

DEPARTMENT OF BIOLOGICAL SCIENCES

Undergraduate Degree Program: BACHELOR OF SCIENCE IN ECOLOGY

Rationale and Purpose:

This past decade has witnessed rapid and significant changes in both the needs and opportunities related to environmental biology and natural resource management. Concerns for environmental quality and the judicious use of natural resources have increased sharply. These concerns have been met, at least in part, by the enactment of numerous laws at the state and national levels. The most notable of these include the National Environmental Policy Act, the Clean Air Act, the Federal Water Pollution Control Act, the Forest and Rangeland Renewable Resources Planning Act, the National Forest Management Act, and the Federal Land Policy and Management Act. Paralleling these developments, opportunities for ecologists and field biologists in environmental assessment and monitoring, planning, and management have increased. In 1977, for the first time, the Life Sciences announcement of the U.S. Civil Service Commission included ECOLOGY among the professional positions described

It has become increasingly clear that the most critical environmental problems do not correspond neatly to traditional areas of differentiation, and diverse and complex problems associated with accelerating use of resources demand a broad-based curriculum which provides a firm foundation in the physical and biological sciences with strength in the social sciences and humanities. Our ecology program seeks to meet such demands by developing:

- 1) an understanding of ecological systems and their reactions to perturbations,
- 2) expertise in problem solving and communication skills, and
- 3) a solid background in basic ecology and supporting disciplines.

The curriculum emphasizes environmental assessment and the collection and analysis of field data through in-depth studies of aquatic and terrestrial ecosystems. The curriculum was designed to meet the needs of students who are interested in environmental assessment planning, or conservation, or of those who wish to pursue advanced training in ecology or natural resource management.

The requirements for the Bachelor of Science in Ecology are shown on the following pages. The program provides sufficient flexibility to allow students to emphasize plant ecology, animal and population ecology or aquatic and fisheries ecology in their individual programs. Elective courses in supporting disciplines which students are encouraged to take include General Soils (GEOL 417), and Environmental Economics (ECON 352).

No student shall have more than 50 hours of credit in his/her major field, unless he/she exceeds the 128 hours for the graduation requirements by at least the number of hours in excess of 50 taken in the major field.

COURSE REQUIREMENTS FOR BACHELOR OF SCIENCE IN ECOLOGY

1. THE GENERAL EDUCATION AND TOTAL UNIVERSITY CREDIT REQUIREMENTS MUST BE MET (See Note 1 below). 128 credits are required for graduation.36 of these must be upper division credits.

2. BIOLOGY CORE: (19 required credits) CREDITS

BIOL 101	Biology I	4
BIOL 102	Biology II	4
BIOL 206	Cell Biology	4
BIOL 358	General Genetics	3
BIOL 417	Organic Evolution	3
BIOL 491 or 492	Senior Seminar	1

3. ECOLOGY COURSES:

BIOL 192	Ecology Seminar (required)	1
BIOL 209	General Ecology (required)	4
BIOL 418	Ecological Topics (required)	1-3
BIOL 489	Field Ecology (required)	3
BIOL 496	Ecology Senior Seminar (required)	1

Take two of the following courses:

BIOL 337	Conservation of Natural Resources	3
BIOL 408	Plant Ecology	3
BIOL 416	Population and Community Ecology	3
BIOL 442	Plant/Animal Interactions	3
BIOL 459	Fish Ecology	3
BIOL 462	Freshwater Ecology	3
BIOL 476	Ecology of Water Pollution	3

4. ORGANISMAL BIOLOGY: (Take 2 of the following courses)

BIOL 303	Principles of Animal Physiology	4
BIOL 310	Invertebrate Zoology	4
BIOL 404	Plant Physiology	4
BIOL 405	Plant Form and Function	3
BIOL 406	Plant Diversity and Evolution	3
BIOL 412	Systematic Botany	4
BIOL 426	Herpetology	3
BIOL 427	Ichthyology	3
BIOL 431	General Entomology	3
BIOL 435	Vertebrate Paleontology	4
BIOL 438	Ornithology	3
BIOL 441	Mammalogy	3
BIOL 495	Ethology	3

5. QUANTITATIVE SKILLS:

MATH 350	Statistical Methods	3
BIOL 315L	Biometry Lab (required)	1
PHYS 111,113	General Physics I, Lab (required)	4

Take one of the following courses:

GEOL 403	Intro to GIS	3
PHYS 112	General Physics II	3
MATH 175	Calculus II (must have MATH 170)	4
MATH 287	Discrete Structures	3
MATH 330	Linear Algebra	3

6. SUPPORTING SCIENCES: CREDITS

MATH 160	Brief Calculus ⁴ (required)	4
CHEM 111	General Chemistry I (required)	5
CHEM 112	General Chemistry II (required)	4
CHEM 301,303	Organic Chemistry I, Lab (required)	4

Take one of the following courses:

GEOL 101&L	Physical Geology	4
GEOL 406	Environmental Geology	3
GEOL 452	Sedimentation – Stratigraphy	3
GEOL 402	Geomorphology	4
GEOL 409	Remote Sensing	3
GEOL 415	Quaternary Geology	4
GEOL 417	General Soils	3
GEOL 420	Principles of Geochemistry	3
GEOL 421	Structural Geology	4
GEOL 430	Principles of Hydrogeology	3
GEOL 445	Principles of Geophysics	4
CHEM 302,304	Organic Chemistry II, Lab	4
BIOL 432	Biochemistry (1 semester class)	3
BIOL 445	Biochemistry I	3
BIOL 447	Biochemistry II	3
PHYS 112	General Physics II	3
PHYS 412	Environmental Health Physics	3
MATH 175	Calculus II	4
MATH 287	Discrete Structures	3
MATH 330	Linear Algebra	3
MATH 457	Applied Regression Analysis	3
MATH 458	Experimental Design	3
MATH 459	Applied Multivariate Analysis	3

7. COURSES IN AREA OF CONCENTRATION OUTSIDE OF BIOLOGICAL SCIENCES

Students should take a minimum of 9 credits in a single area of concentration outside the Department of Biological Sciences, e.g., business, computer science, political science, etc.

Notes:

1. Students pursuing a Bachelor of Science degree must satisfy goals 1, 2, 3, 4, and 5, two of goals 6, 7, and 8, and three of goals 9, 10, 11, and 12. Goal 10 may be satisfied by either 10A or 10B.
2. Many graduate programs in Ecology, including ISU's MS and PhD programs, require one year of organic chemistry and one year of physics. If you plan on applying to a graduate program you are advised to include these courses in your undergraduate program. In many cases a semester of biochemistry can be used in place of the second semester of organic chemistry.
3. A class may not be used to satisfy requirements in more than one area (e.g., Calculus II may not be used to satisfy the Quantitative Skills requirement and the Supporting Sciences requirement).
4. Students may take MATH 170 in place of MATH 160. MATH 160 has a prerequisite of MATH 143. MATH 170 has prerequisites of MATH 143 & 144. Prerequisites for both classes can be satisfied by the Mathematics placement exam.
5. Credits for BIOL 481, 482, 493, or 499 can be substituted for courses in categories 2, 3, and 4, subject to approval by the Assistant Chair for Undergraduate Programs.
6. It is recommended that additional credits be taken in BIOL g481-g482, Independent Problems, or BIOL 493, Senior Thesis, in the area of ecology. A maximum of 8 credits of BIOL g481/g482 may be applied to this degree program. ECON 201 and 202 are highly recommended (only 3 credits apply toward General Education Requirements, Goal 11). In addition, a student should take a minimum of 9 credits in a single area of concentration outside the Biological Sciences, e.g. business, geosciences, political science.

RECOMMENDED COURSE SELECTION – BACHELOR OF SCIENCE IN ECOLOGY

Fall Semester			Spring Semester		
For Students Who Qualify to take Math 147 During their First Semester					
Freshman Year					
BIOL 101	Biology I	4 cr	BIOL 102	Biology II	4 cr
¹ MATH 147	Precalculus	5 cr	MATH 160	Brief Calculus	4 cr
	or MATH 107 <u>and</u> MATH 144		BIOL 192	Ecology Seminar	1 cr
ENGL 101	English Composition	3 cr	COMM 101	Principles of Speech	2 cr
² General Education Requirements		<u>3 cr</u>	² General Education Requirements		<u>6 cr</u>
		15 cr			17 cr
Sophomore Year					
BIOL 209	General Ecology	4 cr	BIOL 206	Cell Biology	4 cr
CHEM 111	General Chemistry I	5 cr	CHEM 112	General Chemistry II	4 cr
PHYS 111,113	General Physics I, lab	4 cr	PHYS 112	General Physics II	3 cr
ENGL 201	Critical Rdg & Wrtg	<u>3 cr</u>		(if applying to grad programs)	
		16 cr	² General Education Requirements		<u>5 cr</u>
			or Electives		17 cr

For Students Who Qualify to take Math 160 During their First Semester					
Freshman Year					
BIOL 101	Biology I	4 cr	BIOL 102	Biology II	4 cr
CHEM 111	General Chemistry I	5 cr	CHEM 112	General Chemistry II	4 cr
¹ MATH 160	Brief Calculus	4 cr	BIOL 192	Ecology Seminar	1 cr
	or MATH 107 <u>and</u> MATH 144		COMM 101	Principles of Speech	2 cr
ENGL 101	English Composition	<u>3 cr</u>	Elective		<u>4 cr</u>
		16 cr			15 cr
Sophomore Year					
BIOL 209	General Ecology	4 cr	BIOL 206	Cell Biology	4 cr
PHYS 111,113	General Physics I, lab	4 cr	PHYS 112	General Physics II	3 cr
ENGL 201	Critical Rdg & Wrtg	3 cr		(if applying to grad programs)	
² General Education Requirement		3 cr	² General Education Requirements		<u>9 cr</u>
Electives		<u>3 cr</u>			16 cr
		16 cr			

¹Students with more than one year of High School Algebra should take the mathematics placement exam and enroll in MATH 160, if possible.

²ECON 201-202 recommended. However, only 3 credits of 201-202 (6 credits) will apply toward the General Education Requirement.

RECOMMENDED COURSE SELECTION – BACHELOR OF SCIENCE IN ECOLOGY

Fall Semester			Spring Semester		
If the Junior Year Starts in the Fall of an Even Year					
CHEM 301	Organic Chemistry I	3	Math, Chemistry, Geology, or Physics		3
CHEM 303	Organic Chemistry I Lab	1	BIOL 315	Biometry Lab	1
BIOL 358	Genetics	3	MATH 350	Statistical Methods	3
BIOL 489	Field Ecology	3			
Ecology Course BIOL 416, 452			Ecology course BIOL 337, 408		
Organismal Biology Course BIOL 427			Organismal Biology Course BIOL 310, 412, 435, 438		
General Education Requirement			General Education Requirement		
If the Senior Year Starts in the Fall of an Odd Year					
BIOL 491	Senior Seminar	1	BIOL 496	Ecology Senior Seminar	1
or BIOL 496	Ecology Senior Seminar		or BIOL 492	Senior Seminar	
			BIOL 417	Evolution	3
Ecology Courses BIOL 320, 459, 462			Ecology Courses BIOL 337, 476		
Organismal Biology Course BIOL 311, 405, 431			Organismal Biology Course BIOL 303, 310, 426, 438, 441, 495		
General Education Requirement			General Education Requirement		

If the Junior Year Starts in the Fall of an Odd Year					
CHEM 301	Organic Chemistry I	3	Math, Chemistry, Geology, or Physics		3
CHEM 303	Organic Chemistry I Lab	1	MATH 350	Statistical Methods	3
BIOL 358	Genetics	3	BIOL 315	Biometry Lab	1
Ecology Course BIOL 320, 459, 462			Ecology courses BIOL 337, 476		
Organismal Biology Course BIOL 311, 405, 431			Organismal Biology Course BIOL 303, 310, 426, 438, 441, 495		
General Education Requirement			General Education Requirement		
If the Senior Year Starts in the Fall of an Even Year					
BIOL 491	Senior Seminar	1	BIOL 496	Ecology Senior Seminar	1
	or BIOL 496			or BIOL 492	
			BIOL 417	Evolution	3
			BIOL 489	Field Ecology	3
Ecology Course BIOL 416, 452			Ecology course BIOL 337, 408		
Organismal Biology Course BIOL 427			Organismal Biology Course BIOL 310, 412, 435, 438		
General Education Requirement			General Education Requirement		