BIOLOGY B.S. - GENETICS AND EVOLUTION

The Genetics and Evolution concentration is for students interested in genetics and evolutionary biology, including molecular genetics, population genetics, ecological genetics, and genomics. This concentration is a graduate preperatory program and is for students interested in academia or research jobs in private or government laboratories. It is also an excellent concentration for students interested in a professional health program such as medical school or a genetic counseling graduate program.

General Degree Requirements

To earn a baccalaureate degree, all students must complete successfully, in addition to any other requirements, the University of Montana General Education Requirements. Please refer to the General Education Requirements page (https://catalog.umt.edu/academics/general-education-requirements/) for more information.

Additional requirements for graduation can be found on the Degree/Certificate Requirements for Graduation page (https://catalog.umt.edu/academics/graduation-requirements/).

Unless otherwise noted in individual program requirements, a minimum grade point average of 2.00 in all work attempted at the University of Montana-Missoula is required for graduation. Please see the Academic Policies and Procedures page (https://catalog.umt.edu/academics/policies-procedures/) for information on how your GPA is calculated.

Courses taken to satisfy the requirements of a major, minor, or certificate program must be completed with a grade of C- or better unless a higher grade is noted in the program requirements.

Bachelor of Science - Biology; Genetics and Evolution Concentration

Course Requirements

Code	Title	Hours
Biology/Microbiology Lower-Division Core		
Complete all of the following courses:		
BIOB 160	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
Upper-Division Core Courses Required by the Genetics & Evolution Concentration		
Complete all of the following courses:		
BIOB 375	General Genetics	3
BIOB 486	Genomics	3
BIOE 370	General Ecology	3
BIOE 371	General Ecology Lab (equivalent to 271)	2
Additional Upper-Division Courses Required for the Genetics & Evolution Concentration		
Biochemistry [2]		
Complete one of the following courses:		4-6
BCH 380	Biochemistry	
BCH 480 & BCH 482	Advanced Biochemistry I and Advanced Biochemistry II	
Genetics/Evolution Depth Courses		
Complete three of the following courses:		9-10
BIOB 480	Conservation Genetics	
BIOB 483	Phylogenics and Evolution	
BIOE 403	Comparative Vertebrate Anatomy	
BIOE 406	Behavior & Evolution	
BIOE 485	Plant Evolution	
BIOH 447	Genes and Development Lab	
BIOM 410	Microbial Genetics	
BIOM 415	Microbial Diversity Ecology & Evolution	
BIOM 420	Host-Microbe Interactions	
CSCI 451	Computational Biology	
Physiology Requirement		
Complete one of the following courses (labs must be taken if available):		3-4
BIOB 425	Advanced Cellular & Molecular Biology	
BIOB 435	Comparative Animal Physiology	
BIOM 450 & BIOM 451	Microbial Physiology and Microbial Physiology Lab	
BIOO 433 & BIOO 434	Plant Physiology and Plant Physiology Lab	
Mathematics - Calculus [3]		
Complete one of the following courses:		4
M 162	Applied Calculus	
M 171	Calculus I	
Mathematics - Statistics		
Complete either one semester or a full year of statistics from the following:		4-8
One Semester:		
STAT 216	Introduction to Statistics	
Full Year:		
STAT 451 & STAT 452	Statistical Methods I and Statistical Methods II	
STAT 457 & STAT 458	Computer Data Analysis I and Computer Data Analysis II	
Chemistry [4]		
Complete one of the following sequences of general and organic chemistry:		10-20
Introductory Chemistry (10 credits):		
CHMY 121N	Introduction to General Chemistry	
CHMY 123 & CHMY 124	Introduction to Organic and Biochemistry and Introduction to Organic and Biochemistry Lab	
Advanced Chemistry (20 credits):		
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	
Physics		
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	
Writing in the Disciplines Requirement		
To complete the Writing in the Disciplines Requirement, Biology students take 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.		3
Total Hours		**75-93**

1 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 160/BIOB 161N or BIOB 170N/BIOB 171N.

2 If introductory chemistry is completed, then BCH 380 must be taken. Either BCH 380 or BCH 480-BCH 482 may be taken if the advanced chemistry sequence is completed.

3 Student should choose M 171 if they plan to take additional calculus courses or if they plan to double major or minor in a field that requires more calculus (e.g. astronomy, math, physics, biochemistry, computer science).

4 Students who begin in the advanced chemistry sequence may substitute those courses for introductory sequence courses at the discretion of the major advisor. Students should choose the advanced sequence for graduate preparation.

Writing in the Disciplines Distributed Model Courses for Biological Sciences

Code	Title	Hours
1/3 Writing in the Disciplines Courses		
BCH 482	Advanced Biochemistry II	3
BIOB 410	Immunology	3
BIOB 425	Advanced Cellular & Molecular Biology	3
BIOB 483	Phylogenics and Evolution	3
BIOE 371	General Ecology Lab (equivalent to 271)	2
BIOE 403	Comparative Vertebrate Anatomy	4
BIOE 428	Freshwater Ecology	5
BIOH 447	Genes and Development Lab	3
BIOM 327	Vector-Borne Diseases: Public Health Perspectives	3
BIOM 435	Virology	3
BIOO 470	Ornithology	4
BIOO 475	Mammalogy	4
WILD 470	Conservation of Wildlife Populations	4
2/3 Writing in the Disciplines 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 448	Terrestrial Plant Ecology	4
BIOE 485	Plant Evolution	3
BIOM 499	Undergraduate Thesis	3-6
Full Writing in the Disciplines Courses		
BIOH 462	Principles of Medical Physiology	3
BIOM 420	Host-Microbe Interactions	3

Advanced Chemistry

Course	Title	Hours
Freshman		
Autumn		
BIOB 160 & BIOB 161N	Principles of Living Systems and Principles of Living Systems Lab	4
CHMY 141N & CHMY 142N or CHMY 121N	College Chemistry I or Introduction to General Chemistry	5
BIOB 194	Your Future in Biology	1
M 171 or M 162	Calculus I or Applied Calculus	4
Elective		1
	Hours	**15**
Spring		
BIOB 170N & BIOB 171N	Principles of Biological Diversity and Principles of Biological Diversity Lab	5
CHMY 143N & CHMY 144N or CHMY 123/124	College Chemistry II or Introduction to Organic and Biochemistry	5
WRIT 101	College Writing I	4
General Education Requirement		3
	Hours	**17**
Sophomore		
Autumn		
BIOB 260	Cellular and Molecular Biology	4
CHMY 221 & CHMY 222	Organic Chemistry I and Organic Chemistry I Lab	5
STAT 216	Introduction to Statistics	4
Intermediate Writing Course		3
	Hours	**16**
Spring		
BIOB 272	Genetics and Evolution	4
CHMY 223 & CHMY 224	Organic Chemistry II and Organic Chemistry II Lab	5
General Education Requirement		6
	Hours	**15**
Junior		
Autumn		
BIOE 370 & BIOE 371	General Ecology and General Ecology Lab (equivalent to 271)	5
BIOB 480 or BIOB 483 or BIOE 403 or BIOE 406 or BIOE 485 or BIOH 447 or BIOM 410 or BIOM 415 or BIOM 420 or CSCI 451	Conservation Genetics (Depth Elective) or Phylogenetics and Evolution or Comparative Vertebrate Anatomy or Behavior & Evolution or Plant Evolution or Genes and Development Lab or Microbial Genetics or Microbial Diversity Ecology & Evolution or Host-Microbe Interactions or Computational Biology	3

PHSX 205N & PHSX 206N	College Physics I and College Physics I Laboratory	5
General Education Requirement		3
	Hours	**16**
Spring		
BIOB 375	General Genetics	3
BIOB 486	Genomics	3
PHSX 207N & PHSX 208N	College Physics II and College Physics II Laboratory	5
General Education Requirement		3
	Hours	**14**
Senior		
Autumn		
BCH 480 or BCH 380	Advanced Biochemistry I or Biochemistry	3
BIOB 480 or BIOB 483 or BIOE 403 or BIOE 406 or BIOE 485 or BIOH 447 or BIOM 410 or BIOM 415 or BIOM 420 or CSCI 451	Conservation Genetics (Depth Elective (take 2)) or Phylogenetics and Evolution or Comparative Vertebrate Anatomy or Behavior & Evolution or Plant Evolution or Genes and Development Lab or Microbial Genetics or Microbial Diversity Ecology & Evolution or Host-Microbe Interactions or Computational Biology	6
Upper Division Elective		4
Elective		1
	Hours	**14**
Spring		
BCH 482	Advanced Biochemistry II (or Upper Division Elective 2 cr. + Advanced Writing)	3
BIOB 425 or BIOB 435 or BIOM 450 ***and*** BIOM 451 or BIOO 433 ***and*** BIOO 434	Advanced Cellular & Molecular Biology (Physiology Elective) or Comparative Animal Physiology or Microbial Physiology ***and*** Microbial Physiology Lab or Plant Physiology ***and*** Plant Physiology Lab	3
General Education Requirement		3
Upper Division Elective		6
	Hours	**15**
	Total Hours	**122**

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