

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 preparatory 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		
Biochemistry²		

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	Phylogenetics 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 - Calculus³

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

Chemistry⁴

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 College Physics I
& PHSX 206N and College Physics I Laboratory

PHSX 207N College Physics II
& PHSX 208N and College Physics II Laboratory

Calculus-based Physics:

PHSX 215N Fundamentals of Physics with Calculus I
& PHSX 216N and Physics Laboratory I with Calculus

PHSX 217N Fundamentals of Physics with Calculus II
& PHSX 218N 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

- 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.
- 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.
- 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).
- 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

Introductory Chemistry

Course	Title	Hours
Freshman		
Autumn		
BIOB 160 & BIOB 161N	Principles of Living Systems and Principles of Living Systems Lab	4
CHMY 121N	Introduction to General Chemistry	4
M 171 or M 162	Calculus I or Applied Calculus	4
WRIT 101	College Writing I	4
Hours		16
Spring		
BIOB 170N & BIOB 171N	Principles of Biological Diversity and Principles of Biological Diversity Lab	5
CHMY 123 & CHMY 124	Introduction to Organic and Biochemistry and Introduction to Organic and Biochemistry Lab	6
General Education Requirement		3
Elective		1
Hours		15
Sophomore		
Autumn		
BIOB 260	Cellular and Molecular Biology	4
STAT 216	Introduction to Statistics	4
General Education Requirement		3
Elective		4
Hours		15
Spring		
BIOB 272	Genetics and Evolution	4
Intermediate Writing Course		3
General Education Requirement		3
Elective		5
Hours		15
Junior		
Autumn		
BIOE 370 & BIOE 371	General Ecology and General Ecology Lab (equivalent to 271)	5
PHSX 205N & PHSX 206N	College Physics I and College Physics I Laboratory	5
General Education Requirement		3
Upper Division Elective		3
Hours		16
Spring		
BIOB 375	General Genetics	3
PHSX 207N & PHSX 208N	College Physics II and College Physics II Laboratory	5
General Education Requirement		3
Upper Division Elective		3
Hours		14

Senior		
Autumn		
BCH 380	Biochemistry	4
BIOB 480	Conservation Genetics (Depth Elective)	3
or BIOB 483	or Phylogenetics and Evolution	
or BIOE 403	or Comparative Vertebrate Anatomy	
or BIOE 406	or Behavior & Evolution	
or BIOE 485	or Plant Evolution	
or BIOH 447	or Genes and Development Lab	
or BIOM 410	or Microbial Genetics	
or BIOM 415	or Microbial Diversity Ecology & Evolution	
or BIOM 420	or Host-Microbe Interactions	
or CSCI 451	or Computational Biology	
BIOB 483	Phylogenetics and Evolution (Depth Elective (Advanced Writing))	3
or BIOE 403	or Comparative Vertebrate Anatomy	
or BIOM 420	or Host-Microbe Interactions	
Upper Division Elective		5
Hours		15
Spring		
BIOB 425	Advanced Cellular & Molecular Biology (Physiology Elective)	3
or BIOB 435	or Comparative Animal Physiology	
or BIOM 450 <i>and</i>	or Microbial Physiology <i>and</i> Microbial Physiology Lab	
or BIO 433 <i>and</i>		
BIOO 434	or Plant Physiology <i>and</i> Plant Physiology Lab	
BIOB 480	Conservation Genetics (Depth Elective)	3
or BIOB 483	or Phylogenetics and Evolution	
or BIOE 403	or Comparative Vertebrate Anatomy	
or BIOE 406	or Behavior & Evolution	
or BIOE 485	or Plant Evolution	
or BIOH 447	or Genes and Development Lab	
or BIOM 410	or Microbial Genetics	
or BIOM 415	or Microbial Diversity Ecology & Evolution	
or BIOM 420	or Host-Microbe Interactions	
or CSCI 451	or Computational Biology	
BIOB 486	Genomics	3
General Education Requirement		3
Elective		2
Hours		14
Total Hours		120

Last updated Autumn 2024

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	College Chemistry I and College Chemistry I Lab	5
M 171 or M 162	Calculus I or Applied Calculus	4
Elective		1
Hours		14
Spring		
BIOB 170N & BIOB 171N	Principles of Biological Diversity and Principles of Biological Diversity Lab	5
CHMY 143N & CHMY 144N	College Chemistry II and College Chemistry II Lab	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	Conservation Genetics (Depth Elective)	3
or BIOB 483	or Phylogenetics and Evolution	
or BIOE 403	or Comparative Vertebrate Anatomy	
or BIOE 406	or Behavior & Evolution	
or BIOE 485	or Plant Evolution	
or BIOH 447	or Genes and Development Lab	
or BIOM 410	or Microbial Genetics	
or BIOM 415	or Microbial Diversity Ecology & Evolution	
or BIOM 420	or Host-Microbe Interactions	
or CSCI 451	or Computational Biology	
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	Conservation Genetics (Depth Elective (take 2))	6
or BIOB 483	or Phylogenetics and Evolution	
or BIOE 403	or Comparative Vertebrate Anatomy	
or BIOE 406	or Behavior & Evolution	
or BIOE 485	or Plant Evolution	
or BIOH 447	or Genes and Development Lab	
or BIOM 410	or Microbial Genetics	
or BIOM 415	or Microbial Diversity Ecology & Evolution	
or BIOM 420	or Host-Microbe Interactions	
or CSCI 451	or Computational Biology	
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	Advanced Cellular & Molecular Biology (Physiology Elective)	3
or BIOB 435	or Comparative Animal Physiology	
or BIOM 450 <i>and</i>	or Microbial Physiology <i>and</i> Microbial Physiology Lab	
or BIO 433 <i>and</i>		
BIOO 434	or Plant Physiology <i>and</i> Plant Physiology Lab	
General Education Requirement		3
Upper Division Elective		6
Hours		15
Total Hours		121

Last updated Autumn 2024