Biological Education (Teacher Preparation Biology)

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/seced/default.php)
- Licensure Degree Requirements (http://catalog.umt.edu/colleges-schools-programs/education-human-sciences/teaching-learning/lic-secondary-licensure)

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

Biology/Microbiology Lower Division Core 17
Upper Division Core Courses Required by the Biological Education Concentration 14
Animal-Based Organismal Requirement 3
Required Content Courses Outside of the Major 28
  Mathematics - Calculus
  Mathematics - Statistics
  Chemistry
  Physics

Environmental Geosciences

<table>
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<tr>
<th>Education</th>
<th>Upper Division Writing Expectation for the Major</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Secondary Teaching Licensure</td>
<td></td>
<td></td>
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<tr>
<td>Total Hours</td>
<td></td>
<td>65</td>
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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.

| BIO 160N | Principles of Living Systems | 3 |
| BIO 161N | Prncpls of Living Systems Lab | 1 |
| BIO 170N | Principles Biological Diversity | 3 |
| BIO 171N | Principles Biological Dvrsty Lab | 2 |
| BIO 260 | Cellular and Molecular Biology | 4 |
| BIO 272 | Genetics and Evolution | 4 |
| Total Hours | | 17 |

Minimum Required Grade: C-

Upper Division Core Courses Required by the Biological Education Concentration

Rule: All of the following courses are required.

| BIO 370 | General Ecology | 3 |
| BIO 371 | Gen Ecology Lab (equiv to 271) | 2 |
| BIOM 360 | General Microbiology | 3 |
| BIOM 361 | General Microbiology Lab | 2 |
| BIOO 433 | Plant Physiology | 3 |
| BIOO 434 | Plant Physiology Lab | 1 |
| Total Hours | | 14 |

Minimum Required Grade: C-

Animal-Based Organismal Requirement

Rule: Complete one of the following courses

| BIOB 301 | Developmental Biology | 3 |
| or BIO 435 | Comparative Animal Physiology | |

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 4
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 4

Total Hours 4

Minimum Required Grade: C-

Chemistry
Rule: All of the following courses are required

CHMY 123       Introduction to Organic and Biochemistry 5
& CHMY 124 and Introduction to Organic and Biochemistry Lab

Choose one of the Chemistry sequences: 4-10

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 9-15

Minimum Required Grade: C-

Physics
Select one of the following Physics sequences: 10

Algebra- and Trigonometry-based:

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 3
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 4

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 411       Immunology Laboratory 2
BIOE 499       Undergraduate Thesis 3-6
BIOO 320       General Botany 5
BIOO 434       Plant Physiology Lab 1
BIOO 470       Ornithology 4
BIOO 475       Mammalogy 4

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 411       Exprmnl Microbial Genetcs Lab 1
BIOM 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>
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<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
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<tbody>
<tr>
<td>M 162</td>
<td>Applied Calculus</td>
<td>4</td>
</tr>
<tr>
<td>or M 171</td>
<td>Calculus I</td>
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</table>

Total Hours 4

Minimum Required Grade: C-