

Program Progression Guide

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		
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 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?		
<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 STS (Science, Tech & Society) - 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.		

* 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).

Credit	Fall 1st Year	Prerequisite	Credit	Spring 2nd Year	Prerequisite
2	BIOL 12100		3	BIOL 13100	
5	CHM 12901	ALEKS 85 or Calc Placement	4	CHM 25500-25501	CHM 12901
2	BIOL 13500 or 19500	CHM 12901 co-req	3-5	Calculus II selective	Calculus I (with min grade C-)
3-5	Calculus I selective	ALEKS 75 or 85	3-4	Science Core Option	
3	Science Core Option		3	Science Core Option	
1	Elective (BIOL 11500 pref.)	BIOL 12100 co-req			
16-18			16-19		

Credit	Fall 2nd Year	Prerequisite	Credit	Spring 2nd Year	Prerequisite
3	BIOL 23100	BIOL 13100 and co-req CHM 12901	3	BIOL 24100	BIOL 23100
2	BIOL 23200	Co-req BIOL 23100	2	BIOL 24200	
4	CHM 25600-25601	CHM 25500	3	CHM 33900	C- or better in all prior CHM courses
3	Science Core Option		1	CHM 33901	CHM 33900 co-req
3	Science Core Option		2	BIOL 28600	BIOL 12100
			1	Free Elective (BIOL 29300 pref)	
			3	Science Core Option	
15			15		

Credit	Fall 3rd Year	Prerequisite	Credit	Spring 3rd Year	Prerequisite
3-4	Intermediate Biology Selective		3-4	Group B Selective	
2-3	Group A Selective		3-4	Science Core Option	
4	PHYS I Selective		4	PHYS II Selective	
3	Science Core Option		1	Elective (BIOL 39300 pref.)	
3	Elective		3	Science Core Option	
15-17			14-16		

Credit	Fall 4th Year	Prerequisite	Credit	Spring 4th Year	Prerequisite
2-4	Base Lab Requirement		3	Biology 500 Level Selective	
3	Science Core Option		3	Biology Selective	
1-3	Science Core Option		3	Science Core Option	
3	Elective		4	Elective	
4	Elective		3	Elective	
13-17			16		

Science Core Curriculum Options

(one course needed for each requirement unless otherwise noted)

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)
 STS^{UC} (BIOL 12100)

Options recommended for third- and fourth-year students

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.

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**
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 ^{1,2} Principles of Physiology (4 cr.; spring) | E. BIOL 41600 Viruses & Viral Diseases (3 cr.; spring) |
| B. BIOL 36700 Principles of Development (2 cr.; fall) | F. BIOL 42000 Eukaryotic Cell Biology (3 cr.; fall) |
| C. BIOL 39500 Macromolecules (2 cr.; fall) | G. BIOL 43600 Neurobiology (3 cr.; fall) |
| D. BIOL 41500 Intro. to Molecular Biology (3 cr.; spring) | 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 54100 Molecular Genetics of Bacteria (3 cr.; fall) |
| BIOL 41500 Intro. to Molecular Biology (3 cr.; spring) | BIOL 54900 Microbial Ecology (2 cr.; alt spring) |
| BIOL 41600 Viruses and Viral Diseases (3 cr.; spring) | BIOL 56200 Neural Systems (3 cr.; spring) |
| BIOL 42000 Eukaryotic Cell Biology (3 cr.; fall) | BIOL 56310 Protein Bioinformatics (2 cr.; alt spring) |
| BIOL 43600 Neurobiology (3 cr.; fall) | BIOL 59500 Cellular Biology of Plants (3 cr.; fall) |
| BIOL 43800 General Microbiology (3 cr.; fall) | BIOL 59500 CRISPR Mechanisms & Applications (3 cr.; spring) |
| BIOL 44400 Human Medical Genetics | BIOL 59500 ² CryoEM 3D Reconstruction (3 cr.; fall) |
| BIOL 44600 Molecular Biology of Pathogens (3 cr.; alt spring) | BIOL 59500 Immun. of Cancer & Infectious Disease (2 cr.; spring) |
| BIOL 47800 Intro to Bioinformatics (3 cr.; fall) | BIOL 59500 Methods & Measurements in Physical Biochem (3 cr.; fall) |
| BIOL 48100 Eukaryotic Genetics (3 cr.; spring) | BIOL 59500 ² Neural Mechanisms Health Disease (3 cr.; alt spring) |
| BIOL 49500 The RNA World, CRISPR & Coronavirus (2 cr.; spring) | BIOL 59500 Neurobiology of Learning & Memory (3 cr.; alt fall) |
| BIOL 51600 Molecular Biology of Cancer (3 cr.; spring) | BIOL 59500 Pathways in Human Health & Disease (3 cr.; fall) |
| BIOL 51700 Molecular Biology: Proteins (2 cr.; alt spring) | BIOL 59500 Practical Biocomputing (3 cr.; spring) |
| BIOL 52900 Bacterial Physiology (3 cr.; spring) | BIOL 59500 ² Theory of Molecular Methods (3 cr.; spring) |
| BIOL 53300 Medical Microbiology (3 cr.; fall) | BIOL 59500 X-Ray Crystallography (3 cr.; spring) |
| BIOL 53601 Biol & Structural Aspects of Drug Design & Action (3 cr; spr) | BCHM 43400 Medical Topics in Biochemistry (3 cr.; spring) |
| BIOL 53800 Molecular, Cellular & Develop Neuro (3 cr.; spring) | BCHM 56200 General Biochemistry II (3 cr.; spring) |

Group B Selectives:

- | | |
|---|--|
| BIOL 20400 Human Anatomy & Physiology II (4 cr.; spring) | BIOL 58210 ² Ecological Statistics (3 cr.; fall) |
| BIOL 32800 ^{1,2} Principles of Physiology (4 cr.; spring) | BIOL 58705 Animal Communication (3 cr.; alt fall) |
| BIOL 36700 Principles of Development (2 cr.; fall) | BIOL 59100 ² Field Ecology (3 cr.; alt fall) |
| BIOL 39500 ² Experimental Design & Quantitative Analysis (3 cr.; summer) | BIOL 59200 The Evolution of Behavior (3 cr.; spring) |
| BIOL 48300 ^{2,3} Environmental & Conservation Biol (3 cr.; alt spring) | BIOL 59500 ² Building the Tree of Life: Phylogenetics (3 cr.; spring) |
| BIOL 49500 ² Biodiversity & Museum Research (3 cr.; fall) | BIOL 59500 Disease Ecology (3 cr.; spring) |
| BIOL 49500 ² Data Science for Biologists (3 cr.; fall) | BIOL 59500 Ecology (3 cr.; fall) |
| BIOL 53700 Immunobiology (3 cr.; fall) | HORT 30100 Plant Physiology (4 cr.; spring) |
| BIOL 58000 Evolution (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 Upper-Level Biol; see next pg. for how research counts for Base Lab | 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

- Each student must complete one course from the “Required Course” list in the chart below. Undergraduate research cannot be used to meet this requirement.
- 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.
- 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 and/or 49900. (BIOL 29400, non-BIOL research, and research for pay will not count toward the BLR.)
- 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.”
- 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

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=28600
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		CR/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		BIOL 415 or other molecular biology

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.
