

Program Progression Guides

Disclaimer: The 2022-2023 Purdue West Lafayette catalog is considered the source for academic and programmatic requirements for students entering programs during the Fall 2022, Spring 2023, and Summer 2023 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.

University Degree Requirements		
Minimum 2.0 Cumulative GPA	Minimum 120 Credits that fulfill degree requirements	32 Residency Credits (30000-level and above) at a Purdue University campus
University Core Curriculum** https://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html		
<ul style="list-style-type: none"> Human Cultures: Behavioral/Social Science Human Cultures: Humanities Information Literacy Oral Communication 	<ul style="list-style-type: none"> Quantitative Reasoning Science Science, Technology & Society Selective Written Communication 	
Civic Literacy Proficiency https://www.purdue.edu/provost/about/provostInitiatives/civics/		
Required Major Courses (see following pages)		
Departmental and Teacher Education Program requirements (including minimum 2.5 GPA for Content Area courses) Minimum 2.0 cumulative GPA Must have a 500-level BIOL course (3-credit BIOL lecture)		
College of Science Core Curriculum https://www.purdue.edu/science/Current_Students/curriculum_and_degree_requirements/college-of-science-core-requirements.html?		
<ul style="list-style-type: none"> Freshman Composition – 3 credits Technical Writing and Presentation - 3 credits Teaming & Collaboration (NC) General Education - 9 credits 	<ul style="list-style-type: none"> Foreign Language & Culture – 9 credits Great Issues - 3 credits Laboratory Science - 8 credits Multidisciplinary - 3 credits 	<ul style="list-style-type: none"> 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.		

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

* 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.

2022-2023 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. Course pre-requisites are specific to this degree plan.

Credits	Fall 1st Year	Prerequisite	Credits	Spring 1st Year	Prerequisite
2	BIOL 12100 (meets Science, Technology, Society requirement for Univ. Core)		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 75 or 85 or SAT/ACT score to meet pre-req	3-4	Science Core Option	
1	Free Elective (BIOL 11500)				
16-18			16-19		

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
18-19			16		

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			
17-19	*EDCI 51900 or 52600 or 55900 or EDPS 21100 or 54200 or 54500		18		

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				
17-20			12		

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 ^{UC} General Education ^{UC} (2 courses + EDPS 23500) Foreign Language and Culture ^{UC} (2 courses + EDCI 28500) Multidisciplinary ^{UC} (BIOL 12100)	Technical Writing and Presentation ^{UC} (COM 217 recommended) Statistics (STAT 50300) Computing (CS 17700 or CS 18000 also meet Teambuilding) 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.

(continued next page)

SCIENCE EDUCATION with Biology Concentration

Fall 2022

Graduation Requirements:

- A minimum 2.0 average in all biology courses required for this major
- At least one 3-credit **500-level Biology** course is required.
- A minimum of 32 credits at or above the 300-level completed at a Purdue campus
- 120 Total Credits

BIOLOGY CORE:

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 32800 ^{1,2} Principles of Physiology (4 cr.; spring)	E. BIOL 41600 ³ Viruses & Viral Diseases (3 cr.; spring)
B. BIOL 36700 ^{2,3} Principles of Development (2 cr.; spring)	F. BIOL 42000 ³ Eukaryotic Cell Biology (3 cr.; fall)
C. BIOL 39500 ³ Macromolecules (2 cr.; fall)	G. BIOL 43600 ³ Neurobiology (3 cr.; fall)
D. BIOL 41500 ³ Intro. to Molecular Biology (3 cr.; fall)	H. BIOL 43800 ^{2,3} 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:

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|---|---|
| BIOL 39500 ³ Macromolecules (2 cr.; fall) | BIOL 55001 Eukaryotic Molecular Biology (3 cr.; fall) |
| BIOL 41500 ³ Intro. to Molecular Biology (3 cr.; fall) | BIOL 56200 ⁵ Neural Systems (3 cr.; spring) |
| BIOL 41600 ³ Viruses and Viral Diseases (3 cr.; spring) | BIOL 56310 Protein Bioinformatics (3 cr.; alt spring) |
| BIOL 42000 ³ Eukaryotic Cell Biology (3 cr.; fall) | BIOL 59500 Cellular Biology of Plants (3 cr.; fall) |
| BIOL 43600 ³ Neurobiology (3 cr.; fall) | BIOL 59500 CRISPR Mechanisms & Applications (3 cr.; spring) |
| BIOL 43800 ^{2,3} General Microbiology (3 cr.; fall) | BIOL 59500 Intro. to X-Ray Crystallography (3 cr.; spring) |
| BIOL 43900 ^{2,4} Microbiology Lab (2 cr.; fall) | BIOL 59500 Methods & Measurement in Physical Biochem (3 cr.; fall) |
| BIOL 44600 Molecular Biology of Pathogens (3 cr.; alt spring) | BIOL 59500 ⁴ Neural Mechanisms in Health & Disease (3 cr.; alt spring) |
| BIOL 47800 ⁵ Intro to Bioinformatics (3 cr.; fall) | BIOL 59500 Neurobiology of Learning and Memory (3 cr.; alt fall) |
| BIOL 48100 Eukaryotic Genetics (3 cr.; spring) | BIOL 59500 Practical Biocomputing (3 cr.; spring) |
| BIOL 49500 RNA World, CRISPR and Coronavirus (2 cr.; spring) | BIOL 59500 ⁴ 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 53300 Introductory Biochemistry (3 cr.; fall) |
| 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) | |

Group B Selective:

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| BIOL 32800 ^{1,2,7} Principles of Physiology (4 cr.; spring) | BIOL 58000 Evolution (3 cr.; spring) |
| BIOL 36700 ^{2,3} Principles of Development (2 cr.; spring) | BIOL 58210 ⁷ Ecological Statistics (3 cr.; fall) |
| BIOL 39500 ⁷ Experimental Design & Quantitative Analysis (3 cr.; summer) | BIOL 58705 Animal Communication (3 cr.; alt fall) |
| BIOL 48300 ⁶ Environmental & Conservation Biology (3 cr.; alt spring) | BIOL 59100 ⁷ Field Ecology (4 cr.; alt fall) |
| BIOL 49500 ⁷ Biodiversity & Museum Research (3 cr.; fall) | BIOL 59200 Evolution of Behavior (3 cr.; alt spring) |
| BIOL 49500 ⁷ Data Science for Biologists (3 cr.; fall) | BIOL 59500 ⁷ Building the Tree of Life: Phylogenetics (3 cr.; spring) |
| BIOL 53700 Immunology (3 cr.; fall) | BIOL 59500 Disease Ecology (3 cr.; spring) |
| | BIOL 59500 ² Ecology (3 cr.; fall) |
| | HORT 30100 ² 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:

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| Research (BIOL 49400 or BIOL 49900, max of 2 credits) | BIOL 49500 Research in Animal Behavior (1 cr.; fall) |
| BIOL 44100 Senior Seminar in Genetics (1 cr.; fall) | BIOL 49500 Topics in Endocrinology & Cancer (2 cr.; spring) |
| Any BIOL 442xx or 54200 lab module (1-2 cr.; both) | BIOL 59500 Laboratory in Ecology (1 cr.; fall) |
| | BCHM 52100 Comparative Genomics (3 cr.; spring) |

Footnotes and other requirements are at the end of this document.

Base Laboratory Requirement (BLR) for all Biology Majors

- Students must complete one of the “Required” courses in the chart below. Undergraduate research cannot be used to meet this requirement.
- Students must also complete Objectives A and B as listed in the chart below with courses or research or a combination of the two.
- Descriptions of Objectives A and B (not all tasks must be met to satisfy an objective):
 - Objective A** – Demonstrate the ability to plan and design hypothesis-driven experiments, simulations or discovery/observational experiments
 - Conduct an appropriate literature review for a specific scientific topic.
 - Generate an applicable hypothesis (-es) for your research project
 - Identify techniques to be used in your project, with justification of those techniques.
 - Write a formal research proposal.
 - Write a detailed outline of experiments
 - 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.
 - Analyze data
 - 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.
 - Write a summary (or summaries) of the data.
- If research is used, the research director will be the one who decides if the research meets Obj A and/or Obj B.
- 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.
- Students who successfully complete a Biology Honors Research Thesis have successfully met Objectives A and B but must still complete a “Required Course.”
- The “*Microbiology*” and the “*Health & Disease*” majors both require BIOL 43900; the “*Ecology, Evolution and Environmental Biology*” major requires BIOL 59500 Laboratory in Ecology.

Base Laboratory Requirement Chart

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

CHEMISTRY

1. General Chemistry:

- A. 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

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

TEACHER EDUCATION PROGRAM (TEP) REQUIREMENTS

Science Education (Biology) majors must also apply for the "Teacher Education Program" (TEP) and complete all requirements. Talk with your Academic Advisor about how to proceed and review the "Biology Education Candidate Checklist" regularly to stay on track with key Milestones.

<https://www.education.purdue.edu/licensure/undergraduate/programs/>

COLLEGE OF SCIENCE CORE

Composition and Presentation; Teambuilding and Collaboration; Language and Culture; Great Issues; General Education; Multidisciplinary Experience; Mathematics; Statistics; Computing

OTHER: all University Core and Civics Literacy Requirements must also be completed.

FREE ELECTIVES approximately 0-2 credits

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 towards the Base Lab requirement, but a total of 10 credits of Biology Selectives must be completed.

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 towards the Base Lab requirement, but a total of 10 credits of Biology Selectives must be completed.
