Biology

MAJOR

CONCENTRATIONS IN
- MOLECULAR BIOLOGY
- ENVIRONMENTAL SCIENCE

OPTION IN PRE-HEALTH PROFESSIONS

MINOR

SEE RELATED PROGRAMS:
- ETHNOBOTANY
- FORESTRY
- INTERPRETIVE BIOLOGY & NATURAL HISTORY
- WILDLIFE & FISHERIES

Contact: David Puthoff, Associate Professor, Department of Biology

Professors: Li, Raesly, Seddon, Serfass

Associate Professors: Brosi, Keller, Lambert, Puthoff (Chair), Taylor

Assistant Professors: Hocking, Hughes, Sheehan

- Biology is often selected as a major by students planning to enter medicine and other health professions careers. If you plan advanced study in the health professions, you should choose the pre-health professions option.

Program Requirements

<table>
<thead>
<tr>
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<th>MAJOR</th>
<th>MINOR</th>
<th>PRE-HEALTH</th>
<th>MOLEC BIO</th>
<th>ENV SCIENCE</th>
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</thead>
<tbody>
<tr>
<td>Hours Required in Biology:</td>
<td>41-44</td>
<td>21-24</td>
<td>43-45</td>
<td>38-40</td>
<td>46</td>
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<tr>
<td>Hours Required in Other Departments:</td>
<td>30</td>
<td>0</td>
<td>30</td>
<td>39</td>
<td>40</td>
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<tr>
<td>Total Hours Required:</td>
<td>71-74</td>
<td>21-24</td>
<td>73-75</td>
<td>77-79</td>
<td>86</td>
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Requirements for Major in Biology

1. Introductory Level Courses: (12 hours)
   - BIOL 149 General Biology I (GEP Group C)

2. Advanced Level Courses: (20 hours)
   - BIOL 304 Microbiology
   - BIOL 310 Cell Biology
   - BIOL 340 General Ecology
   - BIOL 350 Genetics
   - BIOL 401 Genetics Laboratory
   - BIOL 402 Evolution
   - BIOL 496 Seminar in Biology (Capstone)

3. Biology Electives: (9-12 hours)
   - Select any 3 classes between the 300 and 456 level. Students can use 3 credits of BIOL 499 or 493 as one (1) of the classes in this category, but may NOT use both.

4. Required Courses in Other Departments: (30 hours)

   Chemistry:
   - CHEM 201 and 202 General Chemistry I & II (CHEM 201 - GEP Group C)
   - CHEM 311 and 312 Organic Chemistry I
   - CHEM 321 and 322 Organic Chemistry II

   Mathematics:
   - MATH 109/110 Elements of Applied Probability & Statistics (Core Skill 3)
   - Select one from:
     - MATH 119 College Algebra
     - MATH 120 Pre-Calculus Mathematics (Core Skill 3)
     or MATH 220 or higher

   Physics:
   - PHYS 215 and 216 General Physics I & II (PHYS 215 - GEP Group C)
   - or PHYS 261 and 262 Principles of Physics I & II (PHYS 261 - GEP Group C)

Requirements for Minor in Biology

1. Introductory Level Courses: (12 hours)
   - BIOL 149 General Biology I (GEP Group C)
   - BIOL 160 General Zoology
   - BIOL 161 General Botany

2. Elective Hours Within Department: (9-12 hours)
   - Select any 3 biology courses between the 300 and 456 level, except 401.

Pre-Health Professions Option for Biology Majors

(Pre-Dental, Pre-Medical, Pre-Optometry, Pre-Veterinary, Allied Health Fields)

1. Introductory Level Courses: (12 hours)
   - BIOL 149 General Biology I (GEP Group C)
BIOL 160  General Zoology  
BIOL 161  General Botany

2. Advanced Level Courses: (17 hours)  
BIOL 304  Microbiology  
BIOL 310  Cell Biology  
BIOL 340  General Ecology  
BIOL 350  Genetics  
BIOL 401  Genetics Laboratory  
BIOL 496  Seminar in Biology (Capstone)

3. Advanced Level Classes in Biology (8 hours)  
BIOL 321  Anatomy and Physiology I  
BIOL 322  Anatomy and Physiology II  
or  
BIOL 302  Animal Physiology  
BIOL 427  Comparative Anatomy

4. Electives: (6-8 hours)  
Choose two of the following:  
BIOL 302  Animal Physiology  
BIOL 403  Plant Physiology  
BIOL 340  General Ecology  
BIOL 402  Evolution  
BIOL 404  Histology  
BIOL 440  Developmental Biology  
BIOL 445  Immunology  
BIOL 456  Advanced Microscopy  
BIOL 493  Advanced Biological Research*  
BIOL 499  Special Problems in Biology*  
or  
IDIS 493  Honors Thesis  
*Students may NOT use both BIOL 493 and BIOL 499 as the two required electives.

5. Required Courses in Other Departments: (39-40 hours)  
See Section 4 above (Biology major).

Requirements for Major in Biology – Molecular Biology Concentration

- The molecular biology concentration offers an interdisciplinary program with a strong emphasis on laboratory experiences in biology and chemistry, while maintaining a strong biology core. The option is best suited for students who wish to pursue an advanced degree in cell or molecular biology or to find employment in the biotechnology industry.

1. Introductory Level Courses: (12 hours)  
BIOL 149  General Biology I (GEP Group C)  
BIOL 160  General Zoology  
BIOL 161  General Botany

2. Advanced Level Courses: (11 hours)  
BIOL 401  Genetics Lab  
BIOL 435  Molecular Biology  
BIOL 437  Molecular Biology Seminar (Capstone)  
BIOL 438  Biotechnology Laboratory (3 hours)

3. Molecular Biology Option: (9 hours)  
BIOL 401  Genetics Lab  
BIOL 435  Molecular Biology  
BIOL 437  Molecular Biology Seminar (Capstone)  
BIOL 438  Biotechnology Laboratory (3 hours)

4. Electives: (6-8 hours)  
Choose two of the following:  
BIOL 302  Animal Physiology  
BIOL 403  Plant Physiology  
BIOL 340  General Ecology  
BIOL 402  Evolution  
BIOL 404  Histology  
BIOL 440  Developmental Biology  
BIOL 445  Immunology  
BIOL 456  Advanced Microscopy  
BIOL 493  Advanced Biological Research*  
BIOL 499  Special Problems in Biology*  
or  
IDIS 493  Honors Thesis  
*Students may NOT use both BIOL 493 and BIOL 499 as the two required electives.

5. Required Courses in Other Departments: (39-40 hours)  
See Section 4 above (Biology major).

Requirements for Major in Biology – Environmental Science Concentration

- For students interested in the stewardship of natural resources with a greater emphasis on economic and political perspectives.
- This concentration allows you to choose electives in economics, political science and the humanities, which potentially add a thematic direction to your degree.
• You should not choose this concentration if you are in pre-health professions or planning to attend a traditional biology graduate program.

1. Introductory Level Courses: (22 hours)
   BIOL 149 General Biology I *(GEP Group C)*
   BIOL 160 General Zoology
   BIOL 161 General Botany
   ECON 201/211 Macroeconomics *(GEP Group D)*
   GEOG 103/113 Physical Geography *(GEP Group C)*
   POSC 110/112* Introduction to American Politics *(GEP Group D)*
   or POSC 113/114 Introduction to World Politics *(GEP Group D)*
   or POSC 131** Introduction to Comparative Politics *(GEP Group D or F)*

2. Advanced Level Courses: (24 hours)
   BIOL 304 Microbiology
   BIOL 310 Cell Biology
   BIOL 340 General Ecology
   BIOL 350 Genetics
   BIOL 402 Evolution
   BIOL 494 Field Experiences in Biological Sciences *(Capstone - 6 credits)*

3. Supporting Courses: (16 hours)
   BIOL 406 Ornithology
   or BIOL 423 Mammalogy
   or BIOL 426 Vertebrate Zoology
   BIOL 425 Forest Ecology and Conservation
   BIOL 450 Ecology and Management of Wildlife Populations
   or BIOL 420 Fish Management and Culture
   ECON 202 Microeconomics
   GEOG 473 Environmental Law

4. Courses in Other Departments (18 hours)
   Chemistry:
   CHEM 201 and 202 General Chemistry *(CHEM 201 – GEP Group C)*
   CHEM 420 Environmental Chemical Analysis

   Mathematics:
   MATH 109/110 Elements of Applied Probability and Statistics *(Core Skill 3)*
   Select one from:
   MATH 119 College Algebra
   MATH 120 Pre-Calculus Mathematics *(Core skill 3)*
   or MATH 220 or higher

5. Electives: (6 hours)
   Select two courses from different groups.

   Group I Advanced Economics
   ECON 309 Comparative Economic Systems
   ECON 405 Economic Growth and Development: The Developing Economies
   ECON 410 Resource and Energy Economics

   Group II Advanced Political Science
   GEOG 407 Political Geography
   POSC 330 Politics of Africa
   POSC 331 Politics of Latin America
   POSC 332 Politics of the Middle East
   POSC 450 Environmental Public Policy

   Group III Advanced Humanities
   ENGL 440 Literature of the Environment
   HIST 409 World Environmental History
   PHIL 315 Philosophy and the Environment

   Check the prerequisites for other POSC courses before choosing your introductory POSC course.
   * POSC 131 preferred prerequisite for POSC 330, 331, 332.
   ** POSC 110/112 required prerequisite for POSC 450

If you are interested in teaching biology ...

Students wishing to teach biology at the secondary school level (middle and high school) can obtain both a Bachelor of Science in Biology and a Master of Arts in Teaching – Secondary (MATS) in five years through the following pathway offered by the MATS program. This pathway allows students to take up to nine credits of required graduate courses while completing their undergraduate program in biology. These nine graduate credits will be used as electives toward their undergraduate degree as well as the requirements of the MATS.

Students interested in this pathway should:

1. Discuss the MATS pathway option with their first-year advisor.
2. Meet with the MATS Coordinator as a first-year or sophomore.
3. Apply to the MATS program in the Spring of their sophomore year (February 1 application deadline).
4. Once conditionally admitted (a requirement for the following graduate courses to count as electives in the undergraduate program as well as in the MATS program) take:
   a. REED 517 Reading in the Content Area (Fall or Spring of Junior or Senior year).
   b. SPED 551 Adapting Instruction in Diverse Classrooms (Fall Senior year).
   c. SCED 510 Secondary Methods in Curriculum (Spring Senior year).

Please note that students who are considering this pathway should work with their advisor to create a plan of study that allows these nine credits of graduate courses to be taken in the Junior and Senior years in addition to a minimum of 12 undergraduate credits per semester.