Microbiology - Microbial Ecology

Bachelor of Science - Microbiology; Microbial Ecology Concentration

College Humanities & Sciences

Degree Specific Credits: 76

Required Cumulative GPA: 2.0

Catalog Year: 2017-2018

Note: Microbiology is the study of microorganisms including bacteria, fungi, viruses, and protozoa. The concentration in Microbial Ecology emphasizes microbial structure and function as well as interactions and relationships with the environment and other organisms. Students may continue their studies at the graduate level and seek research careers in government, or private laboratories.

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 Microbiology Core Courses 19
Additional UD Major Courses Required for Microbial Ecology Concentration 11-15
Biochemistry
Additional UD Depth Courses in Microbiology
Required Courses Outside of the Major 27-39
Mathematics - Calculus
Mathematics - Statistics
Chemistry
Physics
Additional Science Requirement
Upper Division Writing Expectation for the Major 2-7
Total Hours 76-97

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</th>
<th>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>Principals Biological Diversity</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 171N</td>
<td>Principals Biological Dvrsty Lab</td>
<td>2</td>
</tr>
<tr>
<td>BIOB 260</td>
<td>Cellular and Molecular Biology</td>
<td>4</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</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOE 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 360</td>
<td>General Microbiology (equiv to 260)</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 361</td>
<td>General Microbiology Lab (equiv to 261)</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 Eclgy &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>
</tbody>
</table>

Total Hours 19

Minimum Required Grade: C-

Additional UD Major Courses Required for Microbial Ecology Concentration

Minimum Required Grade: C-

Biochemistry

Select either one semester or one year of biochemistry from the following: 4-6

- 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 7-9 credits from the following (labs must be taken if available): 7-9

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 410</td>
<td>Immunology &amp; BIOB 411 Immunology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOB 440</td>
<td>Biological Electron Microscopy</td>
<td></td>
</tr>
<tr>
<td>BIOE 371</td>
<td>Gen Ecology Lab (equiv to 271)</td>
<td></td>
</tr>
<tr>
<td>BIOE 428</td>
<td>Freshwater Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOE 439</td>
<td>Stream Ecology</td>
<td></td>
</tr>
<tr>
<td>BIOE 453</td>
<td>Ecology of Small &amp; Large Lakes</td>
<td></td>
</tr>
<tr>
<td>BIOM 427</td>
<td>General Parasitology</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOM 428</td>
<td>and General Parasitology Lab</td>
<td></td>
</tr>
<tr>
<td>BIOM 435</td>
<td>Virology</td>
<td></td>
</tr>
<tr>
<td>BIOM 490</td>
<td>Adv Undergrad Research</td>
<td></td>
</tr>
<tr>
<td>BIOO 433</td>
<td>Plant Physiology</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOO 434</td>
<td>and Plant Physiology Lab</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours 7-9

Minimum Required Grade: C-
### Required Courses Outside of the Major

Minimum Required Grade: C-

**Mathematics - Calculus**

Rule: Complete one of the following calculus courses

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

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**

Select either one or two years of chemistry from the following: 8-20

One Year:

- CHMY 121N Introduction to General Chemistry
- CHMY 123 Introduction to Organic and Biochemistry
- & CHMY 124 and Introduction to Organic and Biochemistry Lab

Two Years:

- CHMY 141N College Chemistry I
- CHMY 142N College Chemistry I Lab
- CHMY 143N College Chemistry II
- CHMY 144N College Chemistry II Lab
- CHMY 221 Organic Chemistry I
- & CHMY 222 and Organic Chemistry I Lab
- CHMY 223 Organic Chemistry II
- & CHMY 224 and Organic Chemistry II Lab

Total Hours 8-20

Minimum Required Grade: C-

**Physics**

Rule: The following courses are required.

Select one of the following physics sequences: 5

Algebra- and Trigonometry-based:

- PHSX 205N College Physics I
- & PHSX 206N and College Physics I Laboratory

Calculus-based:

- PHSX 215N Fund of Physics w/Calc I
- & PHSX 216N and Physics Laboratory I w/Calc

Total Hours 5

Minimum Required Grade: C-

**Additional Science Requirement**

Select at least 6 credits from the following: 6

- CHMY 311 Analytical Chem-Quant Analysis
- CSCI 135 Fund of Computer Science I
- NRSN 210N Soils, Water and Climate
- GEO 420 Hydrogeology
- GEO 482 Global Change
- M 172 Calculus II
- M 273 Multivariable Calculus
- PHSX 207N College Physics II
- PHSX 208N College Physics II Laboratory
- STAT 451 Statistical Methods I
- STAT 452 Statistical Methods II
- STAT 457 Computer Data Analysis I
- STAT 458 Computer Data Analysis II

Total Hours 6

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, Microbiology students take at least 2 partial writing courses. The Microbiology degree requires one 2/3 writing course (BIOM 411). The Advanced College Writing Requirement is completed with one more course, chosen from any of the following.

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 Expermntl Microbial Genetcs 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

Total Hours        4

Minimum Required Grade: C-