

# MICROBIOLOGY B.S. - MICROBIAL ECOLOGY

## Bachelor of Science - Microbiology; Microbial Ecology Concentration

### College of Humanities & Sciences

Degree Specific Credits: 74-90

Required Cumulative GPA: 2.0

### Catalog Year: 2018-2019

**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

Code	Title	Hours
	Biology/Microbiology Lower-Division Core	17
	Upper-Division Microbiology Core Courses	19
	Additional Upper-Division Courses Required for Microbial Ecology Concentration	11-15
	Biochemistry	
	Additional Upper-Division Depth Courses in Microbiology	
	Required Courses Outside of the Major	27-39
	Mathematics - Calculus	
	Mathematics - Statistics	
	Chemistry	
	Physics	
	Additional Science Requirement	
	Advanced College Writing Requirement	
	<b>Total Hours</b>	<b>74-90</b>

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	Prncpls of Living Systems Lab	1
BIOB 170N	Prncpls Biological Diversity	3

BIOB 171N	Prncpls Biological Dvrsty 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 Microbiology Core Courses

Code	Title	Hours
	<b>Complete all of the following courses:</b>	
BIOE 370	General Ecology	3
BIOM 360	General Microbiology (equiv to 260)	3
BIOM 361	General Microbiology Lab (equiv to 261)	2
BIOM 410	Microbial Genetics	3
BIOM 411	Exprmntl Microbial Genetcs Lab	1
BIOM 415	Microbial Dvrsty Eclgy & Evltn	3
BIOM 450	Microbial Physiology	3
BIOM 451	Microbial Physiology Lab	1
<b>Total Hours</b>		<b>19</b>

Minimum Required Grade: C-

### Additional Upper-Division Courses Required for Microbial Ecology Concentration

#### Biochemistry

Code	Title	Hours
	<b>Complete either one semester or one year of Biochemistry:</b>	<b>4-6</b>
	<b>One Semester:</b>	
BCH 380	Biochemistry	
	<b>One Year:</b>	
BCH 480	Advanced Biochemistry I	
BCH 482	Advanced Biochemistry II	
<b>Total Hours</b>		<b>4-6</b>

Minimum Required Grade: C-

#### Additional Upper-Division Depth Courses in Microbiology

Code	Title	Hours
	<b>Complete 7-9 credits from the following (labs must be taken if available). 7 credits if BCH 480-482 was taken; 9 credits if BCH 380) was taken.</b>	<b>7-9</b>
BIOB 410 & BIOB 411	Immunology and Immunology Laboratory	
BIOB 440	Biological Electron Microscopy	
BIOE 371	Gen Ecology Lab (equiv to 271)	
BIOE 428	Freshwater Ecology	
BIOE 439	Stream Ecology	
BIOE 453	Ecology of Small & Large Lakes	
BIOM 427 & BIOM 428	General Parasitology and General Parasitology Lab	
BIOM 435	Virology	
BIOM 490	Adv Undergrad Research	

BIOO 433 & BIOO 434	Plant Physiology and Plant Physiology Lab	
Total Hours		7-9

Minimum Required Grade: C-

## Required Courses Outside of the Major

### Mathematics - Calculus

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

Minimum Required Grade: C-

### Mathematics - Statistics

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

Minimum Required Grade: C-

### Chemistry

Code	Title	Hours
<b>Complete one of the following Chemistry sequences:</b>		
<b>Introductory:</b>		
CHMY 121N	Introduction to General Chemistry	
CHMY 123 & CHMY 124	Introduction to Organic and Biochemistry and Introduction to Organic and Biochemistry Lab	8-20
<b>Advanced:</b>		
CHMY 141N & CHMY 142N	College Chemistry I and College Chemistry I Lab	
CHMY 143N & CHMY 144N	College Chemistry II and College Chemistry II Lab	
CHMY 221 & CHMY 222	Organic Chemistry I and Organic Chemistry I Lab	
CHMY 223 & CHMY 224	Organic Chemistry II and Organic Chemistry II Lab	
Total Hours		8-20

Minimum Required Grade: C-

### Physics

Code	Title	Hours
<b>Complete one of the following Physics sequences:</b>		
<b>Algebra- and Trigonometry-based Physics:</b>		
PHSX 205N & PHSX 206N	College Physics I and College Physics I Laboratory	5
<b>Calculus-based Physics:</b>		
PHSX 215N & PHSX 216N	Fund of Physics w/Calc I and Physics Laboratory I w/Calc	
Total Hours		5

Minimum Required Grade: C-

## Additional Science Requirement

Code	Title	Hours
<b>Complete 6 credits from the following courses:</b>		
CHMY 311	Analytical Chem-Quant Analysis	6
CSCI 135	Fund of Computer Science I	
NRSM 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). 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.

### 1/3 Advanced Writing Courses

Code	Title	Hours
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

Code	Title	Hours
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	Exprmntl Microbial Genetcs Lab	1
BIOM 499	Undergraduate Thesis	3-6

Minimum Required Grade: C-

### **Complete Advanced Writing Course**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
BIOH 462	Principles Medical Physiology	3

Minimum Required Grade: C-