BIOLOGY - TEACHER PREPARATION GENERAL SCIENCE BROADFIELD

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 Content 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</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>Prncips Biological Diversity</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 171N</td>
<td>Prncips 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 17

Minimum Required Grade: C-

Chemistry Content Courses
Rule: All of the following courses are required.

Note: CHMY 141N/CHMY 142N & CHMY 143N/CHMY 144N should be completed before attempting CHMY 123.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CHMY 123</td>
<td>Introduction to Organic and Biochemistry</td>
<td>3.000</td>
</tr>
<tr>
<td>CHMY 141N</td>
<td>College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 142N</td>
<td>College Chemistry I Lab</td>
<td>1</td>
</tr>
<tr>
<td>CHMY 143N</td>
<td>College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 144N</td>
<td>College Chemistry II Lab</td>
<td>1</td>
</tr>
<tr>
<td>CHMY 485</td>
<td>Laboratory Safety</td>
<td>1</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ASTR 131N</td>
<td>Planetary Astronomy</td>
<td>3</td>
</tr>
<tr>
<td>ASTR 134N</td>
<td>Planetary Astronomy Lab</td>
<td>1</td>
</tr>
<tr>
<td>GEO 101N</td>
<td>Introduction to Physical Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 102N</td>
<td>Introduction to Physical Geology Lab</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Hours 8

Minimum Required Grade: C-

Earth Sciences Content Courses - Environmental Geosciences
Rule: Complete at least one of the following courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 105N</td>
<td>Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>or GEO 103N</td>
<td>Introduction to Environmental Geology</td>
<td></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

Physics Content Courses
Select one of the following physics sequences: 10

Algebra- and Trigonometry-based:

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PHSX 205N</td>
<td>College Physics I</td>
<td></td>
</tr>
<tr>
<td>&amp; PHSX 206N</td>
<td>College Physics I Laboratory</td>
<td></td>
</tr>
<tr>
<td>PHSX 207N</td>
<td>College Physics II</td>
<td></td>
</tr>
<tr>
<td>&amp; PHSX 208N</td>
<td>College Physics II Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

Calculus-based:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 215N</td>
<td>Fund of Physics w/Calc I</td>
<td></td>
</tr>
<tr>
<td>&amp; PHSX 216N</td>
<td>Physics Laboratory I w/Calc</td>
<td></td>
</tr>
<tr>
<td>PHSX 217N</td>
<td>Fund of Physics w/Calc II</td>
<td></td>
</tr>
<tr>
<td>&amp; PHSX 218N</td>
<td>Physics Laboratory II w/Calc (require M 171 and M 172)</td>
<td></td>
</tr>
</tbody>
</table>

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).

M 162  Applied Calculus  4
or M 171  Calculus I  5
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-

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

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
BIOL 484  Plant Evolution  3
BIOM 402  Medical Bacteriology & Mycology  3
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  Experimtal Microbial Genetics Lab  1
BIOM 499  Undergraduate Thesis  3-6

Minimum Required Grade: C-

Complete Advanced Writing Course

BIOH 462  Principles Medical Physiology  3

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.

M 162  Applied Calculus  4
or M 171  Calculus I  5
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.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)

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>
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<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 (http://catalog.umt.edu/colleges-schools-programs/education-human-sciences))