

# BIOLOGY B.A. - BIOLOGICAL EDUCATION

Individuals interested in teaching in K-12 schools must complete a degree in the content area they want to teach plus the Teacher Education Program through the Department of Teaching and Learning. Individuals must complete the teaching track within that degree program, which may contain different course requirements than the non-teaching track 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.umn.edu/departments/currinst/undergradprograms/seced/default.php>)
- Licensure Degree Requirements (<http://catalog.umn.edu/colleges-schools-programs/education/teaching-learning/lic-secondary-licensure/>)

## Bachelor of Arts - Biology; Biological Education Concentration

### General Education Requirements

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

### Summary

Code	Title	Hours
	Biology/Microbiology Lower-Division Core	17
	Upper-Division Core Courses Required by the Biological Education Concentration	10
	Plant-Based Organismal Course Requirement	4-5
	Animal-Based Organismal Course Requirement	3-4
	Required Courses Outside of the Major	31
	Mathematics - Calculus	
	Mathematics - Statistics	
	Chemistry	
	Physics	
	Environmental Geosciences	
	Education	
	Advanced College Writing Requirement	3
	Secondary Teaching Licensure	
<b>Total Hours</b>		<b>68-70</b>

**Degree Specific Credits:** 68-70

**Required Cumulative GPA:** 2.75

**Note:** This concentration provides students with coursework in Biology and related sciences 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.

### Biology/Microbiology Lower-Division Core

**Note:** The lower-division core should be completed before attempting most upper division major courses. AP Biology credit with a score of 3 may be substituted for either BIOB 160N/BIOB 161N or BIOB 170N/BIOB 171N.

Code	Title	Hours
<b>Complete all of the following courses:</b>		
BIOB 160N	Principles of Living Systems	3
BIOB 161N	Principles of Living Systems Lab	1
BIOB 170N	Principles of Biological Diversity	3
BIOB 171N	Principles of Biological Diversity Lab	2
BIOB 260	Cellular and Molecular Biology	4
BIOB 272	Genetics and Evolution	4
<b>Total Hours</b>		<b>17</b>

Minimum Required Grade: C-

### Upper-Division Core Courses Required by the Biological Education Concentration

Code	Title	Hours
<b>Complete all of the following courses:</b>		
BIOE 370	General Ecology	3
BIOE 371	General Ecology Lab (equivalent to 271)	2
BIOM 360	General Microbiology	3
BIOM 361	General Microbiology Lab	2
<b>Total Hours</b>		<b>10</b>

Minimum Required Grade: C-

### Plant-Based Organismal Course Requirement

Code	Title	Hours
<b>Complete one of the following courses:</b>		
BIOO 320	General Botany	
BIOO 433 & BIOO 434	Plant Physiology and Plant Physiology Lab	
<b>Total Hours</b>		<b>4-5</b>

Minimum Required Grade: C-

### Animal-Based Organismal Course Requirement

Code	Title	Hours
<b>Complete one of the following courses:</b>		
BIOB 301	Developmental Biology	
BIOB 435	Comparative Animal Physiology	
BIOE 403	Comparative Vertebrate Anatomy	
<b>Total Hours</b>		<b>3-4</b>

Minimum Required Grade: C-

## Required Courses Outside of the Major

### Mathematics - Calculus

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

Code	Title	Hours
<b>Complete one of the following courses:</b>		<b>4</b>
M 162	Applied Calculus	
M 171	Calculus I	
<b>Total Hours</b>		<b>4</b>

Minimum Required Grade: C-

### Mathematics - Statistics

Code	Title	Hours
<b>Complete the following course:</b>		
STAT 216	Introduction to Statistics	4
<b>Total Hours</b>		<b>4</b>

Minimum Required Grade: C-

### Chemistry

Code	Title	Hours
<b>Complete all of the following courses:</b>		
CHMY 121N	Introduction to General Chemistry	4
CHMY 123	Introduction to Organic and Biochemistry	4
CHMY 124	Introduction to Organic and Biochemistry Lab	2
CHMY 485	Laboratory Safety	1
<b>Total Hours</b>		<b>11</b>

Minimum Required Grade: C-

### Physics

Code	Title	Hours
<b>Complete one of the following Physics courses:</b>		<b>5</b>
<b>Algebra- and Trigonometry-based Physics:</b>		
PHSX 205N	College Physics I	
& PHSX 206N	and College Physics I Laboratory	
<b>Calculus-based Physics:</b>		
PHSX 215N	Fundamentals of Physics with Calculus I	
& PHSX 216N	and Physics Laboratory I with Calculus (requires M 171)	
<b>Total Hours</b>		<b>5</b>

Minimum Required Grade: C-

### Environmental Geosciences

Code	Title	Hours
<b>Complete one of the following courses:</b>		
GEO 105N	Oceanography	3
or EARTH 101N	Earth Systems Science	
<b>Total Hours</b>		<b>3</b>

Minimum Required Grade: C-

### Education

**Note:** The course number EDU 497 covers many different teaching method courses. The section of EDU 497 entitled "Methods: 5 - 12 Science" for 3 credits is required for the Biological Education option.

Code	Title	Hours
<b>Complete the following course:</b>		
EDU 497	Teaching and Assessing	4
<b>Total Hours</b>		<b>4</b>

Minimum Required Grade: C-

### Advanced College Writing Requirement

Code	Title	Hours
<b>Complete all of the following courses:</b>		
BIOE 371	General Ecology Lab (equivalent to 271)	2
BIOO 434	Plant Physiology Lab	1
or BIOO 320	General Botany	
<b>Total Hours</b>		<b>3</b>

Minimum Required Grade: C-

### 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 (<http://catalog.umd.edu/colleges-schools-programs/education/teaching-learning/lic-secondary-licensure/>). For more information, see the Teaching and Learning Department (<http://catalog.umd.edu/colleges-schools-programs/education/teaching-learning/>).