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		
Total Hours		**83-87**

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
Complete all of the following courses:		
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
Total Hours		**17**

Minimum Required Grade: C-

Upper-Division Core Courses Required by Cellular & Molecular Biology Concentration

Code	Title	Hours
Complete all of the following courses:		
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
Total Hours		**20**

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
Complete one of the following courses:		**3**
BIOB 410	Immunology	
BIOM 435	Virology	
Total Hours		**3**

Minimum Required Grade: C-

Additional Upper-Division Depth Courses - Lecture

Code	Title	Hours
Complete one of the following courses:		**3-4**
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	
Total Hours		**3-4**

Minimum Required Grade: C-

Additional Upper-Division Depth Courses - Laboratory

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

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	
Total Hours		**2-5**

Minimum Required Grade: C-

Required Courses Outside of the Major

Rule: Complete the following subcategories.

Mathematics - Calculus

Code	Title	Hours
Complete one of the following courses:		**4**
M 162	Applied Calculus	
M 171	Calculus I	
Total Hours		**4**

Minimum Required Grade: C-

Chemistry

Code	Title	Hours
Complete all of the following courses:		
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
Total Hours		**20**

Minimum Required Grade: C-

Additional Depth in Chemistry

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

Minimum Required Grade: C-

Physics

Code	Title	Hours
Complete one of the following Physics sequences:		**10**
Algebra- and Trigonometry-based Physics:		
PHSX 205N & PHSX 206N	College Physics I and College Physics I Laboratory	
PHSX 207N & PHSX 208N	College Physics II and College Physics II Laboratory	
Calculus-based Physics:		
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)	
Total Hours		**10**

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-