Genetics (GNTC)
College of Science

2023-2024

Program Progression Guides

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

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Minimum 2.0 Cumulative GPA</th>
<th>Minimum 120 Credits that fulfill degree requirements</th>
<th>32 Residency Credits (30000-level and above) at a Purdue University campus</th>
</tr>
</thead>
</table>

### University Core Curriculum**

[https://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html](https://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html)

- Human Cultures: Behavioral/Social Science
- Human Cultures: Humanities
- Information Literacy
- Oral Communication
- Quantitative Reasoning
- Science
- Science, Technology & Society Selective
- Written Communication

### Civic Literacy Proficiency

[https://www.purdue.edu/provost/about/provostInitiatives/civics/](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](https://www.purdue.edu/science/Current_Students/curriculum_and_degree_requirements/college-of-science-core-requirements.html)

- Freshman Composition – 3 credits
- Technical Writing and Presentation - 3 credits
- Teaming & Collaboration (NC)
- General Education - 9 credits
- Foreign Language & Culture – 9 credits
- Great Issues - 3 credits
- Laboratory Science - 8 credits
- STS (Science, Tech & Society) - 3 credits
- 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](https://www.purdue.edu/science/Current_Students/curriculum_and_degree_requirements/college-of-science-core-requirements.html) 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 Genetics
Degree Progression Guide

The Department of Biological Sciences has suggested the following degree progression guide for the Genetics Degree. Students will work with their academic advisor 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).

<table>
<thead>
<tr>
<th>Credit</th>
<th>Fall 1st Year</th>
<th>Prerequisite</th>
<th>Credit</th>
<th>Spring 2nd Year</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>2</td>
<td>BIOL 12100</td>
<td></td>
<td>3</td>
<td>BIOL 13100</td>
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</tr>
<tr>
<td>5</td>
<td>CHM 12901</td>
<td>ALEKS 85 or Calc Placement</td>
<td>4</td>
<td>CHM 25500-25501</td>
<td>CHM 12901</td>
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<td>2</td>
<td>BIOL 13500 or 19500</td>
<td>CHM 12901 co-req</td>
<td>3-5</td>
<td>Calculus II selective</td>
<td>Calculus I (with min grade C-)</td>
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<td>3-5</td>
<td>Calculus I selective</td>
<td>ALEKS 75 or 85</td>
<td>3-4</td>
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<td>Science Core Option</td>
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<tr>
<td>1</td>
<td>Elective (BIOL 11500 pref.)</td>
<td>BIOL 12100 co-req</td>
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<tr>
<td>16-18</td>
<td></td>
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<td>16-19</td>
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<th>Prerequisite</th>
<th>Credit</th>
<th>Spring 2nd Year</th>
<th>Prerequisite</th>
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<tr>
<td>3</td>
<td>BIOL 23100</td>
<td>BIOL 13100 and co-req CHM 12901</td>
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<td>BIOL 24100</td>
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<tr>
<td>2</td>
<td>BIOL 23200</td>
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<td>BIOL 24200</td>
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<td>4</td>
<td>CHM 25600-25601</td>
<td>CHM 25500</td>
<td>3</td>
<td>CHM 33900</td>
<td>C- or better in all prior CHM courses</td>
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<td>CHM 33901</td>
<td>CHM 33900 co-req</td>
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<td>2</td>
<td>BIOL 28600</td>
<td>BIOL 12100</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>Free Elective (BIOL 29300 pref)</td>
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<th>Credit</th>
<th>Spring 3rd Year</th>
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<td>3</td>
<td>Intermediate Biology Selective</td>
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<td>3</td>
<td>BIOL 48100</td>
<td>BIOL 24100</td>
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<td>PHYS I Selective</td>
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<td>PHYS II Selective</td>
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<td>3-4</td>
<td>Science Core Option</td>
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<tr>
<td>3</td>
<td>Elective</td>
<td></td>
<td>1</td>
<td>Elective (BIOL 39300 pref)</td>
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<tr>
<td>16</td>
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<td>14-15</td>
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<table>
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<th>Prerequisite</th>
<th>Credit</th>
<th>Spring 4th Year</th>
<th>Prerequisite</th>
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<tr>
<td>1</td>
<td>BIOL 44100</td>
<td>BIOL 24100</td>
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<td>BIOL Selective 500 Level</td>
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<td>3-4</td>
<td>Biology Selective</td>
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<td>2-4</td>
<td>Base Lab Requirement</td>
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<tr>
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<td></td>
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<td>Elective</td>
<td></td>
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<tr>
<td>14-17</td>
<td></td>
<td></td>
<td>14-16</td>
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</table>

**Science Core Curriculum Options**

(Options recommended for first- and second-year students)

- Freshman Composition[^1]
- General Education[^2] (3 courses needed)
- Foreign Language and Culture[^3] (3 courses needed)
- STS[^4] (BIOL 12100)

(Options recommended for third- and fourth-year students)

- Technical Writing and Presentation[^3] (COM 217 recommended)
- Statistics (STAT 50300)
- Computing (CS 17700 or CS 18000 also meet Teambuilding)
- Great Issues

[^1]: 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.
GENETICS (GNTC)
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 & 5xxx 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 (11-18 credits):
9. Intermediate Biology Selective: Complete ONE of these:
   (Genetics majors may not use BIOL 43800, General Microbiology, to satisfy this requirement)
   A. BIOL 32800 Principles of Physiology (4 cr.; spring)
   B. BIOL 36700 Principles of Development (2 cr.; fall)
   C. BIOL 39500 Macromolecules (2 cr.; fall)
   D. BIOL 41500 Intro. to Molecular Biology (3 cr.; spring)
   E. BIOL 41600 Viruses & Viral Diseases (3 cr.; spring)
   F. BIOL 42000 Eukaryotic Cell Biology (3 cr.; fall)
   G. BIOL 43600 Neurobiology (3 cr.; fall)
   H. BIOL 43800 General Microbiology (3 cr.; fall)
10. BIOL 44100 Senior Seminar in Genetics (1 cr.; fall)
11. BIOL 48100 Eukaryotic Genetics (3 cr.; spring)
12. Base Lab Requirement: see “Base Lab Requirement (BLR) for all Biology Majors” as described on the back of this page.
13. Genetics Selectives I and II: complete TWO courses as described by the bullets below:
   - One course must be from the Genetics Selective I list to fulfill the “BIOL 500-level requirement”
   - The second course can either be from the Genetics Selective I list or the Genetics Selective II list.

Genetics Selectives I:
- BIOL 51600 Molecular Biology of Cancer (3 cr.; spring)
- BIOL 54100 Molecular Genetics of Bacteria (3 cr.; fall)
- BIOL 58000 Evolution (3 cr.; spring)
- BIOL 59500 Building the Tree of Life (3 cr.; spring)
- BIOL 59500 CRISPR Mechanisms and Applications (3 cr.; spring)
- BIOL 59500 Pathways in Human Health & Disease (3 cr.; fall)
- BIOL 59500 Theory of Molecular Methods (3 cr.; spring)
- BCHM 52100 Comparative Genomics (3 cr.; spring)

Genetics Selectives II:
- BIOL 43800 General Microbiology (3 cr.; fall)
- BIOL 44400 Human Medical Genetics (3 cr.; spring)
- BIOL 47800 Intro to Bioinformatics (3 cr.; fall)
- BIOL 49500 Biodiversity & Museum Research (3 cr.; fall)
- BIOL 49500 Data Science for Biologists (3 cr.; fall)
- BIOL 49500 The RNA World, CRISPR and Coronavirus (2 cr.; spring)
- AGRY 53000 Advanced Plant Genetics (3 cr.; fall)

Footnotes are included on the last page.
Base Laboratory Requirement (BLR) for all Biology Majors

1. Each student must complete one course from the “Required Course” list in the chart below. Undergraduate research cannot be used to meet this requirement.
2. 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.
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 Obj A and/or Obj B.
5. 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.)
6. 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.”
7. 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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Required Course</th>
<th>Obj. A</th>
<th>Obj. B</th>
<th>Usually Offered</th>
<th>Format</th>
<th>Pre-Req (PR) or Co-Req (CR) beyond core courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 32800</td>
<td>Principles of Physiology (4cr)</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>Spring</td>
<td></td>
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<tr>
<td>BIOL 39500DIST</td>
<td>Exper Design &amp; Quant Analysis (3cr)</td>
<td></td>
<td>X</td>
<td>X</td>
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<td>Summer</td>
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<tr>
<td>BIOL 43900</td>
<td>Microbiology Lab (2cr)</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Fall</td>
<td>PR/CR=43800</td>
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<tr>
<td>BIOL 44212</td>
<td>Microscopy &amp; Cell Bio (1cr)</td>
<td>X</td>
<td>X</td>
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<td>5-wk module</td>
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<tr>
<td>BIOL 48300</td>
<td>Environmental &amp; Conservation Biology (3cr)</td>
<td>X</td>
<td>X</td>
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<td>alt Spring '24</td>
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<tr>
<td>BIOL 49500BMR</td>
<td>Biodiversity &amp; Museum Research (3cr)</td>
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<td>X</td>
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<td>Fall</td>
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<tr>
<td>BIOL 49500DSB</td>
<td>Data Science for Biologists (3cr)</td>
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<td>BIOL 49500TEC</td>
<td>Topics in Endocrinology &amp; Cancer (2cr)</td>
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<tr>
<td>BIOL 54200</td>
<td>Neurophysiology (1cr)</td>
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<td>PR=32800 or CR=43600</td>
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<tr>
<td>BIOL 58210</td>
<td>Ecological Statistics (3cr)</td>
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<td>BIOL 59100</td>
<td>Field Ecology (4cr)</td>
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<td>X</td>
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<td>CR/PR=59500EL</td>
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<tr>
<td>BIOL 59500BTL</td>
<td>Building the Tree of Life: Phylogenetics (3cr)</td>
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<td>research experience recommended</td>
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<tr>
<td>BIOL 59500CRYO</td>
<td>CryoEM 3D Reconstruction (3cr)</td>
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<td>Data Analysis in Neuroscience (1cr)</td>
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<td>BIOL 59500EL</td>
<td>Laboratory in Ecology (1cr)</td>
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<td>BIOL 59500</td>
<td>Neural Mechanisms in Health &amp; Disease (3cr)</td>
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<td>alt Spring '23</td>
<td>PR=32800 or 43600; CR=56200</td>
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<td>BIOL 59500SBL</td>
<td>Structural Biology Lab (1cr)</td>
<td>X</td>
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<tr>
<td>BIOL 59500TMM</td>
<td>Theory of Molecular Methods (3cr)</td>
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<td>X</td>
<td>X</td>
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<td>alt Spring</td>
<td>BIOL 415 or other molecular biology</td>
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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)
   - CHM 25501 Organic Chemistry Lab I (1 cr.; both)
   - CHM 25600 Organic Chemistry II (3 cr.; both)
   - CHM 25601 Organic Chemistry Lab II (1 cr.; both)

3. **Biochemistry (4 credits):**
   - CHM 33900 Biochemistry: A Molecular Approach (3 cr.; spring)
   - 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)
   - PHYS 23400 Physics for Life Sciences II (4 cr.; both)

2. PHYS 17200 Modern Mechanics (4 cr.; both)
   - one of the following two choices:
     A. PHYS 27200 Electric and Magnetic Interactions (4 cr.; both)
     B. PHYS 24100 Electricity and Optics (3 cr.; both)
   - 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 13-23 credits

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1. This course counts as the Intermediate Biology Selective and as the College of Science Teambuilding and Collaboration requirement.
2. This course counts as a Genetics Selective course and counts towards the Base Lab Requirement.
3. This course counts as a Genetics Selective and it is also approved to meet the 500-level BIOL requirement.