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>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum 2.0 Cumulative GPA</td>
</tr>
<tr>
<td>32 Residency Credits (30000 and above) at a Purdue University campus</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>University Core Curriculum**</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Human Cultures: Behavioral/Social Science</td>
</tr>
<tr>
<td>• Human Cultures: Humanities</td>
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<tr>
<td>• Information Literacy</td>
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<tr>
<td>• Oral Communication</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Required Major Program Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Departmental specific requirements. 2.0 average in BIOL courses required to graduate. 2.5 average in Biology concentration ^ courses required to graduate. 3.0 average in Professional Education courses required to graduate (No grade below a C-).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>College of Science Core Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Freshman Composition – 3 credits</td>
</tr>
<tr>
<td>• Technical Writing and Presentation - 3 credits</td>
</tr>
<tr>
<td>• Teaming &amp; Collaboration (NC)</td>
</tr>
<tr>
<td>• General Education - 9 credits</td>
</tr>
</tbody>
</table>

| 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                                                                      |

<table>
<thead>
<tr>
<th>Degree Electives</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

* 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.
# 2019-20 Science Education - Biology Concentration
## Degree Progression Guide
The College of Science has suggested the following degree progression guide for the Science Education – Biology Concentration Degree. Students will work with their advisors to determine their best path to degree completion.

### Credits Fall 1st Year | Prerequisite | Credits Spring 1st Year | Prerequisite
--- | --- | --- | ---
2 | BIOL 12100**^ (meets Science, Technology, Society requirement) | 3 | BIOL 13100^ |
2 | BIOL 13500 or 19500^ | CHM 12901 co-req | 4 | Organic CHM I Selective^ | CHM 11600 or 12901 |
5 | CHM 12901** Fall only | Calc I co-req | 3-5 | Calc II Selective **^ | Calc I |
3-5 | Calc I Selective **^ | ALEKS 75 | 3 | Science Core Option |
3 | Science Core Option | | 3-4 | Science Core Option |
1 | Elective (BIOL 11500 Recommended) | | | |
16-18 | | | | |

### Credit Fall 2nd Year | Prerequisite | Credits Spring 2nd Year | Prerequisite
--- | --- | --- | ---
3 | BIOL 23100^ | CHM 12901, BIOL 13100 | 3 | BIOL 24100^ | BIOL 23100 |
2 | BIOL 23200^ | | 2 | BIOL 24200^ Spring only |
4 | Organic CHM II Selective^ | Organic I Lecture | 2 | BIOL 28600^ | BIOL 12100 |
3 | EDCI 20500 | | 3 | EDPS 23500^ |
3 | EDCI 28500^ | | 3 | EDPS 26500 |
3 | Science Core Option | Varies | 3 | Science Core Option |
1 | Elective (BIOL 29300 Recommended) | | 1 | |
18 | | | 17 |

### Credit Fall 3rd Year | Prerequisite | Credit Spring 3rd Year | Prerequisite
--- | --- | --- | ---
3-4 | Intermediate Biology Selective^ | Varies | 2 | Group B Selective^ | Varies |
2-3 | Group A Selective^ | Varies | 4 | PHIS II Selective^ | PHIS I |
4 | PHYS I Selective^ | Varies | 3-4 | Science Core Option |
1 | EDCI 43010 Secondary Creating and Managing Learning Environments | | 3 | Science Core Option |
1 | EDCI 32700 Classroom Assessment | EDPS 23500 | 3 | EDCI 27000 |
1 | EDST 20010 | | 1 | Elective (BIOL 39300 Recommended) |
12-14 | | | 16-17 |

### Credit Fall 4th Year | Prerequisite | Credit Spring 4th Year | Prerequisite
--- | --- | --- | ---
2-4 | Base Lab Requirement^ | | 3 | EDCI 30900 |
3 | STAT 50300^ | | 10 | EDCI 49800 (Teambuilding and Collaboration Experience) | EDCI 20500, 28500 AND EDCI 23500, 26500 (C- or better) |
3-4 | 500-Level Biology Selective^ | Varies | 2 | EDCI 42100 Fall only (Multidisciplinary Experience) | EDCI 20500, 28500 AND EDCI 23500, 26500 (C- or better) |
3 | EDCI 42100 Fall only (Multidisciplinary Experience) | | 2 | EDCI 42800 or EDCI 55800 Integrated STEM Education Methods Secondary | EDCI 20500, 28500 AND EDCI 23500, 26500 (C- or better) |
3 | Science Core Option | | | |
2 | EDCI 42800 or EDCI 55800 Integrated STEM Education Methods Secondary | | | |
16-19 | | | 13 |

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

**Options recommended for first- and second-year students**
- Freshman Composition^UC
- Foreign Language and Culture^UC (2 courses + EDCI 28500)
- General Education^UC (2 courses + EDCI 23500)

**Options recommended for third- and fourth-year students**
- Technical Writing and Presentation^UC (COM 217 recommended)
- Multidisciplinary Experience^UC
- Great Issues
- Computing (CS 17700 or CS 15900) /Teamwork

^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.
SCIENCES EDUCATION with Biology Concentration  
Fall 2019

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.; 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) 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 328001 Principles of Physiology (4 cr.; spring)
   B. BIOL 367002 Principles of Development (2 cr.; spring) plus BIOL 367003 Principles of Development Laboratory (1 cr.; spring)
   C. BIOL 395003 Macromolecules (3 cr.; fall)
   D. BIOL 415003 Intro. to Molecular Biology (3 cr.; fall)
   E. BIOL 416003 Viruses & Viral Diseases (3 cr.; spring)
   F. BIOL 420003 Eukaryotic Cell Biology (3 cr.; fall)
   G. BIOL 436003 Neurobiology (3 cr.; fall)
   H. BIOL 438003 General Microbiology (3 cr.; fall)
10. Biology Selectives: 10 credits from the following: must choose at least one Group A Selective, at least one Group B Selective, satisfy the Base Laboratory requirement, and at least one 500-level course from the Group A Selectives or Group B Selectives. Overlap (A, B, 500, Lab) is allowed, but 10 credits must still be earned.

Group A Selective:
- BIOL 395003 Macromolecules (3 cr.; fall)
- BIOL 415003 Intro. to Molecular Biology (3 cr.; fall)
- BIOL 416003 Viruses and Viral Diseases (3 cr.; spring)
- BIOL 420003 Eukaryotic Cell Biology (3 cr.; fall)
- BIOL 436003 Neurobiology (3 cr.; fall)
- BIOL 438003 General Microbiology (3 cr.; fall)
- BIOL 439002,4 Microbiology Lab (2 cr.; fall)
- BIOL 444003 Human Genetics (3 cr.; fall)
- BIOL 44600 Molecular Biology of Pathogens (3 cr.; alt spring)
- BIOL 478005 Intro to Bioinformatics (3 cr.; fall)
- BIOL 48100 Eukaryotic Genetics (3 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 53601 Biological & Structural Aspects of Drug Design & Action (3 cr.; spring)
- BIOL 53800 Molecular, Cellular & Developmental Neurobiology (3 cr.; spring)
- BIOL 54100 Molecular Genetics of Bacteria (3 cr.; fall)
- BIOL 54900 Microbial Ecology (2 cr.; alt spring)
- BIOL 55001 Eukaryotic Molecular Biology (3 cr.; fall)
- BIOL 562003 Neural Systems (3 cr.; spring)
- BIOL 56310 Protein Bioinformatics (3 cr.; alt spring)
- BIOL 59500 Cellular Biology of Plants (3 cr.; fall)
- BIOL 59500 Epigenetics in Human Disease (3 cr.; alt fall)
- BIOL 59500 Genetics & –Omics of Host-Microbe Interaction (3 cr.; alt spring)
- BIOL 59500 Intro. to X-Ray Crystallography (3 cr.; spring)
- BIOL 59500 Methods & Measurement in Physical Biochemistry (3 cr.; fall)
- BIOL 59500 Neural Mechanisms in Health & Disease (3 cr.; alt spring)
- BIOL 59500 Neurobiology of Learning and Memory (3 cr.; alt fall)
- BIOL 59500 Practical Biocomputing (3 cr.; spring)
- BIOL 59500 Theory of Molecular Methods (3 cr.; fall)
- BCHM 43400 Medical Topics in Biochemistry (3 cr.; spring)
- BCHM 56100 General Biochemistry I (3 cr.; fall)
- BCHM 56200 General Biochemistry II (3 cr.; spring)
- CHM 33900 Biochemistry: A Molecular Approach (3 cr.; spring)
- CHM 53300 Introductory Biochemistry (3 cr.; fall)
- FS 59000 Plant Bioactives & Human Health (3 cr.; fall)

Group B Selective:
- BIOL 30200 Human Anatomy & Physiology (3 cr.; spring)
- BIOL 328001 Principles of Physiology (4 cr.; spring)
- BIOL 367002 Principles of Development (2 cr.; spring)
- BIOL 395007 Experimental Design & Quantitative Analysis (3 cr.; summer)
- BIOL 43200 Reproductive Physiology (3 cr.; alt fall)
- BIOL 483006 Environmental & Conservation Biology (3 cr.; alt spring)
- BIOL 53700 Immunology (3 cr.; fall)
- BIOL 55900 Endocrinology (3 cr.; fall)
- BIOL 58000 Evolution (3 cr.; spring)
- BIOL 582107 Ecological Statistics (3 cr.; fall)
- BIOL 58705 Animal Communication (3 cr.; alt fall)
- BIOL 591007 Field Ecology (4 cr.; alt fall)
- BIOL 59200 Evolution of Behavior (3 cr.; alt spring)
- BIOL 59500 Disease Ecology (3 cr.; spring)
- BIOL 595002 Ecology (3 cr.; fall)
- BIOL 59500 Sensory Ecology (3 cr.; alt spring)
- HORT 301002 Plant Physiology (4 cr.; spring)

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 two credits may count toward the 10 credit requirement.

Other Credits that will count toward the 10 credits but not toward the A or B requirement:
1. Undergraduate Research (BIOL 49400 or BIOL 49900, maximum of 2 credits)
2. BIOL 367013 Principles of Development Lab (1 cr.; spring)
3. BIOL 44100 Senior Seminar in Genetics (1 cr.; fall)
4. Any BIOL 442xx or 54200 lab module (1-2 cr.; both)
5. BIOL 59500 Laboratory in Ecology (1 cr.; fall)

Footnotes and other requirements are on the back of this page.
Base Laboratory Requirement for all Biology Majors

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.

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>X</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>
<td>X</td>
<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>
<td>X</td>
</tr>
<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>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>BIOL 44212</td>
<td>Microscopy &amp; Cell Bio (5 week module)</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>BIOL 48300</td>
<td>Environmental &amp; Conservation Biology</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>BIOL 54200</td>
<td>Neurophysiology (5 week module)</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>BIOL 58210</td>
<td>Ecological Statistics</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>BIOL 59100</td>
<td>Field Ecology</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<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>
<td></td>
<td></td>
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<tr>
<td>BIOL 59500</td>
<td>Laboratory in Ecology</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>BIOL 59500</td>
<td>Neural Mechanisms in Health &amp; Disease</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>BIOL 59500</td>
<td>Theory of Molecular Methods</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
CHEMISTRY

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

2. **Organic Chemistry Selectives:** One of these two options:
   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)

**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)

**EDUCATION**

1. EDCI 20500 Exploring Teaching as a Career (3 cr.; both)
2. EDCI 28500 Multiculturalism and Education (3 cr.; both)
3. EDPS 23500 Learning and Motivation (3 cr.; both)
4. EDPS 26500 The Inclusive Classroom (3 cr.; both)
5. EDCI 27000 Introduction to Educational Technology and Computing (3 cr.; both)
6. EDST 20010 Educational Policies and Laws (1 cr.)
7. EDPS 32700 Assessment Literacy (1 cr.)
8. EDPS 43010 Secondary Create & Manage Learning Environment (1 cr.)
9. EDCI 42100 The Teaching of Biology in Secondary Schools (3 cr.; fall)
10. EDCI 30900 Reading in Middle and Secondary Schools: Methods & Problems (3 cr.; both)
11. EDCI 42800 Teaching Science in the Middle and Junior High School (2 cr.; spring) or EDCI 55800, Integrated STEM Education
12. EDCI 49800 Supervised Teaching Life Science Education (10 cr.; both)

**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 0-2 credits

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1. This may count for the Intermediate Biology Selective and as a Group B course and as the CoS Teambuilding & Collaboration requirement.
2. These courses are recommended for teaching majors.
3. Courses chosen for the Intermediate Biology Selective may satisfy #9 and still count as part of the 10 credit requirement (#10).
4. This course may count for a Group A course and for the Base Lab requirement. You must still complete 10 total credits of biology selectives.
5. This course may count for a Group A course and as the College of Science Multidisciplinary requirement.
6. This course may count for the Group B course and as the College of Science Great Issues requirement and toward the Base Lab Requirement.
7. This course may count for a Group B course and for the Base Lab requirement. However, you must still complete 10 total credits of biology selectives.