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 Teaching and Learning. 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.umt.edu/departments/currinst/undergradprograms/secondary/default.php)

Bachelor of Arts - Biology; Biological Education Concentration

College Humanities & Sciences

Degree Specific Credits: 62
Required Cumulative GPA: 2.75
Catalog Year: 2017-2018

Note: This option provides students with coursework in biology and related science and mathematics needed to be certified by the State of Montana to teach secondary biology (in middle and high school). This concentration is appropriate for students interested in teaching biology in a larger, more urban school. In order to be licensed to teach secondary biology, students must be admitted to the Teacher Education Program through the Phyllis J. Washington College of Education and Human Sciences.

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Minimum Required Grade</th>
<th>Minimum Required Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology/Microbiology Lower Division Core</td>
<td>C-</td>
<td>17</td>
</tr>
<tr>
<td>Upper Division Core Courses Required by the Biological Education Concentration</td>
<td>C-</td>
<td>14</td>
</tr>
<tr>
<td>Animal-Based Organismal Requirement</td>
<td>C-</td>
<td>3</td>
</tr>
<tr>
<td>Required Content Courses Outside of the Major</td>
<td>C-</td>
<td>28</td>
</tr>
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<table>
<thead>
<tr>
<th>Category</th>
<th>Minimum Required Grade</th>
<th>Minimum Required Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics - Calculus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics - Statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td></td>
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</tbody>
</table>

Environmental Geosciences

<table>
<thead>
<tr>
<th>Category</th>
<th>Minimum Required Grade</th>
<th>Minimum Required Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Upper Division Writing Expectation for the Major</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Secondary Teaching Licensure</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Biology/Microbiology Lower Division Core

Rule: All of the following courses are required.

Note: The lower division core should be completed before attempting most upper division major courses.

AP Biology credit may be substituted for either BIOB 160N/BIOB 161N or BIOB 170N/BIOB 171N.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 160N</td>
<td>Principles of Living Systems</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 161N</td>
<td>Prncpls of Living Systems Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIOB 170N</td>
<td>Princpls Biological Diversity</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 171N</td>
<td>Princpls Biological Dvrsty Lab</td>
<td>2</td>
</tr>
<tr>
<td>BIOB 260</td>
<td>Cellular and Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOB 272</td>
<td>Genetics and Evolution</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Hours: 65

Minimum Required Grade: C-

Upper Division Core Courses Required by the Biological Education Concentration

Rule: All of the following courses are required.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOE 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 371</td>
<td>Gen Ecology Lab (equiv to 271)</td>
<td>2</td>
</tr>
<tr>
<td>BIOM 360</td>
<td>General Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 361</td>
<td>General Microbiology Lab</td>
<td>2</td>
</tr>
<tr>
<td>BIOO 433</td>
<td>Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOO 434</td>
<td>Plant Physiology Lab</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Hours: 14

Minimum Required Grade: C-

Animal-Based Organismal Requirement

Rule: Complete one of the following courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 301</td>
<td>Developmental Biology</td>
<td>3</td>
</tr>
<tr>
<td>or BIOL 435</td>
<td>Comparative Animal Physiology</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 3

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).

- **M 162** Applied Calculus
- or **M 171** Calculus I

**Total Hours:** 4

**Minimum Required Grade:** C-

### Mathematics - Statistics

**Rule:** The following course is required

- **STAT 216** Introduction to Statistics

**Total Hours:** 4

**Minimum Required Grade:** C-

### Chemistry

**Rule:** All of the following courses are required

- **CHMY 123** Introduction to Organic and Biochemistry
- & **CHMY 124** and Introduction to Organic and Biochemistry Lab

**Choose one of the Chemistry sequences:**

- CHMY 121N Introduction to General Chemistry
- CHMY 485 Laboratory Safety

**Or (Required for the broadfield teaching concentration)**

- CHMY 141N College Chemistry I
- CHMY 142N College Chemistry I Lab
- CHMY 143N College Chemistry II
- & CHMY 144N and College Chemistry II Lab

**Total Hours:** 4-10

**Minimum Required Grade:** C-

### Physics

**Rule:** Select one of the following Physics sequences: 10

- **PHSX 205N** College Physics I
  - & PHSX 206N and College Physics I Laboratory
- **PHSX 207N** College Physics II
  - & PHSX 208N and College Physics II Laboratory

**Calculus-based:**

- **PHSX 215N** Fund of Physics w/Calc I
  - & PHSX 216N and Physics Laboratory I w/Calc (requires M 171)
- **PHSX 217N** Fund of Physics w/Calc II
  - & PHSX 218N and Physics Laboratory II w/Calc

**Total Hours:** 10

**Minimum Required Grade:** C-

### Environmental Geosciences

**Rule:** Complete one of the following courses

- **GEO 105N** Oceanography
- or **GEO 103N** Introduction to Environmental Geology

**Total Hours:** 3

**Minimum Required Grade:** C-

### Education

**Rule:** The following course is required

- **EDU 497** Teaching and Assessing

**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 Biological Education concentration requires one 2/3 writing course (BIOE 371) and one 1/3 writing course (BIOO 434). No additional courses are needed to meet this requirement.

**Minimum Required Grade:** C-

### 1/3 Advanced Writing Courses

- **BCH 482** Advanced Biochemistry II 3
- **BIOB 410** Immunology 3
- **BIOB 425** Adv Cell & Molecular Biology 3
- **BIOB 483** Phylogenics and Evolution 3
- **BIOE 403** Vert Design & Evolution 5
- **BIOE 409** Behavior & Evolution Discussion 1
- **BIOE 428** Freshwater Ecology 5
- **BIOE 484** Plant Evolution 3
- **BIOE 499** Undergraduate Thesis 3-6
- **BCH 486** Biochemistry Research Lab 3
- **BCH 499** Senior Thesis/Capstone 3-6
- **BIOB 411** Immunology Laboratory 2
- **BIOB 499** Undergraduate Thesis 3-6
- **BIOE 342** Field Ecology 5
- **BIOE 371** Gen Ecology Lab (equiv to 271) 2
- **BIOM 402** Exprmntl Microbial Genetcs Lab 1
- **BIOE 403** Vert Design & Evolution 5
- **BIOE 409** Behavior & Evolution Discussion 1
- **BIOE 428** Freshwater Ecology 5
- **BIOE 484** Plant Evolution 3
- **BIOE 499** Undergraduate Thesis 3-6

**Minimum Required Grade:** C-

### 2/3 Advanced Writing Courses

- **BCH 486** Biochemistry Research Lab 3
- **BCH 499** Senior Thesis/Capstone 3-6
- **BIOB 411** Immunology Laboratory 2
- **BIOB 499** Undergraduate Thesis 3-6
- **BIOE 342** Field Ecology 5
- **BIOE 371** Gen Ecology Lab (equiv to 271) 2
- **BIOM 402** Exprmntl Microbial Genetcs Lab 1
- **BIOE 403** Vert Design & Evolution 5
- **BIOE 409** Behavior & Evolution Discussion 1
- **BIOE 428** Freshwater Ecology 5
- **BIOE 484** Plant Evolution 3
- **BIOE 499** Undergraduate Thesis 3-6

**Minimum Required Grade:** C-
Complete Advanced Writing Course
BIOH 462 Principles Medical Physiology 3

Secondary Teaching Licensure
Note: For endorsement to teach biology, 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 (http://catalog.umt.edu/colleges-schools-programs/education-human-sciences))

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>Description</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-