

## Program Progression Guides

**Disclaimer:** The [2021-2022 Purdue West Lafayette catalog](#) is considered the source for academic and programmatic requirements for students entering programs during the Fall 2021, Spring 2022, and Summer 2022 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.

University Degree Requirements		
Minimum 2.0 Cumulative GPA	Minimum 120 Credits that fulfill degree requirements	32 Residency Credits (30000 and above) at a Purdue University campus
University Core Curriculum**		
<ul style="list-style-type: none"> <li>Human Cultures: Behavioral/Social Science</li> <li>Human Cultures: Humanities</li> <li>Information Literacy</li> <li>Oral Communication</li> </ul> <p><a href="#">University Core Curriculum Course Listing</a></p>	<ul style="list-style-type: none"> <li>Quantitative Reasoning</li> <li>Science</li> <li>Science, Technology &amp; Society Selective</li> <li>Written Communication</li> </ul>	
Civic Literacy Proficiency - <a href="https://www.purdue.edu/provost/about/provostInitiatives/civics/">https://www.purdue.edu/provost/about/provostInitiatives/civics/</a>		
College of Science Core Curriculum		
<ul style="list-style-type: none"> <li>Freshman Composition – 3 credits</li> <li>Technical Writing and Presentation - 3 credits</li> <li>Teaming &amp; Collaboration (NC)</li> <li>General Education - 9 credits</li> </ul>	<ul style="list-style-type: none"> <li>Foreign Language &amp; Culture – 9 credits</li> <li>Great Issues - 3 credits</li> <li>Laboratory Science - 8 credits</li> <li>Multidisciplinary - 3 credits</li> </ul>	<ul style="list-style-type: none"> <li>Mathematics - 6-10 credits</li> <li>Statistics - 3 credits</li> <li>Computing - 3 credits</li> </ul>
Degree Electives		
Any Purdue or transfer course approved to meet degree requirements in accordance with individual departmental policies. Consult the <a href="#">No Count course list</a> 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.

## 2021-22 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	
5	CHM 12901 Fall only	Calc I co-req		2	EDCI 28500 Multiculturalism and Education	
2	EDCI 20500 Exploring Teaching As A Career			1	EDCI 35000 Community Issues and App for Ed	
1	EDST 20010 Ed Policies and Law			4	CHM 25500 and CHM 25501	CHM 11600 or 12901
2	BIOL 13500 or 19500	CHM 12901 co-req		3-5	Calc II Selective	Calculus I, C- or higher
3-5	Calc I Selective	ALEKS or SAT pre-req		3-4	Science Core Option	
1	Free Elective (BIOL 11500)					
<b>16-18</b>				<b>16-19</b>		

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	
1	EDCI 20002 (or EDPS 20002) Seminar ESL	Co-req: EDCI 37001 and EDPS 24000	2	BIOL 28600	BIOL 12100
2	EDCI 37001 Teaching and Learning ESL	Co-req: EDCI 36400 and EDCI 36500; Pre-req EDCI 20500 (min grade C-) and EDCI 28500 (min grade C-)	2	EDPS 23500	
1	EDPS 24000 - Children With Gifts, Creativity, And Talents	Co-req: EDCI/EDPS 20002	1	EDPS 24800 - Differentiating Curriculum And Instruction	Co reqs EDCI/EDPS 20001 and EDPS 26501
2	EDPS 36201 Positive Behavioral Supports	Co-req: EDCI/EDPS 20001 and EDPS 27001; Pre-req EDPS 26500	2	EDPS 26501 - The Inclusive Classroom	
4	CHM 25600 and CHM 26501	Organic II Lecture & Lab	3	Science Core Option	Varies
3-4	Science Core Option		1	EDCI 20001 (or EDPS 20001)	Co-req: EDPS 24800 and EDPS 26501
<b>18-19</b>			<b>16</b>		

Credit	Fall 3rd Year	Prerequisite	Credit	Spring 3rd Year	Prerequisite
1	EDCI 27000 - Introduction To Educational Technology And Computing		3-4	CS 15900 - C Programming or CS 17700 - Programming With Multimedia Objects	
1	EDCI 30900 - Reading In Middle And Secondary Schools: Methods And Problems		2-3	EDCI 42800 - Teaching Science In The Middle And Junior High School OR EDCI 55800 - Integrated Science, Technology, Engineering And Mathematics (STEM) Education Methods-Secondary	EDCI 42800: Pre-req: EDCI 20500 and 28500 and EDPS 23500 and 26500 (min grade C-) plus EDCI 42100 or EDCI 42400 or CHM 50200 (min grade C-) EDCI 55800: Pre-req: EDCI 53900 (may be taken concurrently)
4	PHYS I Selective	Varies	4	PHYS II Selective	PHYS I
3-4	Intermediate Biology Selective	Varies	2	Group B Selective	Varies
2-3	Group A Selective	Varies	3	Science Core Option	
3	Science Core Option	Varies	1	Elective (BIOL 39300 Recommended)	
3	Learner Specialty Dual Pathway Course*	Varies			
<b>17-19</b>	*EDCI 51900 or 52600 or 55900 or EDPS 21100 or 54200 or 54500		<b>18</b>		

Credit	Fall 4th Year	Prerequisite	Credit	Spring 4th Year	Prerequisite
3	STAT 50300		12	EDCI 49800 Supervised Teaching	EDCI 20500, 28500 AND EDPS 23500, 26500 (C- or better)
3	EDCI 42100 Fall only (Multidisciplinary Experience)	EDCI 20500, 28500 AND EDPS 23500, 26500 (C- or better)			
1	EDPS 32700 - Classroom Assessment	Pre-req: EDPS 23500			
2	EDPS 43010 - Secondary Creating And Managing Learning Environments				
2-4	Base Lab Requirement				
3-4	500-Level Biology Selective	Varies			
3	Science Core Option				
<b>17-20</b>			<b>12</b>		

## Science Core Curriculum Options

(one course needed for each requirement unless otherwise noted)

Options recommended for first- and second-year students	Options recommended for third- and fourth-year students
Freshman Composition <sup>UC</sup> Foreign Language and Culture <sup>UC</sup> (2 courses + EDCI 28500) General Education <sup>UC</sup> (2 courses + EDPS 23500)	Technical Writing and Presentation <sup>UC</sup> (COM 217 recommended) Multidisciplinary Experience <sup>UC</sup> 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.

(continued next page)

# SCIENCE EDUCATION with Biology Concentration

Fall 2021

## 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 1<sup>st</sup> 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 32800<sup>1,2</sup> Principles of Physiology (4 cr.; spring)
  - B. BIOL 36700<sup>2,3</sup> Principles of Development (2 cr.; spring)
  - C. BIOL 39500<sup>3</sup> Macromolecules (3 cr.; fall)
  - D. BIOL 41500<sup>3</sup> Intro. to Molecular Biology (3 cr.; fall)
  - E. BIOL 41600<sup>3</sup> Viruses & Viral Diseases (3 cr.; spring)
  - F. BIOL 42000<sup>3</sup> Eukaryotic Cell Biology (3 cr.; fall)
  - G. BIOL 43600<sup>3</sup> Neurobiology (3 cr.; fall)
  - H. BIOL 43800<sup>2,3</sup> 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 39500 <sup>3</sup> Macromolecules (3 cr.; fall)                            | BIOL 56200 <sup>5</sup> Neural Systems (3 cr.; spring)                            |
| BIOL 41500 <sup>3</sup> Intro. to Molecular Biology (3 cr.; fall)               | BIOL 56310 Protein Bioinformatics (3 cr.; alt spring)                             |
| BIOL 41600 <sup>3</sup> Viruses and Viral Diseases (3 cr.; spring)              | BIOL 59500 Cellular Biology of Plants (3 cr.; fall)                               |
| BIOL 42000 <sup>3</sup> Eukaryotic Cell Biology (3 cr.; fall)                   | BIOL 59500 <sup>4</sup> CryoEM 3D Reconstruction (3 cr.; fall)                    |
| BIOL 43600 <sup>3</sup> Neurobiology (3 cr.; fall)                              | BIOL 59500 Intro. to X-Ray Crystallography (3 cr.; spring)                        |
| BIOL 43800 <sup>2,3</sup> General Microbiology (3 cr.; fall)                    | BIOL 59500 Methods & Measurement in Physical Biochemistry (3 cr.; fall)           |
| BIOL 43900 <sup>2,4</sup> Microbiology Lab (2 cr.; fall)                        | BIOL 59500 <sup>4</sup> Neural Mechanisms in Health & Disease (3 cr.; alt spring) |
| BIOL 44600 Molecular Biology of Pathogens (3 cr.; alt spring)                   | BIOL 59500 Neurobiology of Learning and Memory (3 cr.; alt fall)                  |
| BIOL 47800 <sup>5</sup> Intro to Bioinformatics (3 cr.; fall)                   | BIOL 59500 Practical Biocomputing (3 cr.; spring)                                 |
| BIOL 48100 Eukaryotic Genetics (3 cr.; spring)                                  | BIOL 59500 <sup>4</sup> Theory of Molecular Methods (3 cr.; fall)                 |
| BIOL 51600 Molecular Biology of Cancer (3 cr.; spring)                          | BCHM 43400 Medical Topics in Biochemistry (3 cr.; spring)                         |
| BIOL 51700 Molecular Biology: Proteins (2 cr.; alt spring)                      | BCHM 56100 General Biochemistry I (3 cr.; fall)                                   |
| BIOL 52900 Bacterial Physiology (3 cr.; spring)                                 | BCHM 56200 General Biochemistry II (3 cr.; spring)                                |
| BIOL 53300 Medical Microbiology (3 cr.; fall)                                   | CHM 33900 Biochemistry: A Molecular Approach (3 cr.; spring)                      |
| BIOL 53601 Biological & Structural Aspects of Drug Design & Action (3 cr.; spr) | CHM 43300 Introductory Biochemistry (3 cr.; fall)                                 |
| BIOL 53800 Molecular, Cellular & Developmental Neurobiology (3 cr.; spring)     | FS 59000 Plant Bioactives & Human Health (3 cr.; fall)                            |
| 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)                           |   |

### Group B Selective:

- |   |   |
|---|---|
| BIOL 32800 <sup>1,2</sup> Principles of Physiology (4 cr.; spring)                  | BIOL 58210 <sup>7</sup> Ecological Statistics (3 cr.; fall) |
| BIOL 36700 <sup>2,3</sup> Principles of Development (2 cr.; spring)                 | BIOL 58705 Animal Communication (3 cr.; alt fall)           |
| BIOL 39500 <sup>7</sup> Experimental Design & Quantitative Analysis (3 cr.; summer) | BIOL 59100 <sup>7</sup> Field Ecology (4 cr.; alt fall)     |
| BIOL 48300 <sup>6</sup> Environmental & Conservation Biology (3 cr.; alt spring)    | BIOL 59200 Evolution of Behavior (3 cr.; alt spring)        |
| BIOL 53700 Immunology (3 cr.; fall)   | BIOL 59500 Disease Ecology (3 cr.; spring)                  |
| BIOL 58000 Evolution (3 cr.; spring)  | BIOL 59500 <sup>2</sup> Ecology (3 cr.; fall)               |
|   | HORT 30100 <sup>2</sup> 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 44100 Senior Seminar in Genetics (1 cr.; fall)
3. Any BIOL 442xx or 54200 lab module (1-2 cr.; both)
4. BIOL 59500 Laboratory in Ecology (1 cr.; fall)

*Footnotes and other requirements are following.*

## 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

Course	Title	Required	Obj. A	Obj. B
BIOL 32800	Principles of Physiology	X		
BIOL 39500	Exper Design & Quant Analysis		X	X
BIOL 43900	Microbiology Lab	X	X	X
BIOL 44212	Microscopy & Cell Bio (5 week module)	X		X
BIOL 48300	Environmental & Conservation Biology		X	X
BIOL 54200	Neurophysiology (5 week module)	X		X
BIOL 58210	Ecological Statistics		X	X
BIOL 59100	Field Ecology	X	X	X
BIOL 59500	CryoEM 3D Reconstruction		X	X
BIOL 59500	Data Analysis in Neurosci (5 week module)			X
BIOL 59500	Laboratory in Ecology	X	X	X
BIOL 59500	Neural Mechanisms in Health & Disease		X	X
BIOL 59500	Theory of Molecular Methods		X	X

## **CHEMISTRY**

### 1. **General Chemistry:**

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

### 2. **Organic Chemistry:**

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)

## **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 20001 Special Populations Sem.: Students with Disabilities and Differentiation Approaches (1 cr.; spring) (ALSO EDPS 20001)
2. EDCI 20002 Special Populations Sem.: English Lang Learners & Students with Gifts & Talents (1 cr.; spring) (ALSO EDPS 20002)
3. EDCI 20500 Exploring Teaching as a Career (2 cr.; both)
4. EDCI 27000 Introduction to Educational Technology and Computing (1 cr.; both)
5. EDCI 28500 Multiculturalism and Education (2 cr.; both)
6. EDCI 30900 Reading in Middle and Secondary Schools: Methods & Problems (1 cr.; both)
7. EDCI 35000 Community Issues & Applications for Educators (1 cr.; both)
8. EDCI 37001 Teaching & Learning English as a New Language (2 cr.; fall)
9. EDCI 42100 The Teaching of Biology in Secondary Schools (3 cr.; fall)
10. EDCI 42800 Teaching Science in the Middle and Junior High School (2 cr.; spring) or EDCI 55800, Integrated STEM Education Methods Secondary (3 cr.; fall)
11. EDCI 49800 Supervised Teaching Life Science Education (12 cr.; both)
12. EDPS 23500 Learning and Motivation (2 cr.; both)
13. EDPS 24000 Children with Gifts, Creativity & Talents (1 cr.; spring)
14. EDPS 24800 Differentiating Curriculum & Instruction (1 cr.; fall)
15. EDPS 26501 The Inclusive Classroom (2 cr.; both)
16. EDPS 32700 Assessment Literacy (1 cr.)
17. EDPS 43010 Secondary Create & Manage Learning Environment (2 cr.)
18. EDST 20010 Educational Policies and Laws (1 cr.)

## **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

SIED 10/21

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<sup>1</sup> This may count for the Intermediate Biology Selective and as a Group B course and as the CoS Teambuilding & Collaboration requirement.

<sup>2</sup> These courses are recommended for teaching majors.

<sup>3</sup> Courses chosen for the Intermediate Biology Selective may satisfy #9 and still count as part of the 10 credit requirement (#10).

<sup>4</sup> 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.

<sup>5</sup> This course may count for a Group A course and as the College of Science Multidisciplinary requirement.

<sup>6</sup> This course may count for the Group B course and as the College of Science Great Issues requirement and toward the Base Lab Requirement.

<sup>7</sup> 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.