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>Pnrcps 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 Dvrstty Lab</td>
<td>2</td>
</tr>
<tr>
<td>BIOB 260</td>
<td>Cellular and Molecular Biology</td>
<td>4</td>
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</tbody>
</table>

BIOB 272 Genetics and Evolution 4

Total Hours 17

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>
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</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 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>
</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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>BCH 380</td>
<td>Biochemistry</td>
<td></td>
</tr>
<tr>
<td>BCH 480</td>
<td>Advanced Biochemistry I</td>
<td></td>
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<tr>
<td>BCH 482</td>
<td>Advanced Biochemistry II</td>
<td></td>
</tr>
</tbody>
</table>

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):

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 410 &amp; BIOB 411</td>
<td>Immunology and Immunology Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOB 440</td>
<td>Biological Electron Microscopy</td>
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<tr>
<td>BIOE 371</td>
<td>Gen Ecology Lab (equiv to 271)</td>
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<tr>
<td>BIOE 428</td>
<td>Freshwater Ecology</td>
<td></td>
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<tr>
<td>BIOE 439</td>
<td>Stream Ecology</td>
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<tr>
<td>BIOE 453</td>
<td>Ecology of Small &amp; Large Lakes</td>
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<tr>
<td>BIOM 427 &amp; BIOM 428</td>
<td>General Parasitology 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 &amp; BIOO 434</td>
<td>Plant Physiology 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
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
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 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 Organic Chemistry I Lab
CHMY 223 Organic Chemistry II
& CHMY 224 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

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
BIOC 410 Immunology 3
BIOC 425 Adv Cell & Molecular Biology 3
BIOC 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
BIOM 402 Medical Bacteriology & Mycology 3
BIOM 320 General Botany 5
BIOM 434 Plant Physiology Lab 1
BIOM 470 Ornithology 4
BIOM 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
BIOC 411 Immunology Laboratory 2
BIOC 499 Undergraduate Thesis 3-6
BIOE 342 Field Ecology 5
BIOE 371 Gen Ecology Lab (equiv to 271) 2
BIOM 411 Experimt 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-