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.

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

### University Core Curriculum**

- Human Cultures: Behavioral/Social Science
- Human Cultures: Humanities
- Information Literacy
- Oral Communication

- Quantitative Reasoning
- Science
- Science, Technology & Society Selective
- Written Communication

** 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.

### Required Major Program Courses

Departmental specific requirements. Overall GPA for Biology Concentration courses with the Departmental/Program Major Courses must be ≥ 2.50. This includes all courses under the Science Education Core plus all courses in the Biology Concentration. 3.0 average in Professional Education courses (No grade below a C-).

### College of Science Core Curriculum

- 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
- Mathematics - 6-10 credits
- Multidisciplinary - 3 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.
# 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.

<table>
<thead>
<tr>
<th>Credits</th>
<th>Fall 1st Year</th>
<th>Prerequisite</th>
<th>Credits</th>
<th>Spring 1st Year</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>2</td>
<td>BIOL 12100 (meets Science, Technology, Society requirement)</td>
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<tr>
<td>5</td>
<td>CHM 12901 Fall only</td>
<td>Calc I co-req</td>
<td>2-3</td>
<td>EDCI 28500 Multiculturalism and Education</td>
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<tr>
<td>1-3</td>
<td>EDCI 20500 Exploring Teaching As A Career</td>
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<td>1-3</td>
<td>EDCI 35000 Community Issues and App for Ed</td>
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<td>1-3</td>
<td>EDST 20010 Ed Policies and Law</td>
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<td>4</td>
<td>CHM 25500 and CHM 25501</td>
<td>CHM 11600 or 12901</td>
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<tr>
<td>2</td>
<td>BIOL 13500 or 19500</td>
<td>CHM 12901 co-req</td>
<td>3-5</td>
<td>Calc II Selective</td>
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<tr>
<td>3-5</td>
<td>Calc I Selective</td>
<td>ALEKS or SAT pre-req</td>
<td>3-4</td>
<td>Science Core Option</td>
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<td>1</td>
<td>Free Elective (BIOL 11500)</td>
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<td>16-18</td>
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<th>Credits</th>
<th>Spring 2nd Year</th>
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<tr>
<td>3</td>
<td>BIOL 23100</td>
<td>CHM 12901, BIOL 13100</td>
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<td>2</td>
<td>BIOL 23200</td>
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<td>1</td>
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<td>2</td>
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<td>BIOL 12100</td>
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<td>EDCPS 23500</td>
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<tr>
<td>1</td>
<td>EDPS 24800 - Differentiating Curriculum And Instruction</td>
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<td>EDPS 2400 - Children With Gifts, Creativity, And Talents</td>
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<td>2-3</td>
<td>EDPS 36201 Positive Behavioral Supports</td>
<td></td>
<td>2</td>
<td>EDPS 26501 - The Inclusive Classroom</td>
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<tr>
<td>4</td>
<td>CHM 25600 and CHM 26501</td>
<td>Organic I Lecture</td>
<td>3</td>
<td>Science Core Option</td>
<td>Varies</td>
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<tr>
<td>3-4</td>
<td>Science Core Option</td>
<td></td>
<td>18</td>
<td>15-16</td>
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<th>Credit</th>
<th>Spring 3rd Year</th>
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<tr>
<td>1-3</td>
<td>EDPS 32700 Classroom Assessment</td>
<td>EDPS 23500</td>
<td>3-4</td>
<td>CS 15900 - Programming or CS 17700 - Programming With Multimedia Objects</td>
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<tr>
<td>1-3</td>
<td>EDCI 30900 - Reading In Middle And Secondary Schools: Methods And Problems</td>
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<td>2-3</td>
<td>EDCI 42800 - Teaching Science In The Middle And Junior High School OR EDCI 55800 - Integrated Science, Technology, Engineering And Mathematics (STEM) Education Methods-Secondary</td>
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<td>4</td>
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<td>Intermediate Biology Selective</td>
<td>Varies</td>
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<td>Group B Selective</td>
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<td>2-3</td>
<td>Group A Selective</td>
<td>Varies</td>
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<td>Science Core Option</td>
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<th>Spring 4th Year</th>
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<td>STAT 50300</td>
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<td>EDCI 49800 Supervised Teaching</td>
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<td>3</td>
<td>EDCI 42100 Fall only (Multidisciplinary Experience)</td>
<td>EDCI 20500, 28500 AND EDPS 23500, 26501 (C- or better)</td>
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<td>EDCI 20500, 28500 AND EDPS 23500, 26501 (C- or better)</td>
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<tr>
<td>1-3</td>
<td>EDPS 32700 - Classroom Assessment</td>
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<td>1-3</td>
<td>EDPS 43010 - Secondary Creating And Managing Learning Environments</td>
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<td>2-4</td>
<td>Base Lab Requirement</td>
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<td>500-Level Biology Selective</td>
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</table>
## Science Core Curriculum Options

**Options recommended for first- and second-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)

**Options recommended for third- and fourth-year students**

- Technical Writing and Presentation<sup>UC</sup> (COM 217 recommended)
- Multidisciplinary Experience<sup>UC</sup>
- Great Issues
- Computing (CS 17700 or CS 15900)/Teamwork

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**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 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
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>1,3</sup> Principles of Development (2 cr.; spring) plus BIOL 36701 Principles of Development Laboratory (1 cr.; spring)
   - C. BIOL 39500<sup>2</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>2</sup> Macromolecules (3 cr.; fall)
- BIOL 41500<sup>3</sup> Intro. to Molecular Biology (3 cr.; fall)
- BIOL 41600<sup>3</sup> Viruses and Viral Diseases (3 cr.; spring)
- BIOL 42000<sup>3</sup> Eukaryotic Cell Biology (3 cr.; fall)
- BIOL 43600<sup>3</sup> Neurobiology (3 cr.; fall)
- BIOL 43800<sup>2,3</sup> General Microbiology (3 cr.; fall)
- BIOL 43900<sup>2,4</sup> Microbiology Lab (2 cr.; fall)
- BIOL 44400<sup>3</sup> Human Genetics (3 cr.; fall)
- BIOL 44600<sup>3</sup> Molecular Biology of Pathogens (3 cr.; alt spring)
- BIOL 44700<sup>3</sup> Intro to Bioinformatics (3 cr.; fall)
- BIOL 48100<sup>3</sup> Eukaryotic Genetics (3 cr.; spring)
- BIOL 51600<sup>3</sup> Molecular Biology of Cancer (3 cr.; spring)
- BIOL 51700<sup>3</sup> Molecular Biology: Proteins (2 cr.; alt spring)
- BIOL 52900<sup>3</sup> Bacterial Physiology (3 cr.; spring)
- BIOL 53300<sup>3</sup> Medical Microbiology (3 cr.; fall)
- BIOL 53601<sup>3</sup> Biological & Structural Aspects of Drug Design & Action (3 cr.; spr)
- BIOL 53800<sup>3</sup> Molecular, Cellular & Developmental Neurobiology (3 cr.; spring)
- BIOL 54100<sup>2</sup> Molecular Genetics of Bacteria (3 cr.; fall)
- BIOL 54900<sup>3</sup> Microbial Ecology (2 cr.; alt spring)
- BIOL 55001<sup>3</sup> Eukaryotic Molecular Biology (3 cr.; fall)

#### Group B Selective:

- BIOL 30200 Human Anatomy & Physiology (3 cr.; spring)
- BIOL 32800<sup>1,2</sup> Principles of Physiology (4 cr.; spring)
- BIOL 36700<sup>2,3</sup> Principles of Development (2 cr.; spring)
- BIOL 39500<sup>3</sup> Macromolecules (3 cr.; fall)
- BIOL 41500<sup>3</sup> Intro. to Molecular Biology (3 cr.; fall)
- BIOL 41600<sup>3</sup> Viruses & Viral Diseases (3 cr.; spring)
- BIOL 42000<sup>3</sup> Eukaryotic Cell Biology (3 cr.; fall)
- BIOL 43600<sup>3</sup> Neurobiology (3 cr.; fall)
- BIOL 43800<sup>2,3</sup> General Microbiology (3 cr.; fall)
- BIOL 43900<sup>2,4</sup> Microbiology Lab (2 cr.; fall)
- BIOL 44400<sup>3</sup> Human Genetics (3 cr.; fall)
- BIOL 44600<sup>3</sup> Molecular Biology of Pathogens (3 cr.; alt spring)
- BIOL 44700<sup>3</sup> Intro to Bioinformatics (3 cr.; fall)
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- BIOL 54900<sup>3</sup> Microbial Ecology (2 cr.; alt spring)
- BIOL 55001<sup>3</sup> Eukaryotic Molecular Biology (3 cr.; fall)

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<sup>UC</sup> 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 300-level or above taken at Purdue.
**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 36701 Principles of Development Lab (1 cr.; spring)
3. BIOL 44100 Senior Seminar in Genetics (1 cr.; fall)
4. Any BIOL 442xx or 54200 lab module (1-2 cr.; both)
5. BIOL 59500 Laboratory in Ecology (1 cr.; fall)

**Footnotes and other requirements are on the back of this page.**

### 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.).
      iii. Present the research at lab meetings, in a talk, or at a poster session.
      iv. 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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Required</th>
<th>Obj. A</th>
<th>Obj. B</th>
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<tbody>
<tr>
<td>BIOL 39500</td>
<td>Experimental Design &amp; Quantitative Analysis (3 cr.; summer)</td>
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<tr>
<td>BIOL 43200</td>
<td>Reproductive Physiology (3 cr.; alt fall)</td>
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<tr>
<td>BIOL 48300</td>
<td>Environmental &amp; Conservation Biology (3 cr.; alt spring)</td>
<td>X</td>
<td>X</td>
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<tr>
<td>BIOL 53700</td>
<td>Immunology (3 cr.; fall)</td>
<td>X</td>
<td>X</td>
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<tr>
<td>BIOL 55900</td>
<td>Endocrinology (3 cr.; fall)</td>
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<tr>
<td>BIOL 58000</td>
<td>Evolution (3 cr.; spring)</td>
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<tr>
<td>BIOL 58210</td>
<td>Ecological Statistics (3 cr.; fall)</td>
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<td>BIOL 58705</td>
<td>Animal Communication (3 cr.; alt fall)</td>
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<td>Evolution of Behavior (3 cr.; alt spring)</td>
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<td>BIOL 59500</td>
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<td>BIOL 43900</td>
<td>Microbiology Lab</td>
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<td>BIOL 44202</td>
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<td>BIOL 44205</td>
<td>LabView (5 week module)</td>
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<td>BIOL 44207</td>
<td>Protein Structure (5 week module)</td>
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<td>BIOL 44211</td>
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<td>Neural Mechanisms in Health &amp; Disease</td>
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<tr>
<td>BIOL 59500</td>
<td>Theory of Molecular Methods</td>
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CHEMISTRY

1. **General Chemistry:**
   A. CHM 12901 General Chemistry with a Biological Focus (5 cr.; fall)

2. **Organic Chemistry Selectives:** One of these two options:
   A. 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)
   B. CHM 26505 Organic Chemistry (3 cr.; fall) and CHM 26300 Organic Chemistry Lab (1 cr.; fall) and
      CHM 26605 Organic Chemistry (3 cr.; spring) and CHM 26400 Organic Chemistry Lab (1 cr.; spring)

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 20500 Exploring Teaching as a Career (3 cr.; both)
2. EDCI 28500 Multiculturalism and Education (3 cr.; both)
3. EDPS 23500 Learning and Motivation (3 cr.; both)
4. EDPS 26500 The Inclusive Classroom (3 cr.; both)
5. EDCI 27000 Introduction to Educational Technology and Computing (3 cr.; both)
6. EDST 20010 Educational Policies and Laws (1 cr.)
7. EDPS 32700 Assessment Literacy (1 cr.)
8. EDPS 43010 Secondary Create & Manage Learning Environment (1 cr.)
9. EDCI 42100 The Teaching of Biology in Secondary Schools (3 cr.; fall)
10. EDCI 30900 Reading in Middle and Secondary Schools: Methods & Problems (3 cr.; both)
11. 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)
12. EDCI 49800 Supervised Teaching Life Science Education (10 cr.; both)

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