

## Biology Degree Requirements

### 2012-13 Iowa State University Catalog

[www.biology.iastate.edu](http://www.biology.iastate.edu)

**Information in this document is subject to change. See your advisor or the Student Services Office (103 Bessey) for the most current version.**

- Biology majors are required to complete 120 credits to graduate.
- A minimum of 32 ISU credits are required to graduate from ISU.
- The final 32 credits must be taken at ISU or approved by the college.
- Students must have a 2.0 minimum GPA to graduate and be in good standing at the university.
- Students are ultimately responsible for all issues concerning the satisfactory completion of degree requirements.
- Courses taken at other institutions may be equivalent to ISU courses or may be substituted to fulfill requirements.
- Many professions require specific courses, investigate specific schools of interest for admission requirements.
- Students are encouraged to take advantage of opportunities available in undergraduate research, internships, field trip courses, seminars, summer field study and study abroad.

### **University Requirements:**

ENGL 150 <i>*Minimum grade of C</i>	3 credits
ENGL 250 <i>*Minimum grade of C</i>	3 credits
LIB 160	1 credit
U.S. Diversity	3 credits
International Perspective	3 credits

International Perspective and US Diversity courses may also apply to Humanity or Social Science requirements. Lists are available at <http://www.public.iastate.edu/~registrar/courses/div-ip-guide.html>

### **College Requirements:**

Students may major in Biology through the College of Liberal Arts & Sciences or the College of Agriculture & Life Sciences. The LAS College requires 45 credits of 300+ level course work from a 4-year institution.

	<u>LAS requirement</u>	<u>AgLS requirement</u>
Foreign Language	4-8 cr or 3 years H.S.	---
Communication <i>*Minimum grade of C</i>	ENGL 302-316 or SP CM 212	SP CM 212
Math <i>*Met by Biology Requirements</i>	Math <i>and/or</i> Statistics	Math <i>and</i> Statistics
Science <i>*Met by Biology Requirements</i>	Natural Sciences	Biological and Physical Sciences
Arts and Humanities	12 credits	3 credits
Social Sciences	9 credits	3 credits
Ethics	---	3 credits

### **Biology Major Requirements:**

Students must have a minimum 2.0 GPA in the major (Biology Core + Biology Advanced Coursework) with all grades C- or above. Transfer students (both from other universities and from other majors at ISU) are required to complete Biol 112X and Biol 111. New freshmen students are required to complete Biol 110 and Biol 111. A typical 4-year plan is available on the Biology Program web site.

#### **Biology Core:**

BIOL 110 (or 112X for transfers)	Introduction to the Biology Major	1 credit (112X = Rcr)
BIOL 111	Opportunities in Biology	.5 credit
BIOL 211 and 211L	Principles of Biology I	4 credits
BIOL 212 and 212L	Principles of Biology II	4 credits
BIOL 312	Ecology	4 credits
BIOL 313 and 313L	Principles of Genetics	4 credits
BIOL 314	Principles of Molecular Cell Biology	3 credits
BIOL 315	Biological Evolution	3 credits

#### **Biology Advanced Coursework:**

Select 21 credits worth of coursework from approved list. (see attached)

Students must also complete a minimum of 9 credits in BIOL and have credit for 2 laboratory experiences in BIOL to fulfill the advanced area requirement.

**Biology Supporting Requirements:****Chemistry**

Two possible sequences:	<u>General Chemistry</u>	<u>Organic Chemistry</u>	<u>Biochemistry</u>
- Minimum: 12 credits	CHEM 163 and 163L	CHEM 231 and 231L	BBMB 316
- Pre-Prof/grad school: 20 credits [Chem 332&L not required for Biology]	CHEM 177 and 177L; CHEM 178 and 178L	CHEM 331 and 331L [CHEM 332 and 332L]	BBMB 316 (or 404 or 420)

The minimum course requirement for Biology is one semester of general chemistry and lab, one semester of organic chemistry and lab, and one semester of biochemistry. Some sub-disciplinary areas of biology can be met with the minimum; however, certain career paths may suggest or require more than the minimum. Consult an advisor for information.

**Physics 5-10 cr**

-General Physics I and II (Algebra-based):	PHYS 111 & 112
Or Physics for Life Sciences:	PHYS 115X & 115L

One semester of physics is required for biology. Some career paths may require a year of physics or specific physics course requirements.

**Math/Statistics**

Four possible sequences:	Calculus	Statistics
-Typical for LAS, Required of AgLS	MATH 160 or 165 or 181 <i>and</i>	STAT 101 or 104
-General Calculus only: 8 credits (LAS)	MATH 165 and 166	---
-Calculus for the Life Sciences only: 8 credits (LAS)	MATH 181 and 182	---
-Statistics only: 7-8 credits (LAS)	---	STAT 101 or 104 and 401

Students in AgLS are required to have a math and statistics course. This can be accomplished in several ways; however, the Biology math/stat requirements are one calculus course and one statistics course, or year of calculus, or a year of statistics. If two semesters of statistics are completed, an AgLS student may take any acceptable math course as outlined by the AgLS College.

**Approved Biology Advanced Course Lists:**

Semester offerings change, for specific semesters check the Schedule of Classes: <http://classes.iastate.edu/> Check 103 Bessey for most recent list.

\*Students may only apply a maximum of 7 credits from the following: BIOL 393, 394, 480, 481, 490, 491, 494, 495 toward advanced biology requirements and no more than 6 credits in each course may apply.

**BIOL Courses**

-minimum of 9 credits to be selected including 2 laboratory courses denoted by ♦ - Some EEOB and GDCB courses may also meet lab requirements

BIOL 306	Metabolic Physiology of Mammals	3 cr	BIOL 444	Introduction to Bioinformatics	4 cr
BIOL 328	Cell Physiology of Human Disease	3 cr	BIOL 451X ♦	Plant Evolution and Phylogeny	4 cr
BIOL 330	Plant Physiology	3 cr	BIOL 454 ♦	Plant Anatomy	4 cr
BIOL 330L ♦	Plant Physiology Laboratory	1 cr	BIOL 455 ♦	Bryophyte and Lichen Biodiversity	3 cr
BIOL 335 ♦	Princ. of Human & Other Animal Phys.	4 cr	BIOL 456 ♦	Principles of Mycology	3 cr
BIOL 336	Ecological & Evolutionary Animal Phys.	3 cr	BIOL 457 ♦	Herpetology	3 cr
BIOL 349X	Genomic Perspectives in Biology	3 cr	BIOL 458 ♦	Ornithology	3 cr
BIOL 350X	Comprehensive Human Anatomy	3 cr	BIOL 459 ♦	Mammology	3 cr
BIOL 351 ♦	Comparative Chordate Anatomy	5 cr	BIOL 462	Evolutionary Genetics	3 cr
BIOL 352 ♦	Vertebrate Histology	4 cr	BIOL 465 ♦	Morphometric Analysis	4 cr
BIOL 353 ♦	Introductory Parasitology	4 cr	BIOL 471	Introduction to Conservation Biology	3 cr
BIOL 354	Animal Behavior	3 cr	BIOL 472 ♦	Community Ecology	3 cr
BIOL 354L ♦	Laboratory in Animal Behavior	1 cr	BIOL 474	Plant Ecology	3 cr
BIOL 355	Plants and People	3 cr	BIOL 476	Functional Ecology	3 cr
BIOL 356 ♦	Dendrology	4 cr	BIOL 480 ♦	Studies in Marine Biology	1-8 cr
BIOL 364	Invertebrate Biology	3 cr	BIOL 481 ♦	Summer Field Studies	1-8 cr
BIOL 365 ♦	Vertebrate Biology	4 cr	BIOL 482 ♦	Tropical Biology	1-4 cr
BIOL 366 ♦	Plant Systematics	4 cr	BIOL 484	Ecosystem Ecology	3 cr
BIOL 371 ♦	Ecological Methods	3 cr	BIOL 486	Aquatic Ecology	3 cr
BIOL 381 ♦	Environmental Systems I	3 cr	BIOL 486L ♦	Aquatic Ecology Lab	1 cr
BIOL 382 ♦	Environmental Systems II	3 cr	BIOL 487	Microbial Ecology	3 cr
BIOL 393 ♦	North American Field Trips in Biology	1-4 cr	BIOL 488 ♦	Identification of Aquatic Organisms	1 cr
BIOL 394 ♦	International Field Trips in Biology	1-4 cr	BIOL 489 ♦	Population Ecology	3 cr
BIOL 402X	Introduction to Pathology	3 cr	BIOL 490 ♦	Independent Study	1-6 cr
BIOL 423	Developmental Biology	3 cr	BIOL 491 ♦	Laboratory Teaching Experience	1-2cr
BIOL 423L ♦	Developmental Biology Laboratory	1 cr	BIOL 494 ♦	Biology Internship	1-3 cr
BIOL 428	Topics in Cell Biology	3 cr	BIOL 495	Undergraduate Seminar (various topics)	1-3 cr
BIOL 434	Endocrinology	3 cr	BIOL 498	Cooperative Education	R cr
BIOL 436	Neurobiology	3 cr			

**EEOB and GDCB Courses open to undergraduates by prerequisite or permission (will count toward minimum 9 credits of BIOL)**

EEOB 507	Advanced Animal Behavior	3 cr	EEOB 584	Ecosystem Ecology	3 cr
EEOB 514	Evolutionary Ecology	3 cr	EEOB 585	Advanced Community Ecology	3 cr
EEOB 531	Conservation Biology	3 cr	EEOB 586	Aquatic Ecology	3 cr
EEOB 534	General & Compar. Endocrinology	Var.	EEOB 586L	Aquatic Ecology Lab	1 cr
EEOB 535	Restoration Ecology	3 cr	EEOB 587	Microbial Ecology	3 cr
EEOB 537	Plant Stress Biology	3 cr	EEOB 589	Population Ecology	3 cr
EEOB 539	Environmental Physiology	Var.	EEOB 590	Special Topics	Var.
EEOB 542	Intro to Molec Biol Techniques	1 cr	EEOB 596	Ecology and Society	3 cr
EEOB 551	Plant Evolution and Phylogeny	4 cr	EEOB 599	Creative Component	Var.
EEOB 553	Agrostology	3 cr	GDCB 508	Biotech in Ag, Food, & Human Health	3 cr
EEOB 555	Bryophyte and Lichen Biodiversity	3 cr	GDCB 510	Transmission Genetics	3 cr
EEOB 557	Herpetology	3 cr	GDCB 511	Molecular Genetics	3 cr
EEOB 558	Ornithology	3 cr	GDCB 512	Plant Growth and Development	2 cr
EEOB 559	Mammology	3 cr	GDCB 513	Plant Metabolism	2 cr
EEOB 560	Resource Ecology	3 cr	GDCB 520	Genetic Engineering	3 cr
EEOB 561	Plant Diversity and Evolution	4 cr	GDCB 528	Cellular Growth and Regulation	3 cr
EEOB 562	Evolutionary Genetics	3 cr	GDCB 529	Plant Cell Biology	2 cr
EEOB 563	Molecular Phylogenetics	3 cr	GDCB 533	Principles of Developmental Biology	3 cr
EEOB 564	Wetland Ecology	3 cr	GDCB 536	Statistics for Population Genetics	3 cr
EEOB 564I	Wetland Ecology	4 cr	GDCB 537	Statistics for Molecular Genetics	3 cr
EEOB 565	Morphometric Analysis	4 cr	GDCB 538	Computational Genomics & Evolution	3 cr
EEOB 566	Molecular Evolution	3 cr	GDCB 539	Statist. Methods Computational Bio	3 cr
EEOB 567	Empirical Population Genetics	3 cr	GDCB 542	Intro to Molecular Biol Techniques	1 cr
EEOB 568	Advanced Systematics	3 cr	GDCB 544	Intro to Bioinformatics	4 cr
EEOB 569	Biogeography	3 cr	GDCB 545	Plant Molecular Biology	3 cr
EEOB 570	Landscape Ecology	3 cr	GDCB 556	Cell, Molec, & Develop Neuroscience	Var.
EEOB 573	Techniques for Biology Teaching	Var.	GDCB 557	Advance Neuroscience Techniques	2 cr
EEOB 575	Field Mycology	4 cr	GDCB 568	Bioinformatics II	3 cr
EEOB 575I	Field Mycology	4 cr	GDCB 570	Bioinformatics IV	3 cr
EEOB 576	Functional Ecology	3 cr	GDCB 590	Special Topics	Var.
EEOB 580I	Ecology and Systematics of Diatoms	4 cr	GDCB 596	Genomic Data Processing	3 cr
EEOB 581	Environmental Systems : Intro to	4 cr			

**Approved Advanced LIFE SCIENCE Courses from other ISU Departments**

(courses may have pre-requisites not included in the list and that do not meet advanced course requirements)

<b>Agronomy</b>			<b>Food Science and Human Nutrition</b>		
AGRON 317	Principles of Weed Science	3 cr	FS HN 360	Adv. Human Nutrition and Metabolism	4 cr
AGRON 354	Soils and Plant Growth	3 cr	FS HN 361	Nutrition and Health Assessment	3 cr
AGRON 354L	Soils and Plant Growth Lab	1 cr	FS HN 364	Nutrition and Prevention of Chronic Disease	3 cr
AGRON 417	Evolutionary Ecology of Weeds	3 cr	FS HN 461	Medical Nutrition and Disease I	3 cr
AGRON 421	Introduction to Plant Breeding	3 cr	FS HN 464	Medical Nutrition and Disease II	3 cr
AGRON 485	Soil Microbiology Ecology	3 cr			
<b>Animal Science</b>			<b>Horticulture</b>		
AN S 319	Animal Nutrition	3 cr	HORT 321	Horticulture Physiology	3 cr
AN S 331	Domestic Animal Reproduction	3 cr	HORT 322	Hort Propagation	3 cr
AN S 332	Lab Methods in Animal Reproduction	2 cr	HORT 423	Plant Tissue, Cell and Protoplast	3 cr
AN S 333	Embryo Transfer and Related Technology	2 cr			
AN S 334	Embryo Transfer Laboratory	1 cr	<b>Genetics</b>		
AN S 337	Lactation	2 cr	GEN 340	Human Genetics	3 cr
AN S 345	Growth & Devel. of Domestic Animals	3 cr	GEN 409	Molecular Genetics	3 cr
AN S 419	Advanced Animal Nutrition	2 cr	GEN 410	Analytical Genetics	3 cr
<b>Anthropology</b>			<b>Kinesiology</b>		
ANTHR 307	Biological Anthropology	3 cr	KIN 355	Biomechanics	3 cr
ANTHR 319	Skeletal Biology	3 cr			
ANTHR 350	Primate Behavior	3 cr	<b>Microbiology</b>		
ANTHR 424	Forensic Anthropology	3 cr	MICRO 302	Biology of Microorganisms	3 cr
ANTHR 438	Primate Evolutionary Ecology and Behavior	3 cr	MICRO 302L	Microbiology Lab	1 cr
			MICRO 310	Medical Microbiology	3 cr
			MICRO 310L	Medical Microbiology Lab	1 cr
			MICRO 320	Molecular and Cellular Bacteriology	3 cr
			MICRO 402	Microbial Genetics and Genomics	3 cr
			MICRO 408	Virology	3 cr
			MICRO 410	Insect-Virus Interactions: Molec. Perspective	3 cr
			MICRO 475	Immunology	3 cr
			<b>Natural Resources and Ecology Management</b>		
			NREM 301	Forest Ecology and Soils	4 cr
			NREM 345	Nat. Resource Photogrametry & GIS	3 cr
			NREM 390	Fire Ecology and Management	3 cr
			NREM 407	Watershed Management	3 cr
			NREM 446	Integrating GPS & GIS for Nat. Res. Mgmt.	3 cr
			A ECL 321	Fish Biology	3 cr
			A ECL 366	Natural History of Iowa Vertebrates	3 cr
			A ECL 418	Stream Ecology	3 cr
			A ECL 454	Principles of Wildlife Disease	3 cr
			A ECL 442	Aquaculture	3 cr
			FOR 302	Silviculture	
			<b>Plant Pathology</b>		
			PL P 408	Principles of Plant Pathology	3 cr
			PL P 416	Forest Insect & Disease Management	3 cr
			PL P 477	Bacteria-Plant Interactions	3 cr
			<b>Psychology</b>		
			PSYCH 310	Brain and Behavior	3 cr
			PSYCH 315	Drugs and Behavior	3 cr

**Iowa Lakeside Laboratory** -Courses are taught Summer Sessions only at the Lakeside Facility in Milford, IA. Please check for available courses on the Lakeside Lab web page and consult your advisor for those that apply.