### MICROBIOLOGY B.S.

**Bachelor of Science - Microbiology**

**College Humanities & Sciences**

**Degree Specific Credits:** 91

**Required Cumulative GPA:** 2.0

**Catalog Year:** 2017-2018

**Note:** Microbiology is the study of microorganisms including bacteria, fungi, viruses, and protozoa. This general microbiology concentration emphasizes microbial structure and function, as well as interactions with humans. This is a graduate prep program, and is appropriate for students interested in research careers in academia or private or government laboratories. It is also an excellent concentration for pre-medical sciences students.

### General Education Requirements

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

### Summary

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology/Microbiology Lower Division Core</td>
<td>17</td>
</tr>
<tr>
<td>Upper Division Microbiology Core Courses</td>
<td>19</td>
</tr>
<tr>
<td>Additional UD Major Courses Required for Microbiology</td>
<td>11-15</td>
</tr>
<tr>
<td>Biochemistry</td>
<td></td>
</tr>
<tr>
<td>Additional UD Depth Courses in Microbiology</td>
<td></td>
</tr>
<tr>
<td>Required Courses Outside of the Major</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td></td>
</tr>
<tr>
<td>Upper Division Writing Expectation for the Major</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>91-100</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>Pncls of Living Systems Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIOB 170N</td>
<td>Princps Biological Diversity</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 171N</td>
<td>Princps 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>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

### Upper Division Microbiology Core Courses

**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>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>BIOM 410</td>
<td>Microbial Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 411</td>
<td>Exprmntl Microbial Genetcs Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIOM 415</td>
<td>Microbial Dvrsty Ecly &amp; Evltn</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 450</td>
<td>Microbial Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 451</td>
<td>Microbial Physiology Lab</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

Minimum Required Grade: C-

### Additional UD Major Courses Required for Microbiology

Minimum Required Grade: C-

### Biochemistry

Select either one semester or one year of biochemistry from the following:

**One Semester:**
- BCH 380  Biochemistry

**One Year:**
- BCH 480  Advanced Biochemistry I
- BCH 482  Advanced Biochemistry II

**Total Hours:** 4-6

Minimum Required Grade: C-

### Additional UD Depth Courses in Microbiology

Select 10-12 credits from the following (labs must be taken if available):

- BIO 410  Immunology & Immunology Laboratory
- BIO 483  Phylgenics and Evolution
- BIO 370  General Ecology
- BIO 405  Hematology
- BIOM 402  Medical Bacteriology & Mycology & Medc Bacteriolgy & Myclgy Lb
- BIOM 407  Clinical Diagnosis & BIOM 408  and Clinical Diagnosis Lab
- BIOM 427  General Parasitology & BIOM 428  and General Parasitology Lab
- BIOM 435  Virology
- BIOM 490  Adv Undergrad Research

**Total Hours:** 10-12

Minimum Required Grade: C-

### Required Courses Outside of the Major

Minimum Required Grade: C-

### Mathematics

**Rule:** All of the following courses are required.
M 162  Applied Calculus  4
or M 171  Calculus I
STAT 216  Introduction to Statistics  4
Total Hours  8
Minimum Required Grade: C-

Chemistry
Rule: All of the following courses are required.

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 221  Organic Chemistry I  3
CHMY 222  Organic Chemistry I Lab  2
CHMY 223  Organic Chemistry II  3
CHMY 224  Organic Chemistry II Lab  2
CHMY 311  Analytical Chem-Quant Analysis  4
Total Hours  24
Minimum Required Grade: C-

Physics
Rule: All of the following courses are required.

Select one of the following physics sequences:  10
Algebra- and Trigonometry-based:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 205N</td>
<td>College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHSX 206N</td>
<td>and College Physics I Laboratory</td>
<td></td>
</tr>
<tr>
<td>PHSX 207N</td>
<td>College Physics II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHSX 208N</td>
<td>and College Physics II Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

Calculus-based:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 215N</td>
<td>Fund of Physics w/Calc I</td>
<td>3</td>
</tr>
<tr>
<td>&amp; PHSX 216N</td>
<td>and Physics Laboratory I w/Calc</td>
<td></td>
</tr>
<tr>
<td>PHSX 217N</td>
<td>Fund of Physics w/Calc II</td>
<td>3</td>
</tr>
<tr>
<td>&amp; PHSX 218N</td>
<td>and Physics Laboratory II w/Calc</td>
<td></td>
</tr>
</tbody>
</table>
Total Hours  10
Minimum Required Grade: C-

Complete Advanced Writing Course

BIOH 462  Principles Medical Physiology  3

2/3 Advanced Writing Courses

BCH 486  Biochemistry Research Lab  3
BCH 499  Senior Thesis/Capstone  3-6
BIOE 411  Immunology Laboratory  2
BIOE 499  Undergraduate Thesis  3-6
BIOE 342  Field Ecology  5
BIOE 371  Gen Ecology Lab (equiv to 271)  2
BIOH 462  Principles Medical Physiology  3
BIOI 411  Exprmntl Microbial Genetcs Lab  1
BIOI 499  Undergraduate Thesis  3-6
Minimum Required Grade: C-

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  4
Total Hours  4
Minimum Required Grade: C-

1/3 Advanced Writing Courses

BCH 482  Advanced Biochemistry II  3
BIOE 411  Immunology  3
BIOE 420  Freshwater Ecology  5
BIOL 484  Plant Evolution  3
BIOE 342  Field Ecology  5
BIOE 371  Gen Ecology Lab (equiv to 271)  2
BIOI 411  Exprmntl Microbial Genetcs Lab  1
BIOI 499  Undergraduate Thesis  3-6
Minimum Required Grade: C-