

Program Progression Guides

Disclaimer: The 2024-25 Purdue West Lafayette catalog is considered the source for academic and programmatic requirements for students entering programs during the Fall 2024, Spring 2025, and Summer 2025 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) 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"> Written Communication – 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. The College of Science has identified courses that are below the disciplinary level of each program and major area of study. While similar, Not Recommended course lists vary between departments.		

* 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.

2024-25 Cell, Molecular, and Developmental Biology Degree Progression Guide

The Department of Biological Sciences has suggested the following degree progression guide for the Cell, Molecular, and Developmental Biology Degree. Students will work with their academic advisors to determine their best path to degree completion. Course pre-requisite notes are specific to this degree plan (not all pre-requisites are listed for every course).

Credit	Fall 1st Year	Prerequisite	Credit	Spring 1st Year	Prerequisite
2	BIOL 12100		3	BIOL 13100	
5	CHM 12901	ALEKS 85 or Calc Placement	4	CHM 25500 - 25501	D or better in CHM 12901
2	BIOL 13500 or 145xx	(BIOL 121 or 131) & CHM 12901 co-req	3-5	Calculus II selective	C- or better in Calculus I
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 CHM 12901	3	BIOL 24100	BIOL 23100
2	BIOL 23200	BIOL 23100 co-req	2	BIOL 24200	BIOL 24100 co-req
4	CHM 25600 and CHM 25601	C- or better in CHM 25500	3	CHM 33900	C- or better in CHM 25600
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
2-3	Intermediate Biology Selective	BIOL 23100 & 24100	3	CMDB Selective I	varies
4	PHYS I Selective	BIOL, CHM, Calc 2 (varies)	4	PHYS II Selective	PHYS I
3	Elective		3	Science Core Option	
3	Science Core Option		3	Science Core Option	
3	Elective		1	Elective	
			1	Elective (BIOL 39300 pref)	
15-16			15		

Credit	Fall 4th Year	Prerequisite	Credit	Spring 4th Year	Prerequisite
3	CMDB Selective I	varies	3	CMDB Selective II	varies
2-4	Base Lab Requirement	varies	3	Biology Selective	varies
4	Science Core Option – CS 17700 rec.		3	Science Core Option– STAT 50300 rec.	C- or better in calc II
3	Science Core Option		3	Elective	
3	Elective		3	Elective	
15-17			15		

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
Written Communication ^{UC} General Education ^{UC} (9 credits needed) Foreign Language and Culture ^{UC} (9 credits needed with JEDI) Science Tech and Society ^{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.

CELL, MOLECULAR AND DEVELOPMENTAL BIOLOGY (CMDB)

Fall 2024

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 14503 First Yr Bio Lab Dis Ecol-Hnrs (2 cr.; alternate fall) **or**
BIOL 14504 First Yr Lab Diet Disease Immun Sys-Hnrs (2 cr.; spring) **or**
BIOL 14505 First Yr Lab Phages Folds-Hnrs (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 (13-19 credits)¹:

Course(s) taken for #9, #10, #11 and/or #12 must NOT overlap (i.e., a course can only be used to meet either the Intermediate Biology Selective or CMDB Selectives I or CMDB Selectives II, or the Biology Selectives requirement).

9. Intermediate Biology Selective: complete ONE course:

(CMDB majors **must take BIOL 41500 or 42000 for this requirement**)

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|--|--|
| A. BIOL 32800 Principles of Physiology (4 cr.; spring) | E. BIOL 41600 Viruses & Viral Diseases (3 cr.; spring) |
| B. BIOL 36700 ¹ Principles of Development (2 cr.; fall) | F. BIOL 42000¹ Eukaryotic Cell Biology (3 cr.; fall) |
| C. BIOL 38700 Macromolecules (2 cr.; fall) | G. BIOL 43600 Neurobiology (3 cr.; fall) |
| D. BIOL 41500¹ Intro. to Molecular Biology (3 cr.; spring) | H. BIOL 43800 General Microbiology (3 cr.; fall) |

10. CMDB Selectives I: complete TWO courses (see footnotes):

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|--|--|
| A. BIOL 36700 ¹ Principles of Development (2 cr.; fall) | C. BIOL 42000 ¹ Eukaryotic Cell Biology (3 cr.; fall) |
| B. BIOL 41500 ¹ Intro. to Molecular Biology (3 cr.; spring) | D. BIOL 48100 ¹ Eukaryotic Genetics (3 cr.; spring) |

11. CMDB Selective II: complete ONE of these courses (also meets the 500-level BIOL requirement):

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|--|---|
| A. BIOL 51600 ¹ Molecular Biology of Cancer (3 cr. spring) | D. BIOL 59500CMA ¹ CRISPR Mechanisms & Applic (3 cr. spring) |
| B. BIOL 51606 ¹ Pathways in Hum Health & Disease (3 cr. fall) | E. BIOL 59500U ¹ Cell Biology of Plants (3 cr.; alt fall) |
| C. BIOL 55101 ¹ Theory of Molecular Methods (3 cr.; spring) | F. BIOL 59500V ¹ Molecular Virology (3 cr. spring) |

12. Biology Selectives: complete ONE course from the following:

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| BIOL 32101 ³ Experimental Design & Quantitative Analysis (3 cr.; summer) | BIOL 53700 Immunobiology (3 cr.; fall) |
| BIOL 38700 Macromolecules (2 cr.; fall) | BIOL 53800 Molec, Cellular & Develop Neuro (3 cr.; spring) |
| BIOL 41600 Viruses and Viral Diseases (3 cr.; spring) | BIOL 55101 ^{1,3} Theory of Molecular Methods (3 cr.; spring) |
| BIOL 43600 Neurobiology (3 cr.; fall) | BIOL 56200 Neural Systems (3 cr.; spring) |
| BIOL 43800 General Microbiology (3 cr.; fall) | BIOL 56310 Protein Bioinformatics (3 cr.; alt spring) |
| BIOL 44400 Human Medical Genetics (3 cr.; spring) | BIOL 58000 Evolution (3 cr.; spring) |
| BIOL 47800 Intro to Bioinformatics (3 cr.; fall) | BIOL 58210 ³ Ecological Statistics (3 cr.; fall) |
| BIOL 48100 ¹ Eukaryotic Genetics (3 cr.; spring) | BIOL 58601 Ecology (3 cr.; fall) |
| BIOL 48300 ^{2,3} Environmental & Conservation Biology (3 cr.; alt spring) | BIOL 58705 Animal Communication (3 cr.; alt fall) |
| BIOL 49500BMR ³ Biodiversity & Museum Research (3 cr.; fall) | BIOL 59200 Evolution of Behavior (3 cr.; spring) |
| BIOL 49500DSB ³ Data Science for Biologists (3 cr.; fall) | BIOL 59500BTL ³ Building the Tree of Life (3 cr.; spring) |
| BIOL 49500TEC ³ Topics in Endocrinology & Cancer (2 cr.; spring) | BIOL 59500U ¹ Cell Biology of Plants (3 cr.; fall) |
| BIOL 49500RNA RNA World: CRISPR & Coronavirus (3 cr.; spring) | BIOL 59500CMA ¹ CRISPR Mechanisms & Applications (3 cr.; spring) |
| BIOL 51101 Intro to X-Ray Crystallography (3 cr.; spring) | BIOL 59500CRYO ³ CryoEM 3D Reconstruction (3 cr.; fall) |
| BIOL 51202 Methods & Measures in Biophysical Chem (3 cr.; fall) | BIOL 59500ICI Immunology of Cancer & Infectious Dis (3 cr.; spring) |
| BIOL 51600 ¹ Molecular Biology of Cancer (3 cr.; spring) | BIOL 59500 ¹ Molecular Virology (3 cr. spring) |
| BIOL 51606 ¹ Pathways in Human Health & Disease (3 cr.; fall) | BIOL 59500D Neurobiology of Learning & Memory (3 cr.; alt. fall) |
| BIOL 51700 Molecular Biology: Proteins (2 cr.; alt spring) | BIOL 59500M Practical BioComputing (3 cr.; spring) |
| BIOL 52905 Disease Ecology (3 cr.; spring) | BCHM 43400 Medical Topics in Biochemistry (3 cr.; spring) |
| BIOL 53300 Medical Microbiology (3 cr.; fall) | BCHM 52100 Comparative Genomics (3 cr.; spring) |
| BIOL 53601 Biol & Struct Aspects of Drug Design & Action (3 cr; spr) | |

13. Base Lab Requirement: see "Base Lab Requirement (BLR) for all Biology Majors" as described on the next page

NOTE: Footnotes are included on the last 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 32101	Experim Design & Analysis-Hnrs (3cr)		X	X	Summer	online	
BIOL 32800	Principles of Physiology (4cr)	X			Spring		
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		PR=28600
BIOL 49500DSB	Data Science for Biologists (3cr)	X	X	X	Fall		PR=28600
BIOL 49500TEC	Topics in Endocrinology & Cancer (2cr)		X	X	Spring		
BIOL 51099	Neural Mechanisms in Health & Disease (3cr)		X	X	alt Spring '23		PR=32800 or 43600; CR=56200
BIOL 55101	Theory of Molecular Methods (3cr)		X	X	alt Spring		PR=41500
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 58602	Laboratory in Ecology (1cr)	X	X	X	Fall		PR/CR=58601
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 59500SBL	Structural Biology Lab (1cr)	X		X	Spring	5-wk module	

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)

STATISTICS (3 credits) -- STAT 50300 is required (3 cr.; fall, spring, summer); prerequisite is a C- or better in calculus 2

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

FREE ELECTIVES Approximately 9-24 credits

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- ¹ Course(s) taken for the Intermediate Biology Selective, CMDB Selective I, CMDB Selective II, or the Biology Selective may NOT overlap (i.e., courses completed can be used for only one requirement -- #9 or #10 or #11 or #12 -- and must NOT overlap).
 - ² This course may count for a Biology Selective **and** as the College of Science Great Issues requirement.
 - ³ This course may count for a Biology Selective **and** toward the Base Lab Requirement.
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