Biology - Natural Sciences Emphasis, BS

Program Description
The B.S. Biology Natural Science emphasis is designed for students seeking a career in Organismal or Field Biology. This includes careers with the Bureau of Land Management (BLM), U.S. Forest Services, Fish and Game, National Parks Services, State Parks, Department of Natural Resources (DNR), Association of Zoos and Aquariums (AZA) and Local Governments.

Program Curriculum
120 credits

Utah Tech General Education Requirements
All Utah Tech General Education requirements must be fulfilled. A previously earned degree may fulfill those requirements, but courses must be equivalent to Utah Tech's minimum General Education standards in American Institutions, English, and Mathematics.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td></td>
<td>General Education Core Requirements (catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)</td>
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<tr>
<td></td>
<td>English</td>
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<tr>
<td></td>
<td>Mathematics</td>
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<td>American Institutions</td>
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<td></td>
<td>Life Sciences</td>
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<td>Physical Sciences</td>
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<td>Laboratory Science</td>
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<td>Fine Arts</td>
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<td>Literature/Humanities</td>
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<td></td>
<td>Social &amp; Behavioral Sciences</td>
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<tr>
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<td>Exploration</td>
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<tr>
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<tbody>
<tr>
<td>BIOL 1610 &amp; BIOL 1615</td>
<td>Principles of Biology I (LS) and Principles of Biology I Lab (LAB)</td>
<td>5</td>
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<tr>
<td>BIOL 1620 &amp; BIOL 1625</td>
<td>Principles of Biology II and Principles of Biology II Lab</td>
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<tr>
<td>BIOL 2400 &amp; BIOL 2405</td>
<td>Plant Kingdom (LS, ALPP) and Plant Kingdom Lab (LAB, ALPP)</td>
<td>4</td>
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<tr>
<td>BIOL 3010</td>
<td>Evolution</td>
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<tr>
<td>BIOL 3030</td>
<td>Principles of Genetics</td>
<td>4</td>
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<tr>
<td>BIOL 3040 &amp; BIOL 3045</td>
<td>General Ecology and General Ecology Lab</td>
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<tr>
<td>BIOL 3110 or BIOL 3120</td>
<td>Scientific Writing and Science Communication</td>
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<tr>
<td>BIOL 4910</td>
<td>Senior Seminar</td>
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Mathematics & Physical Science Requirements

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<tr>
<td>CHEM 1210 &amp; CHEM 1215</td>
<td>Principles of Chemistry I (PS) and Principles of Chemistry I Lab (LAB)</td>
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<td>Principles of Chemistry II and Principles of Chemistry II Lab</td>
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<tr>
<td>ENVS 1210 &amp; ENVS 1215</td>
<td>Introduction to Environmental Science and Introduction to Environmental Science Lab</td>
<td>4</td>
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</table>
GEO 1110  
& GEO 1115  
| Physical Geology (PS)  
| and Physical Geology Lab (LAB)  

GEOG 3600  
& GEOG 3605  
| Introduction to Geographic Information Systems  
| and Introduction to Geographic Information Systems Laboratory  

MATH 1040  
or MATH 1050  
| Introduction to Statistics (MA)  
| College Algebra / Pre-Calculus (MA)  

PHYS 1010  
& PHYS 1015  
| Elementary Physics (PS)  
| and Elementary Physics Lab (LAB)  

or PHYS 2010  
& PHYS 2015  
| College Physics I (PS)  
| and College Physics I Lab (LAB)  

**Additional Biology Requirements**

Complete three (3) of the following sets of courses:

- BIOL 3200  
  & BIOL 3205  
  | Invertebrate Zoology  
  | and Invertebrate Zoology Lab  

- BIOL 3340  
  & BIOL 3345  
  | Plant Anatomy  
  | and Plant Anatomy Lab  

- BIOL 4200  
  & BIOL 4205  
  | Plant Taxonomy (ALPP)  
  | and Plant Taxonomy Lab (ALPP)  

- BIOL 4260  
  & BIOL 4265  
  | Herpetology  
  | and Herpetology Lab  

- BIOL 4270  
  & BIOL 4275  
  | Ichthyology  
  | and Ichthyology Lab  

- BIOL 4280  
  | Marine Biology  

- BIOL 4350  
  & BIOL 4355  
  | Animal Behavior  
  | and Animal Behavior Lab  

- BIOL 4380  
  & BIOL 4385  
  | Ornithology  
  | and Ornithology Lab  

- BIOL 4411  
  & BIOL 4415  
  | Mammalogy  
  | and Mammalogy Lab  

- BIOL 4440  
  | General Entomology  

- BIOL 4600  
  & BIOL 4605  
  | Plant Physiology  
  | and Plant Physiology Lab  

**Elective Courses**

Complete 12 credits from the following or from any upper-division BIOL course listed above not already used to fulfill a requirement.

- BIOL 3100  
  | Bioethics  

- BIOL 3140  
  & BIOL 3145  
  | Comparative Vertebrate Anatomy  
  | and Comparative Vertebrate Anatomy Lab  

- BIOL 3250  
  | Cancer Biology  

- BIOL 3340  
  & BIOL 3345  
  | Plant Anatomy  
  | and Plant Anatomy Lab  

- BIOL 3360  
  | Developmental Biology  

- BIOL 3450  
  & BIOL 3455  
  | General Microbiology  
  | and General Microbiology Lab  

- BIOL 3550  
  & BIOL 3555  
  | Eukaryotic Cell Biology  
  | and Eukaryotic Cell Biology Lab  

- BIOL 4300  
  & BIOL 4305  
  | Molecular Biology  
  | and Molecular Biology Laboratory  

- BIOL 4500  
  & BIOL 4505  
  | Comparative Vertebrate Physiology  
  | and Comparative Vertebrate Physiology Lab  

- BIOL 4810R  
  | Independent Research  

- BIOL 4930R  
  | Senior Thesis  

- GEOG 4140  
  | Advanced GIS Analysis  

- GEOG 4180  
  | Geoprocessing with Python  

- MATH 1210  
  | Calculus I (MA)
MATH 3060 & BIOL 3155
Statistics for Scientists
and Scientific Method and Experimental Design

Graduation Requirements

1. Complete a minimum of 120 college-level credits (1000 and above).
2. Complete at least 40 upper-division credits (3000 and above).
3. Complete at least 30 upper-division credits at Utah Tech for institutional residency.
4. Cumulative GPA 2.0 or higher.
5. Grade C or higher required (not C-) in each Program Requirement, Core Discipline Requirement, and Biology Elective Requirement course.
6. Maximum 6 total credits of BIOL 4810R, and/or BIOL 4890R, and/or BIOL 4930R may be used toward Biology requirements.

Graduation Plan

1st Year

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<th>Fall Semester</th>
<th>Hours</th>
<th>Spring Semester</th>
<th>Hours</th>
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<td>BIOL 1620 &amp; BIOL 1625</td>
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<td>ENGL 1010 &amp; CHEM 1210 &amp; CHEM 1215</td>
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<td>MATH 1050 &amp; CHEM 1220 &amp; CHEM 1225</td>
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<td>SSC 1010</td>
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2nd Year

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<th>Hours</th>
<th>Spring Semester</th>
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<tr>
<td>BIOL 2400 &amp; BIOL 2405 (meets GE Exploration requirement)</td>
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<td>BIOL 3010</td>
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<td>PHYS 1010 &amp; PHYS 1015</td>
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<td>ENGL 2010</td>
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<td>Biology organismal course #1</td>
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<td>General Elective</td>
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<td>ENVS 1210 &amp; ENVS 1215</td>
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3rd Year

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<th>Spring Semester</th>
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<tbody>
<tr>
<td>BIOL 3040 &amp; BIOL 3045</td>
<td>4</td>
<td>BIOL electives</td>
<td>3</td>
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<tr>
<td>GEOG 3600 &amp; GEOG 3605</td>
<td>4</td>
<td>BIOL organismal course #2</td>
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<td>BIOL 3120 or 3110</td>
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<td>Additional Physical Sciences course</td>
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<td>General Education (Fine Arts) (catalog.utahtech.edu/programs/generaleducation/#gerequirementstext)</td>
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<td>General Elective(s)</td>
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4th Year

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<td>GEO 1110 &amp; GEO 1115</td>
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<td>BIOL Upper Division electives</td>
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<td>BIOL electives</td>
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<td>BIOL 4910</td>
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General Education (American Institutions) (catalog.utahtech.edu/programs/generaleducation/#gerequirementstext) 3  General Education (Literature / Humanities) (catalog.utahtech.edu/programs/generaleducation/#gerequirementstext) 3

BIOL organismal course #3 4 Upper Division Electives 6

15 15

Total Hours 120

Natural Sciences Program Learning Outcomes

At the successful conclusion of this program, students will be able to:

1. Outline the foundational concepts of biology including cellular, organismic, ecological, and evolutionary biology.
2. Evaluate hypotheses, design research, test hypotheses, conduct data analysis, and draw conclusions on biology related problems.
3. Integrate knowledge of scientific literacy in oral and written assignments when communicating biological topics.
4. Evaluate information to discriminate between science and non-science.
5. Develop an understanding of why science is an integral activity for addressing social and environmental problems.