BIOLOGY B.S. - ECOLOGY AND ORGANISMAL BIOLOGY

The Ecology and Organismal Biology concentration is for students interested in the biology of organisms (plants or animals) or the biology of populations or communities. Course offerings include those from organismal biology, ecology, evolutionary biology, and conservation biology. This concentration is a graduate preperatory program and it is designed for students interested in academia or employment with government or environmental consulting agencies. This concentration is also an excellent choice for pre-veterinary students.

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; Ecology and Organismal Biology 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 Ecology & Organismal Biology Concentration		
Complete one of the following courses:		5
BIOE 370 & BIOE 371	General Ecology and General Ecology Lab (equivalent to 271)	
BIOE 342	Field Ecology	
Additional Upper-Division Courses Required for the Ecology & Organismal Biology Concentration		
Complete a minimum of 21 credits of upper-division BIOB, BIOE, BIOH, BIOL, BIOM, BIOO, or BCH course, with at least one course from each of the following subcategories. Other recommended courses include BCH 380 or BCH 480-BCH 482. 21 total credits required.		21
Organismal Course Requirement		
Complete at least one organismal course (lab must also be taken, if available) from the following list:		
BIOB 301	Developmental Biology	
BIOB 375	General Genetics	
BIOB 435	Comparative Animal Physiology	
BIOB 468	Endocrinology	
BIOE 403	Comparative Vertebrate Anatomy	
BIOO 433 & BIOO 434	Plant Physiology and Plant Physiology Lab	
-Ology Course Requirement		
Complete at least one course with a focus on a group of organisms (lab must also be taken, if available) from the following list:		
BIOM 360 & BIOM 361	General Microbiology and General Microbiology Lab	
BIOM 427 & BIOM 428	General Parasitology and General Parasitology Lab	
BIOO 320	General Botany	
BIOO 335	Rocky Mountain Flora	
BIOO 340	Biology and Management of Fishes	
BIOO 462	Entomology	
BIOO 470	Ornithology	
BIOO 475	Mammalogy	
Specialized Ecology Course Requirement		
Complete one of the following courses:		
BIOE 400	Aquatic Microbial Ecology (Flathead Lake Biological Station - summer only)	
BIOE 416	Alpine Ecology (Flathead Lake Biological Station - summer only)	
BIOE 428	Freshwater Ecology	
BIOE 439	Stream Ecology (Flathead Lake Biological Station - summer only)	
BIOE 440	Conservation Biology (Flathead Lake Biological Station - summer only)	
BIOE 447	Ecosystem Ecology	
BIOE 448	Terrestrial Plant Ecology	
BIOE 451	Landscape Ecology (Flathead Lake Biological Station - summer only)	
BIOE 453	Lake Ecology (Flathead Lake Biological Station - summer only)	
BIOE 458	Forest and Fire Ecology (Flathead Lake Biological Station - summer only)	
BIOM 415	Microbial Diversity Ecology & Evolution	
BIOM 460	Ecology of Infectious Diseases	
WILD 346	Wildlife Physiological Ecology	
WILD 470	Conservation of Wildlife Populations	
Evolution Course Requirement		
Complete one of the following courses:		
BIOB 480	Conservation Genetics	

BIOB 483	Phylogenics and Evolution	
BIOB 486	Genomics	
BIOE 406	Behavior & Evolution	
BIOE 485	Plant Evolution	
BIOM 420	Host-Microbe Interactions	
Mathematics - Calculus [2]		
Complete one of the following courses:		4
M 162	Applied Calculus	
M 171	Calculus I	
Mathematics - Statistics [3]		
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.		3-9
Total Hours		**74-94**

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

3 Students should choose the full year of statistics for graduate preparation in ecology.

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 in organismal biology or pre-veterinary medicine.

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

Track 1: Introductory Chemistry (ecology/ field biology)

Course	Title	Hours
Freshman		
Autumn		
BIOB 160 & BIOB 161N	Principles of Living Systems and Principles of Living Systems Lab	4
BIOB 194	Your Future in Biology	1

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	**17**
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
	Hours	**14**
Sophomore		
Autumn		
BIOB 260	Cellular and Molecular Biology	4
General Education Requirement		3
Intermediate Writing Course		3
Elective		5
	Hours	**15**
Spring		
BIOB 272	Genetics and Evolution	4
STAT 216	Introduction to Statistics	4
General Education Requirement		3
Elective		4
	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 480 or BIOB 483 or BIOB 486 or BIOE 406 or BIOE 485 or BIOM 420	Conservation Genetics (Evolution Elective) or Phylogenetics and Evolution or Genomics or Behavior & Evolution or Plant Evolution or Host-Microbe Interactions	3
BIOE 428 or BIOE 447 or BIOE 448 or BIOM 415 or BIOM 460 or WILD 346 or WILD 470	Freshwater Ecology (Specialized Ecology Elective) [1] or Ecosystem Ecology or Terrestrial Plant Ecology or Microbial Diversity Ecology & Evolution or Ecology of Infectious Diseases or Wildlife Physiological Ecology or Conservation of Wildlife Populations	3-5
PHSX 207N & PHSX 208N	College Physics II and College Physics II Laboratory	5
General Education Requirement		3
	Hours	**14-16**
Senior		
Autumn		
Major Elective (BIO_ 300+)		4
Major Elective (BIO_ 300+) - Advanced Writing		4
Upper Division Elective		6
Elective		1
	Hours	**15**
Spring		
BIOB 301 or BIOB 375 or BIOB 435 or BIOB 468 or BIOE 403 or BIOO 433 ***and*** BIOO 434	Developmental Biology (Organismal Elective) or General Genetics or Comparative Animal Physiology or Endocrinology or Comparative Vertebrate Anatomy or Plant Physiology ***and*** Plant Physiology Lab	3
BIOO 320 or BIOO 335 or BIOO 340 or BIOO 462 or BIOO 470 or BIOO 475 or BIOM 360 ***and*** BIOM 361 or BIOM 427 ***and*** BIOM 428	General Botany (-Ology Elective) or Rocky Mountain Flora or Biology and Management of Fishes or Entomology or Ornithology or Mammalogy or General Microbiology ***and*** General Microbiology Lab or General Parasitology ***and*** General Parasitology Lab	4-5
General Education Requirement		3
Upper Division Elective		4
Elective		1
	Hours	**15-16**
	Total Hours	**121-124**

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Track 2: Advanced Chemistry (pre-vet/ organismal biology)

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
BIOB 194	Your Future in Biology	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
General Education Requirement		3
WRIT 101	College Writing I	4
	Hours	**17**
Sophomore		
Autumn		
BIOB 260	Cellular and Molecular Biology	4
STAT 216	Introduction to Statistics	4
CHMY 221 & CHMY 222	Organic Chemistry I and Organic Chemistry I Lab	5
Intermediate Writing Course		3
	Hours	**16**
Spring		
CHMY 223 & CHMY 224	Organic Chemistry II and Organic Chemistry II Lab	5
BIOB 272	Genetics and Evolution	4
General Education Requirement		6
	Hours	**15**
Junior		
Autumn		
BIOE 370 & BIOE 371	General Ecology and General Ecology Lab (equivalent to 271)	5

BIOO 320	General Botany (-Ology Elective)	5
or BIOO 335	or Rocky Mountain Flora	
or BIOO 340	or Biology and Management of Fishes	
or BIOO 462	or Entomology	
or BIOO 470	or Ornithology	
or BIOO 475	or Mammalogy	
or BIOM 360 ***and*** BIOM 361	or General Microbiology ***and*** General Microbiology Lab	
or BIOM 427 ***and*** BIOM 428	or General Parasitology ***and*** General Parasitology Lab	
PHSX 205N & PHSX 206N	College Physics I and College Physics I Laboratory	5
	Hours	**15**
Spring		
BIOB 301	Developmental Biology (Organismal Elective)	3
or BIOB 375	or General Genetics	
or BIOB 435	or Comparative Animal Physiology	
or BIOB 468	or Endocrinology	
or BIOE 403	or Comparative Vertebrate Anatomy	
or BIOO 433 ***and*** BIOO 434	or Plant Physiology ***and*** Plant Physiology Lab	
PHSX 207N & PHSX 208N	College Physics II and College Physics II Laboratory	5
General Education Requirement		3
Upper Division Elective		3
Elective		1
	Hours	**15**
Senior		
Autumn		
BIOE 428	Freshwater Ecology (Specialized Ecology Elective) [1]	4-5
or BIOE 447	or Ecosystem Ecology	
or BIOE 448	or Terrestrial Plant Ecology	
or BIOM 415	or Microbial Diversity Ecology & Evolution	
or BIOM 460	or Ecology of Infectious Diseases	
or WILD 346	or Wildlife Physiological Ecology	
or WILD 470	or Conservation of Wildlife Populations	
Major Elective (BIO_300+)		3
General Education Requirement		3
Upper Division Elective		4
	Hours	**14-15**
Spring		
Major Elective (BIO_300+) - Advanced Writing		3
BIOB 480	Conservation Genetics (Evolution Elective)	3
or BIOB 483	or Phylogenetics and Evolution	
or BIOB 486	or Genomics	
or BIOE 406	or Behavior & Evolution	
or BIOE 485	or Plant Evolution	
or BIOM 420	or Host-Microbe Interactions	
General Education Requirement		3
Upper Division Elective		6
	Hours	**15**
	Total Hours	**121-122**

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[1] Summer-only Specialized Ecology courses at the Flathead Lake Biological Station: BIOE 400, BIOE 416, BIOE 439, BIOE 440,BIOE 451, BIOE 453, BIOE 458