

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 4417), and Environmental Economics (ECON 3352).

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 1101	Biology I	4
BIOL 1102	Biology II	4
BIOL 2206	Cell Biology	4
BIOL 3358	General Genetics	3
BIOL 4417	Organic Evolution	3
BIOL 4491 or 4492	Senior Seminar	1

3. ECOLOGY COURSES:

BIOL 1192	Ecology Seminar (required)	1
BIOL 2209	General Ecology (required)	4
BIOL 4418	Ecological Topics (required)	1-3
BIOL 4489	Field Ecology (required)	3
BIOL 4496	Ecology Senior Seminar (required)	1

Take two of the following courses:

BIOL 3337	Conservation of Natural Resources	3
BIOL 4408	Plant Ecology	3
BIOL 4416	Population and Community Ecology	3
BIOL 4442	Plant/Animal Interactions	3
BIOL 4459	Fish Ecology	3
BIOL 4462	Freshwater Ecology	3
BIOL 4476	Ecology of Water Pollution	3

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

BIOL 3303	Principles of Animal Physiology	4
BIOL 3310	Invertebrate Zoology	4
BIOL 4404	Plant Physiology	4
BIOL 4405	Plant Form and Function	3
BIOL 4406	Plant Diversity and Evolution	3
BIOL 4412	Systematic Botany	4
BIOL 4426	Herpetology	3
BIOL 4427	Ichthyology	3
BIOL 4431	General Entomology	3
BIOL 4435	Vertebrate Paleontology	4
BIOL 4438	Ornithology	3
BIOL 4441	Mammalogy	3
BIOL 4495	Ethology	3

5. QUANTITATIVE SKILLS:

MATH 3350	Statistical Methods	3
BIOL 3315L	Biometry Lab (required)	1
PHYS 1111,1113	General Physics I, Lab (required)	4

Take one of the following courses:

GEOL 4403	Intro to GIS	3
PHYS 1112	General Physics II	3
MATH 1175	Calculus II (must have MATH 1170)	4
MATH 2287	Discrete Structures	3
MATH 3330	Linear Algebra	3

6.	SUPPORTING SCIENCES:	CREDITS
	MATH 1160 Brief Calculus ⁴ (required)	4
	CHEM 1111 General Chemistry I (required)	5
	CHEM 1112 General Chemistry II (required)	4
	CHEM 3301,3303 Organic Chemistry I, Lab (required)	4
	Take one of the following courses:	
	GEOL 1101&L Physical Geology	4
	GEOL 4406 Environmental Geology	3
	GEOL 4452 Sedimentation – Stratigraphy	3
	GEOL 4402 Geomorphology	4
	GEOL 4409 Remote Sensing	3
	GEOL 4415 Quaternary Geology	4
	GEOL 4417 General Soils	3
	GEOL 4420 Principles of Geochemistry	3
	GEOL 4421 Structural Geology	4
	GEOL 4430 Principles of Hydrogeology	3
	GEOL 4445 Principles of Geophysics	4
	CHEM 3302,3304 Organic Chemistry II, Lab	4
	BIOL 4432 Biochemistry (1 semester class)	3
	BIOL 4445 Biochemistry I	3
	BIOL 4447 Biochemistry II	3
	PHYS 1112 General Physics II	3
	PHYS 4412 Environmental Health Physics	3
	MATH 1175 Calculus II	4
	MATH 2287 Discrete Structures	3
	MATH 3330 Linear Algebra	3
	MATH 4457 Applied Regression Analysis	3
	MATH 4458 Experimental Design	3
	MATH 4459 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 1170 in place of MATH 1160. MATH 1160 has a prerequisite of MATH 1143. MATH 1170 has prerequisites of MATH 1143 & 1144. Prerequisites for both classes can be satisfied by the Mathematics placement exam.
5. Credits for BIOL 4481, 4482, 4493, or 4499 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 g4481-g4482, Independent Problems, or BIOL 4493, Senior Thesis, in the area of ecology. A maximum of 8 credits of BIOL g4481/g4482 may be applied to this degree program. ECON 2201 and 2202 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 1147 During their First Semester					
Freshman Year					
BIOL 1101	Biology I	4 cr	BIOL 1102	Biology II	4 cr
¹ MATH 1147	Precalculus	5 cr	MATH 1160	Brief Calculus	4 cr
	or MATH 1107 <u>and</u> MATH 1144		BIOL 1192	Ecology Seminar	1 cr
ENGL 1101	English Composition	3 cr	COMM 1101	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 2209	General Ecology	4 cr	BIOL 2206	Cell Biology	4 cr
CHEM 1111	General Chemistry I	5 cr	CHEM 1112	General Chemistry II	4 cr
PHYS 1111,1113	General Physics I, lab	4 cr	PHYS 1112	General Physics II	3 cr
ENGL 2201	Critical Rdg & Wrtg	<u>3 cr</u>		(if applying to grad programs)	
		16 cr	² General Education Requirements		
			or Electives		<u>5 cr</u>
					17 cr

For Students Who Qualify to take Math 1160 During their First Semester					
Freshman Year					
BIOL 1101	Biology I	4 cr	BIOL 1102	Biology II	4 cr
CHEM 1111	General Chemistry I	5 cr	CHEM 1112	General Chemistry II	4 cr
¹ MATH 1160	Brief Calculus	4 cr	BIOL 1192	Ecology Seminar	1 cr
	or MATH 1107 <u>and</u> MATH 1144		COMM 1101	Principles of Speech	2 cr
ENGL 1101	English Composition	<u>3 cr</u>	Elective		<u>4 cr</u>
		16 cr			15 cr
Sophomore Year					
BIOL 2209	General Ecology	4 cr	BIOL 2206	Cell Biology	4 cr
PHYS 1111,1113	General Physics I, lab	4 cr	PHYS 1112	General Physics II	3 cr
ENGL 2201	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 1160, if possible.

²ECON 2201-2202 recommended. However, only 3 credits of 2201-2202 (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 3301	Organic Chemistry I	3	Math, Chemistry, Geology, or Physics		3
CHEM 3303	Organic Chemistry I Lab	1	BIOL 3315	Biometry Lab	1
BIOL 3358	Genetics	3	MATH 3350	Statistical Methods	3
BIOL 4489	Field Ecology	3			
Ecology Course BIOL 4416, 4452			Ecology Course BIOL 3337, 4408		
Organismal Biology Course BIOL 4427			Organismal Biology Course BIOL 3310, 4412, 4435, 4438		
General Education Requirement			General Education Requirement		
If the Senior Year Starts in the Fall of an Odd Year					
BIOL 4491	Senior Seminar	1	BIOL 4496	Ecology Senior Seminar	1
	or BIOL 4496 Ecology Senior Seminar			or BIOL 4492 Senior Seminar	
Ecology Courses BIOL 3320, 4459, 4462			Ecology Courses BIOL 3337, 4476		
Organismal Biology Course BIOL 3311, 4405, 4431			Organismal Biology Course BIOL 3303, 3310, 4426, 4438, 4441, 4495		
General Education Requirement			General Education Requirement		
If the Junior Year Starts in the Fall of an Odd Year					
CHEM 3301	Organic Chemistry I	3	Math, Chemistry, Geology, or Physics		3
CHEM 3303	Organic Chemistry I Lab	1	MATH 3350	Statistical Methods	3
BIOL 3358	Genetics	3	BIOL 3315	Biometry Lab	1
Ecology Course BIOL 3320, 4459, 4462			Ecology Courses BIOL 3337, 4476		
Organismal Biology Course BIOL 3311, 4405, 4431			Organismal Biology Course BIOL 3303, 3310, 4426, 4438, 4441, 4495		
General Education Requirement			General Education Requirement		
If the Senior Year Starts in the Fall of an Even Year					
BIOL 4491	Senior Seminar	1	BIOL 4496	Ecology Senior Seminar	1
	or BIOL 4496			or BIOL 4492	
Ecology Course BIOL 4416, 4452			Ecology Course BIOL 3337, 4408		
Organismal Biology Course BIOL 4427			Organismal Biology Course BIOL 3310, 4412, 4435, 4438		
General Education Requirement			General Education Requirement		