BIOLOGY

Bachelor of Arts - Biology - General Science Broadfield

College Humanities & Sciences

Degree Specific Credits: 72

Required Cumulative GPA: 2.75

Catalog Year: 2017-2018

General Education Requirements

Information regarding these requirements can be found in the General Education Section (http://catalog.umt.edu/academics/general-education-requirements) of the catalog.

Summary

Lower Division Courses in the Content Areas 52

Biology Content Courses

Chemistry Content Courses

Earth Sciences Content Courses

Earth Sciences Content Courses - Environmental Geosciences

Physics Content Courses

Upper Division Courses 5

Required Content Courses Outside of the Major 8

Mathematics - Calculus

Mathematics - Statistics

Upper Division Writing Expectation for the Major 6

Total Hours 71

Lower Division Courses in the Content Areas - Biology, Chemistry, Earth Sciences, and Physics

Note: A minimum of 10 credits is required in each of the four content areas.

Biology Content Courses

Rule: All of the following courses are required

Note: AP Biology will substitute for either BIOB 160N/BIOB 161N or BIOB 170N/BIOB 171N.

BIOB 160N Principles of Living Systems 3

BIOB 161N Principls of Living Systems Lab 1

BIOB 170N Principls Biological Diversity 3

BIOB 171N Principls Biological Dvrsty Lab 2

BIOB 260 Cellular and Molecular Biology 4

BIOB 272 Genetics and Evolution 4

Total Hours 17

Minimum Required Grade: C-

Chemistry Content Courses

Rule: All of the following courses are required.

CHMY 123 Introduction to Organic and Biochemistry 3.000

CHMY 141N College Chemistry I 4

CHMY 142N College Chemistry I Lab 1

CHMY 143N College Chemistry II 4

CHMY 144N College Chemistry II Lab 1

CHMY 485 Laboratory Safety 1

Total Hours 14

Minimum Required Grade: C-

Earth Sciences Content Courses

Rule: All of the following courses are required

Note: ASTR 132N/ASTR 135N are NOT acceptable substitutes for ASTR 131N/ASTR 134N.

ASTR 131N Planetary Astronomy 3

ASTR 134N Planetary Astronomy Lab 1

GEO 101N Introduction to Physical Geology 3

GEO 102N Introduction to Physical Geology Lab 1

Total Hours 8

Minimum Required Grade: C-

Earth Sciences Content Courses - Environmental Geosciences

Rule: Complete at least one of the following courses

GEO 105N Oceanography 3

or GEO 103N Introduction to Environmental Geology

Minimum Required Grade: C-

Physics Content Courses

Select one of the following physics sequences: 10

Algebra- and Trigonometry-based:

PHSX 205N & PHSX 206N College Physics I and College Physics I Laboratory

PHSX 207N & PHSX 208N College Physics II and College Physics II Laboratory

Calculus-based:

PHSX 215N & PHSX 216N Fund of Physics w/Calc I and Physics Laboratory I w/Calc

PHSX 217N & PHSX 218N Fund of Physics w/Calc II and Physics Laboratory II w/Calc (require M 171 and M 172)

Total Hours 10

Minimum Required Grade: C-

Upper Division Content Courses

Rule: All of the following courses are required.

BIOE 370 General Ecology 3

BIOE 371 Gen Ecology Lab (equiv to 271) 2

Total Hours 5
Minimum Required Grade: C-

### Required Content Courses Outside of the Major
Minimum Required Grade: C-

#### Mathematics - Calculus
**Rule:** Complete one of the following calculus courses

**Note:** Choose M 171, if you plan to take additional calculus courses, or if you plan a double major or minor in a field that requires more calculus (e.g. math, physics, biochemistry, computer science).

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 162</td>
<td>Applied Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or M 171</td>
<td>Calculus I</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 4

Minimum Required Grade: C-

#### Mathematics - Statistics
**Rule:** The following course is required

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 216</td>
<td>Introduction to Statistics</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Hours: 4

Minimum Required Grade: C-

### Advanced College Writing Requirement
**Rule:** Complete the equivalent of a full writing course (either three 1/3 writing courses or one 2/3 writing course + one 1/3 writing course or one complete writing course).

**Note:** To meet the Advanced College Writing Requirement, Biology students take 2 or 3 partial writing courses (either three 1/3 writing courses or one 1/3 writing course and one 2/3 writing course or one complete writing course). The General Science Broadfield requires one 2/3 writing course (BIOE 371). The Advanced College Writing Requirement is completed with one additional course, chosen from any of the following. The recommended course is BIOO 434 (taken with BIOO 433), which are required for the Teaching Biology endorsement.

Minimum Required Grade: C-

#### 1/3 Advanced Writing Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 482</td>
<td>Advanced Biochemistry II</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 410</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 425</td>
<td>Adv Cell &amp; Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 483</td>
<td>Phylogenics and Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 403</td>
<td>Vert Design &amp; Evolution</td>
<td>5</td>
</tr>
<tr>
<td>BIOE 409</td>
<td>Behavior &amp; Evolution Discussion</td>
<td>1</td>
</tr>
<tr>
<td>BIOE 428</td>
<td>Freshwater Ecology</td>
<td>5</td>
</tr>
<tr>
<td>BIOL 484</td>
<td>Plant Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 402</td>
<td>Medical Bacteriology &amp; Mycology</td>
<td>3</td>
</tr>
<tr>
<td>BIOO 320</td>
<td>General Botany</td>
<td>5</td>
</tr>
<tr>
<td>BIOO 434</td>
<td>Plant Physiology Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIOO 470</td>
<td>Ornithology</td>
<td>4</td>
</tr>
<tr>
<td>BIOO 475</td>
<td>Mammalogy</td>
<td>4</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

#### 2/3 Advanced Writing Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 486</td>
<td>Biochemistry Research Lab</td>
<td>3</td>
</tr>
<tr>
<td>BCH 499</td>
<td>Senior Thesis/Capstone</td>
<td>3-6</td>
</tr>
<tr>
<td>BIOB 411</td>
<td>Immunology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>BIOB 499</td>
<td>Undergraduate Thesis</td>
<td>3-6</td>
</tr>
<tr>
<td>BIOE 342</td>
<td>Field Ecology</td>
<td>5</td>
</tr>
<tr>
<td>BIOE 371</td>
<td>Gen Ecology Lab (equiv to 271)</td>
<td>2</td>
</tr>
<tr>
<td>BIOM 411</td>
<td>Exprmntl Microbial Genetcs Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIOM 499</td>
<td>Undergraduate Thesis</td>
<td>3-6</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

### Complete Advanced Writing Course

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOH 462</td>
<td>Principles Medical Physiology</td>
<td>3</td>
</tr>
</tbody>
</table>

### Exception to the Modern/Classical Languages Requirement
**Rule:** Choose one of the following Math courses

**Note:** The Division of Biological Sciences has been granted an exception to the Modern/Classical Language Requirement. Either of these Calculus courses (required by the major) will satisfy this requirement.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 162</td>
<td>Applied Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or M 171</td>
<td>Calculus I</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 4

Minimum Required Grade: C-

### Teaching General Science Broadfield Track
Individuals interested in teaching in K-12 schools must complete a degree in the content area they want to teach plus the teacher preparation program through the Department of Curriculum and Instruction. Individuals must complete the teaching major/teaching track within that degree program, which may contain different course requirements than the academic major since the sequence of courses is designed to meet state standards. Upon completion of the degree program with the teaching track and the secondary licensure program, one will be eligible for a standard Montana teaching license in this content area.

- Secondary Education Licensure Program (http://www.coehs.umont.edu/departments/currinst/undergradprograms/seced/default.php)
- Licensure Degree Requirements (http://catalog.umt.edu/colleges-schools-programs/education-human-sciences/teaching-learning/lic-secondary-licensure)

This is an advising track only and not an official program as recognized by the University of Montana (UM) or the Montana University System. This information will not appear on your UM transcript, diploma, university lists, student data system, or university publication. You do not fill out a major change for a track.

**Note:** This option provides students with coursework in biology, chemistry, physics, earth sciences and mathematics needed to be certified by the State of Montana in broad-field science. This allows students to teach secondary sciences—biology, chemistry, physics, and
earth science (in middle and high schools). This option is appropriate for students interested in teaching science in smaller, more rural schools. In order to be licensed to teach secondary science, students must be admitted to the Teacher Education Program through the Phyllis J. Washington College of Education and Human Sciences.

**Education**

**Rule:** The following course is required

**Note:** The course number EDU 497 covers many different teaching methods courses. The section of EDU 497 entitled "Methods: 5 - 12 Science" is required for the General Science Broadfield.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 497</td>
<td>Teaching and Assessing</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total Hours</td>
<td>4</td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

**Secondary Teaching Licensure**

**Note:** For endorsement to teach general science, a student also must gain admission to the Teacher Education Program and meet all the requirements for secondary teaching licensure (see the College of Education & Human Sciences [here](http://catalog.umt.edu/colleges-schools-programs/education-human-sciences))