2009-2010 Course Catalog

The University Of Montana

Biology

The Division offers an undergraduate degree in biology that provides a solid foundation in core areas of the biological sciences and in supporting physical sciences and mathematics. Several options are provided within the biology degree. Options in cellular and molecular biology, ecology, field ecology, and organismal biology, and human biological sciences allow specialization in biological subdisciplines and are appropriate background for certain employment opportunities and for continued graduate or professional study:

Cellular and molecular biology: For students interested in the cellular and molecular aspects of biology. This option is also appropriate for students interested in medical school.

Ecology and organismal biology: For students interested in the biology of organisms (plants and animals), and populations. This option is also appropriate for students interested in veterinary school.

Human biological sciences: Provides a strong background in the biological sciences for students interested in pursuing further study in a health sciences professional program.

Natural history: Designed especially for students wishing to combine basic natural history and biological sciences with another field such as art, journalism, or creative writing. Option is not suitable for students planning a traditional career in the biological sciences.

Teacher preparation in biology, Teacher preparation in general science: Two separate options designed for students interested in a career teaching biology or broad-field science at the secondary level.

High School Preparation: In addition to general University admission requirements, chemistry, mathematics through precalculus, and a modern foreign language are recommended.

Special Degree Requirements

Refer to graduation requirements listed previously in the catalog. See index.

Upper-Division Writing Expectation: To meet the Upper-Division Writing Expectations for the major, biology students must take two or three partial writing courses (either three 1/3 writing courses or one 2/3 writing course plus one 1/3 writing course). Courses that are approved as 2/3 partial writing include: BIOC 486, BIOL 341, MICB 404, and MICB 411. Courses that are approved as 1/3 partial writing include: BIOC 482, BIOC 499, BIOL 304, BIOL 306, BIOL 316, BIOL 366, BIOL 403, BIOL 406, BIOL 445, BIOL 499, MICB 410, MICB 412, and MICB 499.

Option in Ecology and Organismal Biology

Forty-three credits in biology, biochemstry, and microbiology including BIOL 108N-109N, 110N, 221, 223, 340-341; one organismal course chosen from BIOL 301, 403, 435, 444-445; one course with a focus on a group of organisms chosen from BIOL 304, 306, 308, 316, 350, 400-401, 410, 418, MICB 300-301; one ecology course chosen from BIOL 366, 430, 442, 446, 447,448, MICB 422, WBIO 470; one evolutionary biology course chosen from 405, 406, 480, 482, 484. Other recommended courses include BIOC 380 or 481-482, MICB 423.

Also required: M 162 (MATH 150) or M 171 (MATH 152); one semester of statistics STAT 216 (MATH 241) or a full year of statistics STAT 451-457;452-458 (MATH 444-447, 445-448); one year of chemistry CHMY 121N, 123N-124N (CHEM 151N, 152N-154N) or two years of chemistry CHMY 141N, 143N, 221-222, 223-224) (CHEM 161N, 162N, 221-223, 222-224); PHYS 111N/113N, 112N/114N.

Option in Field Ecology

Forty-three credits in biology and microbiology including BIOL 108N-109N, 110, 221, 223, 342 or 340/341. Major courses chosen from the Aquatic Emphasis, BIOL 451, 453, 454, 452, 492; or the Terrestrial Emphasis, BIOL 451, 458, 459, 452, 492. Choose an additional 8 credits of upper division BIOL or MICB, with at least one being from each category from BIOL 304, 306, 308, 316, 350, 400/401, 410, 418, MICB 300/301; or Evolutionary Biology, BIOL 405, 406, 480, 482 or 484. One of these classes must be an Upper Division Writing course. Other required courses are M 162, STAT 216 (MATH 150, MATH 241) or STAT 451/457 and STAT 452/458 (MATH 444/447 and MATH 445/448); CHMY 121N & 123N/124N (CHEM 151N and 152N/154N) or CHMY 141N, 143N 221-222 and 223-224 (CHEM 161N, 162N, 221/222 and 223/224); and PHYS 111N/113N, 112N/114N.

Students in Track A will also spend two summers at the Flathead Lake Biological Station

Option in Cellular and Molecular Biology

Forty-four to forty-nine credits in biochemistry, biology and microbiology including BIOC 481-482; BIOL 108N-109N, 110N, 221, 223, 301, 340, and 464; MICB 300-301; one course chosen from MICB 410 or 420; one course chosen from BIOL 435, 440, 444-445, MICB 404, or 450; and two lab courses chosen from BIOC 486, MICB 405, 411, 451, or 497.

M 162 (MATH 150); CHMY 141N-143N, 221-222-223-224 (CHEM 161N-162N, 221-222-223-224); one course chosen from CHMY 311, 360, 373 (CHEM 341, 370, 371); PHYS 111N/113N, 112N/114N or PHYS 211N/213N, 212N/214N are also required.

Option in Human Biological Sciences

Forty-two to forty-three credits in biology, biochemistry, and microbiology including BIOL 108N-109N, 110N, 221, 223, 301, 312, 313, 340-341, 460 or 464. MICB 300-301 (or MICB 302) and the remaining credits at the 300 or 400 level, including one writing course.

One year of chemistry CHMY 121N, 123N-124N (CHEM 151N, 152N-154N) or two years of chemistry CHMY 141N, 143N, 221-222-223-224 (CHEM 161N, 162N, 221-223-222-224); M 162 (MATH 150), STAT 216 (MATH 241); PHYS 111N/113N, 112N/114N or PHYS 211N/213N, 212N/214N; PSYX 110S, 230S or 340S (PSYC 100S, 240S or 330S) also are required.

Recommended Courses: Some graduate schools in the health professions also may require course work in these areas: BIOL 400, General Parasitology; BIOC 380 or 481, 482, Biochemistry; COMM 111A, Introduction to Public Speaking; HHP 236N, Nutrition; HHP 377-378, Physiology of Exercise and Laboratory; SOCI 101S (SOC 110S) Principles of Sociology.

Option in Natural History

Forty-two to forty-four credits in biology including BIOL 108N-109N, 110N, 221, 223, 316, 340-341, 350, 410; one course chosen from 304, 306, or 356; one course chosen from 405 or 406.

CHMY 121N, 123N-124N (CHEM 151N-152N, 154N) and GEO 101N-102N (GEOS 100N-101N) are required. Students also must complete at least 20 credits in cognate areas of anthropology, chemistry (excluding CHMY 121N, 123N-124N (CHEM 151N-152N, 154N)), geography, geology (excluding GEO 101N-102N (GEOS 100N-101N)), forestry, mathematics, physics/astronomy, and wildlife biology. No more than 10 credits from any one of these areas can be applied toward the 20-credit requirement. Students interested in combining this option with another subject area may, with the advisor's permission, substitute 20 credits in English-writing, journalism, photography, art, foreign language, business management, or other appropriate field.

Teacher Preparation in Biology

Option in Biological Education Major Teaching Field of Biology: This option is designed for students seeking an endorsement in the major teaching field of biology.

A student must complete thirty-four credits in biology and microbiology including BIOL108N-109N, 110N, 221, 223, 340-341, 444 & 445; MICB 300-301 and one course chosen from BIOL 301 or 435.

M 162 or M 171 (MATH 150 or 152) and STAT 216 (MATH 241) are required; CHMY 121N-123N, 124N, 485 (CHEM 151N-152N, 154N, 485); PHYS 111N/113N; C&I 426; and one course chosen from GEO109N or GEO 301 also are required.

For endorsement to teach biology, a student also must gain admission to Teacher Education and Student Teaching and meet all the requirements for certification as a secondary teacher (see the School of Education section of this catalog).

Biology qualifies for a single-field endorsement. However, there is a limited demand in most Montana high schools for teachers with a single endorsement in biology, and students are advised to complete the requirements for a second teaching endorsement (major or minor).

Minor Teaching Field of Biology: For an endorsement in the minor teaching field of biology, a student must complete BIOL 108N-109N, 110N, 221, 223; MICB 300-301; C&I 426; GEO 109N or GEO 301; M 162 or 171 (MATH 150 or 152),STAT 216 (MATH 241); and CHMY 121N-123N, 485 (CHEM 151N-152N, 485). A student also must

gain admission to Teacher Education and Student Teaching and must meet the requirements for certification as a secondary teacher (see the School of Education section of this catalog).

Teacher Preparation in General Science

Extended Major Teaching Field of General Science: A student is awarded a B.A. with a major in biology with an ecology option by completing the following 60 credits in astronomy, biology, chemistry, geology, mathematics and physics: ASTR 131N, 134N; BIOL 108N-109N, 110N, 221, 223, 340-341; CHMY 123N , 141N-143N, 485 (CHEM 152N, 161N-162N, 485); GEO 101N-102N, 301 (GEOS 100N-101N, 301); M 162 or 171 (MATH 150 or 152), STAT 216 (MATH 241 and PHYS 111N/113N, 112N/114N. C&I 426 also is required

Highly recommended are BIOL 435, MICB 300-301, and CHMY 101N (CHEM 101N).

For an endorsement in the extended major teaching field of General Science, a student must gain admission to Teacher Education and Student Teaching, complete C&I 426 and meet the requirement for certification as a secondary teacher (see the School of Education section of this catalog.)

Suggested Course of Study

Biological Education Option

First Year		
BIOL 108N-109N Diversity of Life and Laboratory	5	-
BIOL 110N Principles of Biology	-	4
CHMY 121N (CHEM 151N) Introduction to General Chemistry	3	-
CHMY 123N (CHEM 152N) Organic and Biochemistry	-	3
CHMY 124N (CHEM 154N) Intro to Organic and Biochemistry Laboratory	-	2
WRIT 101 (ENEX 101) College Writing I	3	-
M 162 (MATH 150) Applied Calculus	4	-
PSYX 100S (PSYC 100S) Introduction to Psychology	-	4
General Education	-	3
	15	16
Second Year		

BIOL 221 Cell and Molecular Biology	4	-
BIOL 223 Genetics and Evolution	-	4
CHMY 485 (CHEM 485) Laboratory Safety	1	-
STAT 216 (MATH 241) Introduction to Statistics	4	-
MICB 300-301 General Microbiology & Laboratory	-	5
Lower-division writing course	-	3
General Education/Native American Studies Course	6	3
	15	15
Third Year		
BIOL 340-341 Ecology and Laboratory	-	5
PHYS 111N/113N General Physics I	5	-
BIOL 444/445 Plant Physiology and Lab	-	4
C&I 200 Exploring Teaching	1	-
C&I 303 Educational Psychology and Measurement	3	-
C&I 306 Instructional Media and Computer Applications	3	-
C&I 410 Exceptionality and Classroom Management	3	-
HHP 233 Health Issues of Children and Adolescents	-	3
Elective	-	2
	15	14
Fourth Year		
C&I 301 or 302 Field Experience	1	-
C&I 407E Ethics and Policy Issues	3	-
C&I 426 Teaching Science in the Middle and Secondary School	3	-

C&I 427 Literary Strategies in Content Areas	3	-
C&I 482 Student Teaching: Secondary	-	14
C&I 494 Professional Portfolio	-	1
BIOL 435 Comparative Animal Physiology	3	-
GEO 109N Environmental Geoscience (or GEO 301 Environmental Geology)	2	-
	15	15

Cellular and Molecular Biology Option

First Year		
BIOL 108N-109N Diversity of Life and Laboratory	5	-
BIOL 110N Principles of Biology	-	4
CHMY 141N-143N (CHEM 161N-162N) Introduction to General Chemistry	5	5
WRIT 101 (ENEX 101) College Writing I	-	3
M 162 (MATH 150) Applied Calculus	4	-
General Education	-	3
Elective	1	-
	15	15
Second Year		
BIOL 221 Cell and Molecular Biology	4	-
BIOL 223 Genetics & Evolution	-	4
CHMY 221-222, 223-224 (CHEM 221-222, 223-224) Organic Chemistry and Laboratory	5	5
MICB 300-301 General Microbiology and Laboratory	-	5
Lower-division writing course	3	-

General Education	3	-
Elective	-	1
	15	15
Third Year		
BIOC 481-482 Biochemistry	3	3
MICB 404 Microbial Genetics (or BIOL 345, 440, 444, 495; MICB 450)	-	3
MICB 405 Molecular Genetics Laboratory (or 405, 411, 451, 497, or BIOC 486)	-	1
PHYS 111N/113N, 112N/114N General Physics	5	5
General Education	3	3
Electives	4	-
	15	15
Fourth Year		
BIOL 340 Ecology	-	3
BIOL 301 Developmental Biology	-	3
BIOL 464 Adv. Cell Biology	-	3
CHMY 311 (CHEM 341) Analytic Chemistry-Quantitative Analysis	4	-
MICB 410-411 Immunology and Laboratory	5	-
Upper-division elective	3	3
General Education	3	3
	15	15

Ecology and Organismal Biology Option with One Year of Chemistry

First Year		
BIOL 108N-109N Diversity of Life and Laboratory	5	-
BIOL 110N Principles of Biology	-	4
CHMY 121N (CHEM 151N) Introduction to General Chemistry	3	-

CHMY 123N (CHEM 152N) Introduction to Organic and Biochemistry	-	3
CHMY 124N (CHEM 154N) Introduction to Organic and Biochemistry Laboratory	-	2
WRIT 101 (ENEX 101) College Writing I	3	-
M 162 (MATH 150) Applied Calculus	4	-
General Education Requirement	-	3
Electives	-	3
	15	15
Second Year		
BIOL 221 Cell and Molecular Biology	4	-
BIOL 223 Genetics and Evolution	-	4
PHYS 111N/113N-112N/114N General Physics I, II	5	5
Lower-division writing course	3	-
Elective	3	
General Education	3	6
	15	15
Third Year		
STAT 451/457 (MATH 444/447) Statistical Methods I and Comp. Lab	4	-
STAT 452/458 (MATH 445/448) Statistical Methods II and Comp. Lab	-	4
BIOL 340-341 Ecology and Laboratory	5	-
BIOL 306 Mammalogy (or BIOL 304, 308, 316, 350, 400/401, 410 and MICB 300/301)	4	-
BIOL 406 Behavior and Evolution (or BIOL 405, 480, 482, 484)	-	4
BIOL 446 Wildlife Physiological Ecology (or	-	3

BIOL 366, 430, 442, 447, 448, MICB 422, or WBIO 470		
General Education Requirement	-	3
Electives	3	-
	16	14
Fourth Year		
BIOL 316 Plant Form and Function (or UD BIOL elective)	-	5
BIOL 403 Vertebrate Design and Evolution (or BIOL 301, 435, 444/445)	5	-
Upper-division elective	5	-
General Education Requirement	3	3
Electives	1	8
	14	16

Ecology and Organismal Biology Option with Two Years of Chemistry

First Year	A	S
BIOL 108N-109N Diversity of Life and Laboratory	5	-
BIOL 110N Principles of Biology	-	4
CHMY 141N (CHEM 161N) College Chemistry	5	-
CHMY 143N (CHEM 162N) College Chemistry Laboratory	-	5
WRIT 101 (ENEX 101) College Writing I	-	3
M 162 (MATH 150) Applied Calculus	4	-
STAT 216 (MATH 241) Statistics	-	4
	14	16
Second Year	A	S
BIOL 221 Cell and Molecular Biology	4	-
BIOL 223 Genetics & Evolution	-	4
CHMY 221-222-223-224 (CHEM 221-222-223-224)	5	5

Organic Chemistry and Laboratory			
Writing course	3		-
General Education	3		6
	15		15
Third Year		A	S
BIOC 481-482 Biochemistry I and II	3		-
BIOL 301 Developmental Biology(or BIOL 345, 403, 444/445)	-		3
BIOL 340-341 Ecology and Laboratory	5		-
PHYS 111N/113N, 112N/114N General Physics I, II	5		5
General Education	-		3
Elective	2		-
Upper-division electives	-		4
	15		15
Fourth Year		A	S
BIOL 405 Animal Behavior (or BIOL 406, 480,482, 484)	-		5
BIOL 448 Terrestrial Plant Ecology (or BIOL 366, 430, 446, 447, 495, MICB 422, WBIO 470)	4		-
MICB 300/301 General Microbiology & Lab (or BIOL 304, 306, 308, 316, 350, 400/401, 410, 418)	-		5
General Education Requirement	6		-
Upper-division elective	4		5
Elective	1		1
	15		15

Ecology Option for Teacher Preparation in General Science

First Year			
BIOL 108N-109N Diversity of Life and Laboratory	5		-
BIOL 110N Principles of Biology	-		4

CHMY 141N-143N (CHEM 161N-162N) College Chemistry	5	5
WRIT 101 (ENEX 101) College Writing I	-	3
M 162 (MATH 150) Applied Calculus	4	-
PSYX 100S (PSYC 100S) Introduction to Psychology	-	4
	14	16
Second Year		
ASTR 131N, 134N Elementary Astronomy and Laboratory	4	-
BIOL 221 Cell and Molecular Biology	4	-
BIOL 223 Genetics and Evolution	-	4
CHMY 123N (CHEM 152N) Introduction to Organic and Biochemistry	-	3
GEO 101N-102N (GEOL 100N-101N) Introduction to Physical Geology	-	3
STAT 216 (MATH 241) Statistics	4	-
General Education/Native American Studies course	-	3
Lower-division writing course	3	-
Elective	-	1
	15	14
Third Year		
CHMY 485 (CHEM 485) Laboratory Safety	1	-
C&I 200 Exploring Teaching	-	1
C&I 303 Educational Psychology and Measurement	-	3
C&I 306 Instructional Media and Computer Applications	-	3
C&I 410 Exceptionality and Classroom Management	-	3

GEO 301 (GEOS 301) Environmental Geology	3	-
PHYS 111N/113N-112N/114N General Physics I, II	5	5
General Education	6	-
	15	15
Fourth Year		
BIOL 340-341 Ecology and Laboratory	5	-
C&I 301 or 302 Field Experience	1	-
C&I 407E Ethics and Policy Issues	3	-
C&I 426 Teaching Science in the Middle and Secondary School	3	-
C&I 427 Literary Strategies in Content Areas	3	-
HHP 233 Health Issues of Children and Adolescents	-	3
Upper-division biology writing course	-	4
General Education	-	3
Electives	-	5
	15	15
Fifth Year		A
C&I 482 Student Teaching: Secondary		14
C&I 494 Professional Portfolio		1

Field Ecology Option (Track A, two summers)

First Year	A	S
BIOL 108N Diversity of Life	3	-
BIOL 109N Diversity of Life Lab	2	-
CHMY 121N (CHEM 151N) Introduction to General Chemistry	3	-
M 162 (MATH 150) Applied Calculus	3	-

WRIT 101 (ENEX 101) College Writing I	3	-
Elective	1	1
BIOL 110N Principles of Biology	-	4
CHMY 123N (CHEM 152N) Introduction to Organic and Biochemistry	-	3
CHMY 124N (CHEM 154N) Introduction to Organic and Biochemistry Lab	-	2
General Education Requirement	-	3
Lower Division Writing Requirement	-	3
	16	16
Second Year		
BIOL 221 Cell and Molecular Biology	4	-
STAT 451/457 (MATH 444/447) Statistical Methods/Computer Analysis	4	-
General Education Requirement	3	-
Electives	5	-
BIOL 223 Genetics and Evolution	-	4
STAT 452/458 (MATH 445/448) Statistical Methods/Computer Analysis	-	4
General Education Requirement	-	6
Elective	-	2
	16	16
Third Year		
Summer (at Biological Station)		
BIOL 342 Field Ecology and Lab	5	
Upper Division Electives	5	10
BIOL 484 Planet Evolution	3	
PHYS 111N (PHYS 121N) Fundamentals of Physics I	5	-

General Education Requirement	6	-
Electives	2	-
BIOL 316 Plant Form & Function	-	5
PHYS 112N (PHYS 122N) Fundamentals of Physics II	-	5
Electives	-	7
	16	17
Summer (at Biological Station)		
BIOL 451 Landscape Ecology of Mntn Ecosystems	3	
BIOL 458 Ecology of Forests & Grasslands	3	
BIOL 459 Alpine Ecology	3	
BIOL 452 Conservation Biology & Ecology	3	
BIOL 492 Seminars in Ecology & Resource Management	1	
	13	

Field Ecology Option (Track B one summer)

First Year	A	S
BIOL 108N Diversity of Life	3	-
BIOL 109N Diversity of Life Lab	2	-
CHMY 141N (CHEM 161N) College Chemistry I	5	-
M 162 (MATH 150) Applied Calculus	4	-
Elective	1	-
BIOL 110N Principles of Biology	-	4
CHMY 143N (CHEM 162N) College Chemistry II	-	5
WRIT 101 (ENEX 101) College Writing I	-	3
General Education Requirement	-	3

	15	15
Second Year		
BIOL 221 Cell and Molecular Biology	4	-
CHMY 221/222 (CHEM 221/222) Organic Chemistry I & Lab	5	-
STAT 216 (MATH 241) Introduction to Statistics	4	-
Lower Division Writing Requirement	3	-
BIOL 223 Genetics and Evolution	-	4
CHMY 222/224 (CHEM 222/224) Organic Chemistry II & Lab	-	5
General Education	-	6
	16	15
Third Year		
BIOL 340/341 Ecology and Lab	5	-
PHYS 111N/113N Fundamentals of Physics I	5	
Electives	2	-
PHYS 112N/114N (PHYS 122N) Fundamentals of Physics II	-	5
General Education Requirements	-	6
Electives	-	1
	12	12
Summer Semester at Flathead Lake Biological Station		
BIOL 451 Landscape Ecology	3	
BIOL 453 Lake Ecology	3	
BIOL 454 Stream Ecology	3	
BIOL 452 Conservation Ecology	3	
BIOL 492 Seminar in Ecology & Res. Management	1	
	13	
Fourth Year		

BIOL 308 Biology and Management of Fishes	4	-
Upper Division electives	8	-
BIOL 406 Behavior and Evolution	-	4
Upper-division elective	-	5
General Education	-	3
	12	12

Human Biological Sciences Option with Two Years of Chemistry

First Year		
BIOL 108N-109N Diversity of Life and Laboratory	5	-
BIOL 110N Principles of Biology	-	4
CHMY 141N-143N (CHEM 161N-162N) College Chemistry	5	5
WRIT 101 (ENEX 101) College Writing I	-	3
M 162 (MATH 150) Applied Calculus	4	-
PSYX 100S (PSYC 100S) Introduction to Psychology	-	4
	14	16
Second Year		
BIOL 221 Cell and Molecular Biology	4	-
BIOL 223 Genetics and Evolution	-	4
CHMY 221-222-223-224 (CHEM 221-222-223-224) Organic Chemistry and Laboratory	5	5
MICB 300-301 General Microbiology and Laboratory	-	5
Lower-division writing course	3	-
STAT 216 (MATH 241) Introduction to Statistics	4	-
	16	14
Third Year		
BIOL 312, 313 Anatomy and Physiology I and II	4	4

BIOL 301 Developmental Biology	-	3
PHYS 111N/113N-112N/114N General Physics I, II	5	5
PSYX 340S (PSYC 330S) Abnormal Psychology or PSYX 230S (PSYC 240S) (if PSYC 230S OR PSYC 240S, must have 3 more upper-division credits)	-	3
Upper-division elective	3	-
General Education	3	-
	15	15
Fourth Year		
BIOL 340-341 Ecology and Laboratory	-	5
BIOL 464 Adv. Cell Biology	-	3
MICB 410 Immunology or other upper-division biology or microbiology elective that meets the biology Writing requirement	3	-
General Education	6	3
Elective	-	4
Upper-division elective	6	-
	15	15

Natural History Option

First Year		
BIOL 108N -109N Diversity of Life and Laboratory	5	-
BIOL 110N Principles of Biology	-	4
CHMY 121N (CHEM 151N) -Introduction to General Chemistry	3	-
CHMY 123N (CHEM 152N) Introduction to Organic and Biochemistry	-	3
CHMY 124N (CHEM 154N) Introduction to	-	2

Organic and Biochemistry Laboratory		
WRIT 101 (ENEX 101) College Writing I	3	-
M 115 (MATH 117) Probability and Linear Mathematics	3	-
General Education	-	6
Elective	1	-
	15	15
Second Year		
BIOL 221 Cell and Molecular Biology	4	-
BIOL 223 Genetics & Evolution	-	4
BIOL 350 Rocky Mountain Flora	-	3
GEO 101N-102N (GEOL 100N-101N) Introduction to Physical Geology and Laboratory	3	-
Lower-division writing course	3	-
General Education	-	3
Modern/Classic Language	5	5
	15	15
Third Year		
BIOL 340 Ecology	3	-
BIOL 341 Ecology Laboratory	2	-
BIOL 316 Plant Form and Function	-	5
Cognate course	3	4
Upper-division cognate course	-	7
General Education	6	-
	14	16
Fourth Year		
BIOL 306 Mammalogy or 304, 356	4	-
BIOL 406 Behavior and Evolution or 405	-	4
BIOL 410 Insect Biology	-	4
Cognate course	3	-
Upper-division electives	3	4

General Education	3	-
Electives	2	3
	15	15

Requirements for a Minor

To earn a minor in biology, the student must complete a minimum of 25 credits in biology including BIOL 108N-109N, 110N, 221 and 223 and 8 credits in Biology at the 300-400 level. All courses must be taken for a traditional letter grade.

Courses

U = for undergraduate credit only, UG = for undergraduate or graduate credit, G = for graduate credit. R after the credit indicates the course may be repeated for credit to the maximum indicated after the R. Credits beyond this maximum do not count toward a degree.

Biology (BIOL)

U 100N The Science of Life 3 cr. Offered every term. Contemporary exploration of the organization and complexity of living organisms and the systems in which they live. The central question of biology--relationship between form and function, acquisition and use of energy, and continuity between generations will be addressed through lectures and laboratory investigations. Credit not allowed toward a major in biology. Credit not allowed for both BIOL 100N and 110N.

U 106N Elementary Medical Microbiology 3 cr. Offered spring. Infectious diseases, including concepts of virulence, resistance, prevention and control of microbial diseases in the individual and in the community. If laboratory experience is desired, the student may enroll concurrently in BIOL 107. Credit not allowed toward a major in microbiology.

U 107 Elementary Microbiology Laboratory 1 cr. Offered spring. Prereq. or coreq., BIOL 106N. Same as MICB 107. Observation of live microorganisms, their characteristics and activities. Experience with microbiological techniques. Credit not allowed toward a major in microbiology.

U 108N Diversity of Life 3 cr. Offered autumn and summer. Survey of the diversity, evolution and ecology of life including prokaryotes, viruses, protista, fungi, plants and animals.

U 109N Diversity of Life Laboratory 2 cr. Offered autumn and summer. Coreq., BIOL 108N. The diversity of life including prokaryotes, viruses, protista, fungi, plants and animals including structure and evolutionary relationships.

U 110N Principles of Biology 4 cr. Offered spring and summer. Unifying principles of biological structure-function relationships at different levels of organization and complexity. Consideration of reproduction, genetics, development, evolution, ecosystems, as well as the inter-relationships of the human species to the rest of life. Lab experiences illustrate biological principles underlying growth, reproduction, development, genetics and physiology. Credit not allowed for both BIOL 100N and 110N.

U 112 Introduction to Human Form and Function I 3cr. Offered autumn. Explores the fundamentals of structure and function at basic cellular and tissue levels, in addition to the anatomy and physiology of the integumentary, musculoskeletal, and nervous systems.

U 113 Introduction to Human Form and Function II 3 cr. Offered spring. Explores the fundamental structures and functions of the endocrine, cardiovascular, respiratory, digestive, urinary and reproductive systems.

U 120N General Botany 3 cr. Offered spring. Prereq., consent of instr. Introduction to the plant kingdom including anatomy, physiology and ecology.

U 121N Introductory Ecology 3 cr. Offered autumn. An introduction to ecological principles, stressing the structure and function of natural communities and examining human's role in these ecosystems.

U 130N Evolution and Society 3 cr. Offered spring. A focus on relationships between evolutionary biology and important social issues, including the evolution of drug-resistant diseases, the construction and use of genetically-modified organism, human evolutionary biology, and experimental laboratory evolution.

U 135N Biology of Yellowstone Hot Springs. 3 cr. Offered autumn. A field and laboratory based exploration of the microbial diversity of the thermal features of our first national park. Topics to be discussed include how these communities are shaped by the physical and chemical conditions of the environment and how microorganisms can thrive at life's extremes. Includes a field trip to Yellowstone National Park.

U 195 Special Topics Variable cr. (R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

U 198 Internship Variable cr. Offered intermittently. Prereq., consent of Division. Extended classroom experience that provides practical application of learning during placement off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

U 201N Montana Wildlife 3 cr. Offered autumn. Prereq., one course in biology. Interpreting biological patterns associated with selected Montana wildlife species, including mammals, birds, reptiles and amphibians.

U 221 Cell and Molecular Biology 4 cr. Offered autumn. Prereq., BIOL 110N or equiv. and one year of college chemistry. Description and analysis of biological structures and processes at the cellular and subcellular levels including molecular genetics, energy, metabolism and cell differentiation.

U 223 Genetics and Evolution 4 cr. Offered spring. Prereq., BIOL 221. Principles and mechanisms of inheritance and evolution. Population genetics, fossil record, macroevolution, speciation, extinction, systematics, molecular evolution.

U 240 Introduction to Biostatistics (Honors) 3 cr. Offered autumn even-numbered years. Prereq., calculus and consent of instr. Same as WBIO 240. Introduction to statistical ecology: distributions, hypothesis testing, and fitting models to data with emphasis on problems in ecological sampling.

U 265 Human Sexuality 3 cr. Offered autumn. Same as ANTH 201. Biological, behavioral, cross-cultural aspects of human sexuality to help students place their own sexuality and that of others in a broader perspective. Includes sexual anatomy,

physiology, development, reproduction, diseases, determination, as well as gender development and current issues.

U 295 Special Topics Variable cr. (R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

U 298 Internship Variable cr. Offered intermittently. Prereq., consent of Division. Extended classroom experience that provides practical application of learning during placement off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

UG 301 Developmental Biology 3 cr. Offered spring. Prereq., BIOL 221; BIOL 223 recommended. An analysis of the origin and development of form and patterns in organisms, stressing the processes of growth and differentiation in plants and animals. Graded traditional letter grade only.

UG 304 Ornithology 4 cr. Offered spring. Prereq., BIOL 108N, 109N and 223. The classification, structure, evolution, behavior and ecology of birds.

UG 306 Mammalogy 4 cr. Offered autumn. Prereq., BIOL 108N, 109N and 223. The evolution, systematics, anatomy, physiology and ecology of mammals.

UG 308 Biology and Management of Fishes 4 cr. Offered autumn. Prereq., BIOL 108N, 109N, 223 and one year of college mathematics. Diversity, adaptations and ecology of fishes. Analysis and management of fish populations and communities.

U 312 Anatomy and Physiology I 4 cr. Offered autumn. Prereq. or coreq., CHMY 121N (CHEM 151N) or CHMY 141N (CHEM 161N); BIOL 110N or BIOL 112 or BIOL 113. Introduction to basic cellular structure and function. The fundamental facts and concepts of the anatomy and physiology of the integumentary, musculoskeletal, nervous and endocrine systems.

U 313 Anatomy and Physiology II 4 cr. Offered spring. Prereq., BIOL 312. The fundamental facts and concepts of the anatomy and physiology of the endocrine, circulatory, respiratory, digestive, urinary and reproductive systems.

UG 315 Peer Advising 1 cr. (R-6) Offered every term. Prereq., consent of instr. Supervised training and internship for peer advisors who will gain knowledge and ability to communicate degree requirements and relate the various degree offerings to professional and career goals. No more than two credits are allowed toward upper-division major requirements.

U 316 Plant Form and Function 5 cr. Offered spring. Prereq., BIOL 108N-109N, 221. Prereq. or coreq., BIOL 223. Anatomy, morphology, ecology and physiology of photosynthetic organisms.

U 339 Listening to Ecology 2 cr. Offered autumn. Preparatory readings and attendance at seminars on a wide variety of ecological and wildlife management topics followed by critiques.

UG 340 Ecology 3 cr. Offered autumn and spring. Prereq., BIOL 223 and one year of college mathematics including STAT 216 (MATH 241) or equiv. Analysis of the distribution and abundance of plants and animals. Includes individual, population and community-level processes (e.g., population growth and regulation, competition, predation, succession, nutrient cycling, energy flow and community organization).

UG 341 Ecology Laboratory 2 cr. Offered autumn and spring. Coreq., BIOL 340. Methods of describing and testing alternative explanations for patterns in nature. The use of scientific methodology in ecology.

U 342 Field Ecology 5 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 223 and one year of college math, including statistics. The principles and practices of the study of animals and plants in their natural environments, including human influences, with focus on the Crown of the Continent area of the Rock Mountains and taught entirely outdoors.

U 343 Ecological Methods and Analysis 5 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or BIOL 340/341. The methods and tools for conducting observational and experimental research in field ecology with emphasis on experimental design, hypothesis testing, data gathering and analysis and presentation of scientific research in ecology.

U 347 Introduction to Neuroscience 3 cr. Offered autumn. Prereq., introductory chemistry and biology. Same as BMED 347. The molecular and cellular physiology of the human nervous system. Topics range from the basis of electrical and chemical signaling in neurons to the organization of the nervous system and its functions in generating behavior.

U 350 Rocky Mountain Flora 3 cr. Offered spring. Prereq., one college-level course in BIOL or consent of instr. Elements of the evolution, geography and natural affinities of flowering plants. Identification using a manual of native plants of Montana.

UG 356 Ecology of Birds 4 cr. Prereq., BIOL 223 or equiv. Offered summers only at Flathead Lake Biological Station. The identification, natural history, and behavior of western Montana birds.

UG 366 Freshwater Ecology 5 cr. Offered autumn. Prereq., BIOL 108N, 109N and one year of college chemistry. Physical and chemical dynamics of lakes and streams. Diversity, distribution and dynamics of freshwater organisms.

U 395 Special Topics Variable cr. (R-10) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

U 397 Research 1-10 cr. (R-10) Offered every term. Prereq., consent of instr. Independent research under the direction of a faculty member. Graded credit/no credit.

U 398 Internship 1-6 cr. Offered intermittently. Prereq., consent of the Division. Extended classroom experience that provides practical application of learning during placement off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

UG 400 General Parasitology 2 cr. Offered autumn. Prereq., BIOL 223. Same as MICB 400. Parasitism as a biological phenomenon, origin of parasitism, adaptations and life cycles, parasite morphology, fine structure, physiology, parasites and their environment.

UG 401 General Parasitology Laboratory 2 cr. Offered autumn. Coreq., BIOL 400. Same as MICB 401. Taxonomy, morphology and identification of parasitic protozoa, helminths and arthropods.

UG 403 Vertebrate Design and Evolution 5 cr. Offered autumn. Prereq., BIOL 108N, 109N and 223 and PHYS 111N113N or 211N/213N. Evolutionary patterns of animal morphology and the importance of body size on life history patterns. Phylogenetic study

of major extant and extinct vertebrate groups. Laboratory includes systematic study of organ systems and workshops in experimental functional morphology.

UG 405 Animal Behavior 3 cr. Offered spring alternate years. Prereq., BIOL 223, senior standing or consent of instr. The description and evolutionary interpretation of animal behavior under natural conditions. Laboratory involves observation and recording of animal behavior.

UG 406 Behavior and Evolution 4 cr. Offered spring. Prereq., BIOL 223. Diversity of animal behavior in an evolutionary context including inheritance of behavior, diets, avoidance responses, mating systems and sexual selection, parental care, and evolution of animal groups and societies. Discussion sections examine both landmark and recent literature.

UG 407 Global Biogeochemical Cycles 3 cr. Offered spring odd numbered years. Same as FOR 408, GEO/CCS 407. Exploration of how variations in the availability or utilization of critical Earth elements influences the atmosphere, the oceans, and the terrestrial biosphere including the natural and agricultural ecosystems on which we depend.

UG 408 Advanced Fisheries Science 2 cr. Offered spring. Prereq., BIOL 308. Quantitative analysis and interpretation of fish population and community data for use in management. Selection, application and evaluation of management techniques.

UG 410 Insect Biology 4 cr. Offered spring. Prereq., BIOL 108N, 109N and 223. The classification, morphology, anatomy, development, life-history, behavior and ecology of insects. Labs include identification of major insect groups, internal and external anatomy and student collections.

UG 415 Field Methods in Fisheries Biology and Management 1-4 cr. Offered autumn. Prereq., BIOL 308; Consent of instr. Same as WBIO 441. Field instruction by practicing biologists in techniques for evaluating and managing aquatic habitats and fish populations.

UG 418 Fungal Biology 3 cr. Offered autumn even-numbered years. Prereq., BIOL 108N-109N and 221-223 or MICB 300 or consent of instr. Same as MICB 418. Reviews the definition, evolution, genetics, physiology, and ecology of fungi (including organisms in the Chromista), provides overview of all fungal phyla (Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota, Hyphochytriomycota, Labyrinthulomycota, Oomycota), and highlights the importance of fungi to human affairs (food production, fungal pathogens).

UG 430 Plant Biogeography 3 cr. Prereq., consent of instr. Offered alternate years. Description of the distribution of plants and animals at global, continental and regional scales. Analysis of ecological and historical factors influencing distribution and association.

UG 435 Comparative Animal Physiology 3 cr. Offered autumn. Prereq., BIOL 221 or equivalent. Animal physiology with emphasis on diversity of functional processes, with strong links to broader ecological and evolutionary contexts.

UG 440 Biological Electron Microscopy 2 cr. Offered spring. Prereq., senior standing or consent of instr. Theory of electron microscopy, recent developments in transmission and scanning electron microscopy. Limited experience with the instruments.

UG 442 Ecology of Infectious Diseases 3 cr. Offered autumn (even-numbered years). Prereq., BIOL 223, 340. Introduction to the field of disease ecology, focusing on

diversity of parasites, parasite population biology and causes and consequences of host-parasite interactions.

UG 444 Plant Physiology 3 cr. Offered spring. Prereq., BIOL 108N-109N, 120N or 316. The chemical and physical basis of water relations, photosynthesis, mineral nutrition, respiration, vegetative and reproductive growth of plants.

UG 445 Plant Physiology Lab 1 cr. Offered spring. Prereq or coreq., BIOL 444. Laboratory exercises designed to familiarize students with concepts and techniques in plant physiology.

UG 446 Wildlife Physiological Ecology 3 cr. Offered spring. Same as WBIO 446. Prereq., BIOL 221, 223 and 340. How physiological and biochemical processes in animals influence behavior and ecology. Application of physiological approaches to wildlife conservation such as assessment of animal health, nutritional condition, and physiological performance.

UG 447 Terrestrial Ecosystem Ecology 3 cr. Offered autumn odd-numbered years. Prereq., BIOL 110N and any ecology-themed course or consent of instr. Same as MICB 447. Introduction to systems thinking and the ecosystem concept, review of water and energy balance, carbon cycling and production processes, nutrient cycling, trophic dynamics, and species effects on ecosystem functioning.

UG 448 Terrestrial Plant Ecology 4 cr. Offered autumn. Prereq., an introductory college course in ecology. The interrelationships between plants and plant communities and their natural environment.

UG 449 Plant-Animal Interactions 4 cr. Offered summers only at Flathead Lake Biological Station. Prereq., a college course in ecology. Concepts and techniques for understanding the interdependent relationships between plants and animals. Emphasis given to ecological and behavioral studies.

UG 451 Landscape Ecology 3 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or 340/341. Biophysical processes that determine landscape and ecosystem structure and function using remote sensing tools, geographic information systems and dynamic models to demonstrate landscape change.

UG 452 Conservation Ecology 3 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or 340/341. Concepts and approaches for sustaining biodiversity and other natural goods and services provided by terrestrial and aquatic systems.

UG 453 Lake Ecology 3 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or 340/341, CHMY 121N (CHEM 151N) and CHMY 123N (CHEM 152N). The physical, chemical and biological characteristics of lake ecosystems with an emphasis on nutrient cycling, food web interactions and water quality.

UG 454 Stream Ecology 3 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or 340/341, CHMY 121N (CHEM 151N). The biota and biogeochemical processes of running waters with unifying principles and contemporary research approaches.

UG 458 Ecology of Forests and Grasslands 3 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or 340/341. Patterns and processes of the forests and grasslands of the northern Rocky Mountains in the context of principles of population community and ecosystem ecology.

UG 459 Alpine Ecology 3 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or 340/341. Distribution, abundance and life cycles of plants and animals and their unique ecophysiological adaptations to life in the rigorous environments of the high mountains above the timberline, with emphasis on the Crown of the Continent area.

UG 460 Medical Physiology 3 cr. Offered spring. Prereq., C (2.00) or better in BIOL 312, 313, one year college chemistry or consent of instr. An advanced course in human physiology for students preparing for careers in health care.

UG 464 Advanced Cellular Biology 3 cr. Offered spring. Prereq., BIOL 221 and BIOL 223; BIOC 380 strongly recommended. Cell structure and function, cell cycle, cellular signaling, molecular basis of cancer, regulated cell death, membrane transport, organelle dynamics, cytoskeleton, cell adhesion, and the molecular basis of learning and memory.

U 471 Teaching Anatomy and Physiology I 3 or 4 cr. Offered autumn. Prereq., "A" or "B" in BIOL 312 and 313 or equiv. and consent of instr. This select group of students performs cadaver prosections; assists in preparation and grading of demonstrations and laboratory teaching materials; and provides laboratory anatomy and physiology instruction to undergraduate students enrolled in BIOL 312. Students enrolling for the 4 credit option will also provide occasional comparable assistance for BIOL 112.

U 472 Teaching Anatomy and Physiology II 3 or 4 cr. Offered spring. Prereq., "A" or "B" in BIOL 312 and 313 or equiv. and consent of instr. This select group of students performs cadaver prosections; assists in the preparation and grading of demonstrations and laboratory teaching materials; and provides laboratory anatomy and physiology instruction to undergraduate students enrolled in BIOL 313. Students enrolling for the 4 credit option will also provide occasional comparable assistance for BIOL 113.

UG 480 Conservation Genetics 3 cr. Offered autumn. Prereq., BIOL 223. Genetic basis for solving biological problems in conservation including the genetics of small populations, the application of molecular genetic techniques to conservation biology and case studies of the application of genetics to conservation problems.

UG 482 Evolution and Development 3 cr. Offered spring, alternate years. Prereq., BIOL 108N and 223. Lecture, reading and discussion of questions at the intersection of developmental and evolutionary biology. Questions include but are not restricted to: how novel traits arise; how diversity in animal form is generated; and how phenotypic plasticity (environment-sensitive expression of traits) is produced.

UG 484 Plant Evolution 3 cr. Offered fall, alternate years. Prereq., BIOL 223. Lecture, reading and discussion on the evolutionary processes that shape major patterns of plant diversity. Topics include but are not restricted to: local adaptation, floral and mating system evolution, polyploidy, genome evolution, and speciation.

UG 486 Field Techniques in Mammalogy 2 cr. Offered autumn. Prereq., BIOL 306 or equiv. and consent of instr. A "hands-on" approach to lab and field techniques employed for the study of mammals. Includes mark/recapture live trapping methods, remote cameras, and tracking plates of non-invasive censussing.

UG 492 Seminars in Ecology and Resource Management 1 cr. Offered summers only at Flathead Lake Biological Station. Prereq., BIOL 342 or 340/341 or taken concurrently with BIOL 342. Seminar course that meets weekly for 2 hours in the evening. Includes seminar speaker and discussion.

U 493 Omnibus 1-10 cr. Offered intermittently. Prereq., consent of instr. Independent work under the University omnibus option. See index.

UG 494 Seminar in Biology 1 cr. (R-3) Offered intermittently. Prereq., consent of instr.

UG 495 Special Topics Variable cr. (R-10) Offered intermittently. Prereq., consent of instr. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

UG 497 Advanced Undergraduate Research 1-10 cr. (R-10) Offered every term. Prereq., junior or senior standing and consent of instr. Independent research under the direction of a faculty member. Graded credit/no credit.

U 498 Internship 1-6 cr. Offered intermittently. Prereq., consent of the Division. Extended classroom experience that provides practical application of learning during placement off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

U 499 Undergraduate Thesis 3-6 cr. (R-6) Offered every term. Prereq., senior standing and consent of instr. Preparation of a thesis or manuscript based on undergraduate research for presentation and/or publication. Student must give oral or poster presentation at the Biological Sciences Undergraduate Research Symposium or a scientific meeting. Graded credit/no credit

G 501 Graduate Issues and Policies 1 cr. Prereq., graduate standing in biological sciences. Discussion of issues of importance to new graduate students, including the philosophy of graduate education, the mentor-student relationship, the role of the teaching assistant, handling ethical quandaries, library resources and bibliographic searches, animal use policies and issues, proposal writing and the publication process. Review of ongoing research by faculty in the organismal biology and ecology program.

G 510 Avian Ecology 3 cr. (R-6) Offered intermittently. Prereq., graduate standing in EVST, BIOL, WBIO; upper-division course in ecology; or consent of instr. Review of recent developments in avian ecology with special emphasis on scientific methodology.

G 513 Community Ecology 3 cr. Offered alternate years. Prereq., BIOL 340 or equiv., consent of instr. Current concepts of species interactions, succession, food webs, temporal and spatial patterns and quantitative characterization of community structure.

G 517 Advanced Plant Ecology 3 cr. Prereq., upper-division course in ecology or consent of instr. Offered alternate years. Review and discussion of recent advances in plant ecology.

G 518 Plant-Consumer Interactions 3 cr. Offered alternate years. Prereq. BIOL 340 or equiv. Ecology and evolution of plant-consumer interactions. Review of classic and contemporary literature on plant-consumer interactions.

G 519 Fire Ecology 3 cr. Offered autumn even-numbered years. Prereq., graduate standing or consent of instr. Review of fundamental principles and recent advances in fire ecology with the primary focus on biological effects.

G 522 Readings in Morphology, Physiology and Ecology 1 cr. (R-8) Prereq., graduate standing and consent of instr. Review and discussion of current literature in the fields of morphology, physiology, and ecology.

G 524 Physiological Plant Ecology 3 cr. Offered alternate years. Prereq., BIOL 340 and 444. The physiological basis of plant adaptation and response to the environment.

G 526 Current Trends in Plant Ecology 2 cr. (R-16) Prereq., graduate standing. Current concepts, theory, and experiments in plant ecology.

G 530 Advanced Topics in Physiology 1-4 cr. (R-8) Prereq., consent of instr. Offered alternate years. Topics vary but emphasize aspects of comparative or environmental physiology of animals and/or plants.

G 541 Electron Microscopy Laboratory Variable cr. (R-6) Prereq. or coreq., BIOL 440 or equiv. Practical laboratory experience in the preparation of various biological materials, hands-on operation of the transmission electron microscope.

G 551 Environmental Field Study 1-3 cr. (R-3) Prereq. or coreq., BIOL 550 or EVST 540 or 560. Same as EVST 551. Designing, executing, and interpreting environmental studies. Project oriented.

G 561 Population Genetics Seminar 1-2 cr. (R-12) Prereq., consent of instr. or graduate standing. Current topics in population genetics, evolutionary biology, molecular evolution and related topics.

G 575 Frontiers in Conservation Research 2 cr. (R-6) Same as WBIO 575. Exploration of current topics in conservation biology.

G 594 Seminar in Biology 1 cr. (R-6) Prereq., graduate standing or consent of instr. A review and discussion of current research in biology. Topics vary.

G 595 Special Topics 1-8 cr. (R-8) Prereq., graduate standing and consent of instr. Experimental offering of new courses by resident or visiting faculty.

G 596 Independent Study 1-8 cr. (R-8) Prereq., consent of instr. Credit for independent research project unrelated to thesis or dissertation.

G 597 Research 1-8 cr. (R-12) Prereq., consent of instr. Library work involved with preparation of a thesis or dissertation proposal.

G 598 Internship 1-8 cr. (R-8) Prereq., consent of the Division, graduate standing. Extended classroom experience that provides practical application of learning during placement off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office.

G 599 Thesis 1-10 cr. (R-10) Prereq., masters student in biology. Field and laboratory research on, and writing of, a student's master's thesis.

G 699 Dissertation 1-10 cr. (R-20) Prereq., doctoral student in biology. Credit for field and laboratory research on, and writing of, a student's doctoral dissertation.