

# BIOLOGY B.S. - CELLULAR AND MOLECULAR BIOLOGY

## Bachelor of Science - Biology; Cellular & Molecular Biology Concentration

### 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 Core Courses Required by Cellular & Molecular Biology Concentration	20
	Additional Upper-Division Major Courses Required for the Cellular & Molecular Biology Concentration	8-12
	Disease Elective	
	Additional Upper-Division Depth Courses - Lecture	
	Additional Upper-Division Depth Courses - Laboratory	
	Required Courses Outside of the Major	38
	Mathematics - Calculus	
	Chemistry	
	Additional Depth in Chemistry	
	Physics	
	Advanced College Writing Requirement	
<b>Total Hours</b>		<b>83-87</b>

**Degree Specific Credits:** 83-87

**Required Cumulative GPA:** 2.0

**Note:** Cellular and Molecular Biology is the study of cellular, molecular, and physiological aspects of Biology. This concentration is a graduate prep program and is for students interested in academia or research jobs in private or government laboratories. It is also an excellent concentration for pre-medical sciences students.

### 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	Principles of Living Systems Lab	1
BIOB 170N	Principles of Biological Diversity	3
BIOB 171N	Principles of Biological Diversity 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 Core Courses Required by Cellular & Molecular Biology Concentration

Code	Title	Hours
<b>Complete all of the following courses:</b>		
BCH 480	Advanced Biochemistry I	3
BCH 482	Advanced Biochemistry II	3
BIOB 301	Developmental Biology	3
BIOB 375	General Genetics	3
BIOB 425	Advanced Cellular & Molecular Biology	3
BIOM 360	General Microbiology	3
BIOM 361	General Microbiology Lab	2
<b>Total Hours</b>		<b>20</b>

Minimum Required Grade: C-

### Additional Upper-Division Major Courses Required for the Cellular & Molecular Biology Concentration

**Rule:** Complete the following subcategories.

#### Disease Elective

Code	Title	Hours
<b>Complete one of the following courses:</b>		
BIOB 410	Immunology	3
BIOM 435	Virology	
<b>Total Hours</b>		<b>3</b>

Minimum Required Grade: C-

#### Additional Upper-Division Depth Courses - Lecture

Code	Title	Hours
<b>Complete one of the following courses:</b>		
BIOB 468	Endocrinology	
BIOB 483	Phylogenics and Evolution	
BIOB 486	Genomics	
BIOB 435	Comparative Animal Physiology	
BIOM 410	Microbial Genetics	
BIOM 420	Host-Microbe Interactions	
BIOM 450	Microbial Physiology	
BIOO 433 & BIOO 434	Plant Physiology and Plant Physiology Lab	
<b>Total Hours</b>		<b>3-4</b>

Minimum Required Grade: C-

#### Additional Upper-Division Depth Courses - Laboratory

Code	Title	Hours
<b>Complete two of the following courses:</b>		
BCH 486	Biochemistry Research Lab	
BIOB 411	Immunology Laboratory	
BIOH 447	Genes and Development Lab	
<b>Total Hours</b>		<b>2-5</b>

BIOM 411	Experimental Microbial Genetics Lab	
BIOM 451	Microbial Physiology Lab	
BIOM 490	Advanced Undergraduate Research	
or BIOB 490	Advanced Undergraduate Research	
or BCH 490	Undergraduate Research	
<b>Total Hours</b>		<b>2-5</b>

Minimum Required Grade: C-

## Required Courses Outside of the Major

**Rule:** Complete the following subcategories.

### Mathematics - Calculus

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

Minimum Required Grade: C-

### Chemistry

Code	Title	Hours
<b>Complete all of the following courses:</b>		
CHMY 141N & CHMY 142N	College Chemistry I and College Chemistry I Lab	5
CHMY 143N & CHMY 144N	College Chemistry II and College Chemistry II Lab	5
CHMY 221 & CHMY 222	Organic Chemistry I and Organic Chemistry I Lab	5
CHMY 223 & CHMY 224	Organic Chemistry II and Organic Chemistry II Lab	5
<b>Total Hours</b>		<b>20</b>

Minimum Required Grade: C-

### Additional Depth in Chemistry

Code	Title	Hours
<b>Complete one of the following courses:</b>		
CHMY 311	Analytical Chemistry-Quantitative Analysis	4
CHMY 373	Physical Chemistry-Kinetics & Thermodynamics	
<b>Total Hours</b>		<b>4</b>

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	10
PHSX 207N & PHSX 208N	College Physics II and College Physics II Laboratory	
<b>Calculus-based Physics:</b>		

PHSX 215N & PHSX 216N	Fundamentals of Physics with Calculus I and Physics Laboratory I with Calculus	
PHSX 217N & PHSX 218N	Fundamentals of Physics with Calculus II and Physics Laboratory II with Calculus (require M 171 and M 172)	
<b>Total Hours</b>		<b>10</b>

Minimum Required Grade: C-

## Advanced College Writing Requirement

**Rule:** To complete the Advanced College Writing Requirement, Biology students complete 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 Cellular & Molecular Biology concentration requires two 1/3 writing courses: BCH 482 and BIOB 425. The Advanced College Writing Requirement is completed with one additional course, chosen from any of the following.

Minimum Required Grade: C-

### 1/3 Advanced Writing Courses

Code	Title	Hours
BCH 482	Advanced Biochemistry II	3
BIOB 410	Immunology	3
BIOB 425	Advanced Cellular & Molecular Biology	3
BIOB 483	Phylogenics and Evolution	3
BIOE 403	Comparative Vertebrate Anatomy	4
BIOE 409	Behavior & Evolution Discussion	1
BIOE 428	Freshwater Ecology	5
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	General Ecology Lab (equivalent to 271)	2
BIOM 411	Experimental Microbial Genetics Lab	1
BIOM 499	Undergraduate Thesis	3-6

Minimum Required Grade: C-

### Complete Advanced Writing Course

Code	Title	Hours
BIOH 462	Principles of Medical Physiology	3
BIOM 420	Host-Microbe Interactions	3

Minimum Required Grade: C-