cr.; both) and
   CHM 25601 Organic Chemistry Lab II (1 cr.; both)

3. Biochemistry (4 credits):
   CHM 33900 Biochemistry: A Molecular Approach (3 cr.; spring) and
   CHM 33901 Biochemistry Laboratory (1 cr.; spring)

PHYSICS (8 credits) -- One of these two options – (PHYS 23300+23400 are recommended):

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)

OTHER: all University Core, College of Science Core, and Civics Literacy Requirements must also be completed.

FREE ELECTIVES: Approximately 14-26 credits

1. This course counts for Upper-Level Biology Coursework and the College of Science Teambuilding & Collaboration requirement.
2. This course counts towards portions of the Base Lab Requirement, but 14-16 total credits of Upper-Level Biology Coursework must still be earned.
3. This course may count for Upper-Level Biology Coursework and the College of Science Great Issues requirement.