

Biology Degree Requirements 2022-2023

Have Questions About the Biology Major?

Visit Student Services in 103 Bessey Hall
or call 515-294-1064

Biology Major at Iowa State University

Obtaining a Bachelor of Science degree in biology at Iowa State University requires the completion of 120 credits total. Up to 65 semester hours (97 quarter hours) earned at two-year colleges can be applied, as can courses taken at other 4-year institutions. All students must maintain a 2.0 or higher cumulative grade point average (GPA) to complete a degree. The final 32 credits of coursework must be taken at Iowa State.

Students are ultimately responsible for all issues concerning the satisfactory completion of degree requirements, and should be aware that many professions require specific courses that may go above and beyond the minimum degree requirements of the Biology Program.

University Requirements

Course #	Course Name	Credits	FYI...
ENGL 150	Critical Thinking and Communication	3	A grade of C or higher is required in ENGL 150, ENGL 250, and the advanced communications course.
ENGL 250	Written, Oral, Visual, and Electronic Composition	3	
(variable)	Advanced Communications (determined by major/college)	3	
LIB 160	Information Literacy	1	International Perspectives and U.S. Diversity are frequently double-counted with college-level degree requirements
(variable)	International Perspectives	3	
(variable)	U.S. Diversity	3	

Additional information about University requirements can be found at (<https://catalog.iastate.edu/collegescurricula/>); details about English requirements, including test-out and placement, at (<https://engl.iastate.edu/isucomm/>); and lists of approved courses that meet International Perspectives and U.S. Diversity at (<https://www.registrar.iastate.edu/students/div-ip-guide>).

College Requirements

Students may major in biology either through the College of Liberal Arts and Sciences (LAS) or the College of Agriculture and Life Sciences (AgLS/CALS). The differences in requirements are as follows:

	LAS Requirement	CALS Requirement
Foreign Language	101/102 college level -or- 3+ years in high school	none required
Advanced Comm.	writing (ENGL 302 to 316) or speech (SP CM 212)	speech (e.g., SP CM 212)
Math	mathematics and/or statistics	mathematics AND statistics
Science	natural sciences	biological and physical sciences
Arts & Humanities	12 credits (~4 courses)	3 credits (~1 course)
Social Sciences	9 credits (~3 courses)	3 credits (~1 course)
Ethics	none required	3 credits (~1 course)

LAS also requires 45 credits of 300-level coursework, all but 7 of which are met by completing minimum requirements of the biology major. Lists of approved courses that meet the general education requirements for the two colleges can be found at: (<https://las.iastate.edu/students/academics/general-education/>) and (<https://www.cals.iastate.edu/student-services>) for LAS and CALS, respectively.

Biology Major Requirements

Students must have at least a 2.0 GPA for the biology core and the advanced biology areas of the major.

Biology Core

Course #	Course Name	Credits
BIOL 110*	Introduction to Biology	1
BIOL 111*	Opportunities in Biology	0.5
BIOL 211 & BIOL 211L	Principles of Biology I & Lab	4
BIOL 212 & BIOL 212L	Principles of Biology II & Lab	4
BIOL 312	Ecology (with lab)	4
BIOL 313 & BIOL 313L	Principles of Genetics & Lab	4
BIOL 314	Principles of Molecular Cell Biology	3
BIOL 315	Biological Evolution	3

* Students entering directly from high school take BIOL 110 and BIOL 111. Students transferring from another institution take BIOL 112 (Transfer Student Orientation, 1 credit) instead of these two courses.

Advanced Biology

Select 21 credits of upper-level coursework from the approved list (see pages 3 and 4). At least 9 of these credits must be from BIOL, EEOB, or GDCB course offerings, and 2 courses must include a laboratory/field component. Upper-level life science courses not on the approved list may be used with departmental permission.

Complementary or Supporting Science Requirements

Mathematics

Students must complete two semesters of calculus and/or statistics. Appropriate sequences depend on career interests and choice of college. Biology majors in LAS may take calculus or statistics only, while biology majors in CALS must take one statistics course and one mathematics course (preferably calculus).

	Mathematics Courses	Statistics Courses	Credits
Statistics Only (LAS)	none (LAS option ONLY)	STAT 101 or STAT 104, & STAT 301	7 to 8
Calculus Only (LAS)	MATH 165 & MATH 166	none (LAS option ONLY)	8
Calc & Stat (LAS or CALS)	MATH 160 or MATH 165	STAT 101 or STAT 104	7 to 8
Non-Calc (CALS)	any CALS approved math	STAT 101 or STAT 104, & STAT 301	10 to 11

Chemistry

Biology majors must complete at least one semester of general chemistry (with lab), one semester of organic chemistry (with lab), and one semester of biochemistry. Several sub-disciplines of biology will require more than the minimum, and students should speak with their advisors for more information.

	General Chemistry	Organic Chemistry	Biochemistry	Credits
Minimum Sequence	CHEM 163 & 163L	CHEM 231 & 231L	BBMB 316	12
Advanced Sequence	CHEM 177 & 177L -and- CHEM 178 & 178L	CHEM 331 & 331L -and- CHEM 332 & 332L	BBMB 420 -or- BBMB 404/405	20 to 23

Physics

One semester of physics (with lab) is required for biology. Some career paths may require a year of physics.

	Courses	Credits
Single Semester Physics	PHYS 115 & PHYS 115L	5
Full Year Physics (algebra-based)	PHYS 131+L & PHYS 132+L	10
Full Year Physics (calculus-based)	PHYS 231+L & PHYS 232+L	10

Approved Advanced Biology Courses

Biology Program at Iowa State University

Course #	Biology Course Name	Credits	Course #	Biology Course Name	Credits
BIOL 322	Intro Bioinformatics and Comp. Bio	3	BIOL 430	Principles of Plant Physiology	3
BIOL 328	Mole. & Cell. Bio of Human Disease	3	BIOL 434	Endocrinology	3
BIOL 335	Human & Animal Physiology	3	BIOL 436	Neurobiology	3
BIOL 335L •	Human & Animal Physiology Lab	1	BIOL 451 •	Plant Evolution & Phylogeny	4
BIOL 336	Ecological & Evolutionary Animal Phys	3	BIOL 454 •	Plant Anatomy	4
BIOL 344	Human Reproduction	3	BIOL 455 •	Bryophyte and Lichen Biodiversity	3
BIOL 349 •	Genome Perspective in Biology	3	BIOL 456 •	Principles of Mycology	3
BIOL 350 •	Comprehensive Human Anatomy	4	BIOL 457	Herpetology	2
BIOL 351 •	Comparative Chordate Anatomy	5	BIOL 457L •	Herpetology Lab	1
BIOL 352 •	Vertebrate Histology	4	BIOL 458	Ornithology	2
BIOL 353	Introductory Parasitology	3	BIOL 458L •	Ornithology Lab	1
BIOL 354	Animal Behavior	3	BIOL 459	Mammalogy	2
BIOL 354L •	Animal Behavior Lab	1	BIOL 459L •	Mammalogy Lab	1
BIOL 355	Plants and People	3	BIOL 462	Evolutionary Genetics	3
BIOL 356 •	Dendrology	4	BIOL 464	Wetland Ecology	3
BIOL 357	Biology of Plants	3	BIOL 465	Macroevolution	3
BIOL 358 •	Bee Biology, Mngm't, and Beekeeping	3	BIOL 471	Introductory Conservation Biology	3
BIOL 364	Invertebrate Biology	3-4	BIOL 472	Community Ecology	3
BIOL 365 •	Vertebrate Biology	4	BIOL 474	Plant Ecology	3
BIOL 366 •	Plant Systematics	4	BIOL 476	Functional Ecology	3
BIOL 370 •	GIS for Ecology and Env't Science	1-6	BIOL 480 •	Studies in Marine Biology	1-8
BIOL 371 •	Ecological Methods	3	BIOL 481 •	Summer Field Studies	1-8
BIOL 375X	Marine Ecology & Ecosystems Dynamics	3	BIOL 482 •	Tropical Biology	1-4
BIOL 381	Environmental Systems I	3	BIOL 483	Environmental Biogeochemistry	3
BIOL 382 •	Environmental Systems II	3	BIOL 484	Ecosystem Ecology	3
BIOL 393 •	N. American Field Trips	1-4	BIOL 486	Aquatic Ecology	3
BIOL 394 •	International Field Trips	1-4	BIOL 486L •	Aquatic Ecology Lab	1
BIOL 395X	Professional Dev't in Biological Sciences	2	BIOL 487	Microbial Ecology	3
BIOL 401	Intro Bioinformatics & Comp. Biology	4	BIOL 488 •	Identification of Aquatic Organisms	1
BIOL 402	Introduction to Pathology	3	BIOL 489 •	Population Ecology	3
BIOL 403X	Introduction to Pathology II	3	BIOL 490	Independent Study	1
BIOL 406	Bioinformatics of OMICS	3	BIOL 491 •	Undergraduate Teaching Experience	1-2
BIOL 414	Life History & Reproductive Strategy	3	BIOL 492	Preparing for Grad School in Biology	1
BIOL 421	Biological Principles of Aging	3	BIOL 494 •	Biology Internship	1-3
BIOL 423	Developmental Biology	3	BIOL 495	Undergraduate Seminar (various topics)	1-3
BIOL 423L •	Developmental Biology Lab	1	BIOL 499 •	Undergraduate Research	1-3
BIOL 428	Cell Biology	3			

Students may apply a maximum of 7 credits of the following: BIOL 480, 481, 490 (2 cr max), 491 (2 cr max), 494, and 499 towards advanced biology. Lab courses are denoted by •. Courses below are graduate level courses open to undergraduates by prerequisite or permission and typically offered alternate semesters.

Course #	Graduate Course Name	Credits	Course #	Graduate Course Name	Credits
EEOB 507	Advanced Animal Behavior	3	EEOB 581	Environmental Systems I	3-4
EEOB 514	Life History and Reproductive Strategies	3	EEOB 582 •	Environmental Systems II	3
EEOB 521	Biological Principles of Aging	3	EEOB 584	Ecosystem Science	3
EEOB 531	Conservation Biology	3	EEOB 585	Advanced Community Ecology	3
EEOB 534	Endocrinology	3	EEOB 586	Aquatic Ecology	3
EEOB 535 •	Restoration Ecology	3	EEOB 586L •	Aquatic Ecology Lab	1
EEOB 546	Computational Skills for Biological Data	3	EEOB 587	Microbial Ecology	3
EEOB 551 •	Plant Evolution and Phylogeny	4	EEOB 589 •	Population Ecology	3
EEOB 553	Agrostology	3	EEOB 596	Ecology and Society	3
EEOB 555 •	Bryophyte and Lichen Biodiversity	3	GDCB 510	Transmission Genetics	3
EEOB 559	Mammalogy	2	GDCB 511	Molecular Genetics	3
EEOB 561	Evolutionary and Ecological Genomics	3	GDCB 513	Plant Metabolism	2
EEOB 562	Evolutionary Genetics	3	GDCB 528	Advances in Molecular Cell Biology	3
EEOB 563	Molecular Phylogenetics	3	GDCB 533	Advances in Developmental Biology	3
EEOB 564	Wetland Ecology	3	GDCB 536	Statistical Genetics	4
EEOB 565	Macroevolution	3	GDCB 542 •	Intro to Molecular Biology Techniques	1
EEOB 566	Molecular Evolution	3	GDCB 544	Fundamentals of Bioinformatics	4
EEOB 567	Empirical Population Genetics	3	GDCB 545	Plant Molecular, Cell and Dev't Biology	3
EEOB 568 •	Advanced Systematics	3	GDCB 556	Cell, Molec, & Dev't Neuroscience	3
EEOB 569	Biogeography	3	GDCB 557	Advanced Neuroscience Techniques	3
EEOB 573	Techniques for Biology Teaching	1-2	GDCB 568	Statistical Bioinformatics	3
EEOB 576	Functional Ecology	3	GDCB 569	Structural Bioinformatics	3
EEOB 577	Concepts in Theoretical Ecol. & Evol.	1	GDCB 570	Systems Biology	3
			GDCB 585	Fund. of Predictive Plant Phenomics	4

This page lists approved advanced biology courses offered by other departments at Iowa State. These courses may have pre-requisites not included in this list that do not count as advanced biology courses.

Agronomy Courses

	Credits
AGRON 316 Crop Structure-Function Relationships	3
AGRON 317 Principles of Weed Science	3
AGRON 338 • Seed Science and Technology	3
AGRON 354 Soils and Plant Growth	3
AGRON 354L • Soils and Plant Growth Lab	1
AGRON 421 Introduction to Plant Breeding	3
AGRON 485 • Soil & Environmental Microbiology	3

Animal Science Courses

	Credits
AN S 313 Exercise Physiology of Animals	2
AN S 319 Animal Nutrition	3
AN S 331 Domestic Animal Reproduction	3
AN S 332 • Lab Methods in Animal Reproduction	1
AN S 333 Embryo Transfer & Related Technologies	3
AN S 334 • Embryo Transfer Laboratory	1
AN S 337 Lactation	3
AN S 345 Growth & Dev't of Domestic Animals	3
AN S 352 • Genetic Improvem't of Domestic Animals	3
AN S 419 Advanced Animal Nutrition	2

Anthropology Courses

	Credits
ANTHR 307 • Biological Anthropology	3
ANTHR 317 Primate Behavior, Ecology & Evolution	3
ANTHR 319 • Skeletal Biology	3
ANTHR 424 • Forensic Anthropology	3
ANTHR 438 Primate Evolutionary Ecology & Behavior	3
ANTHR 482 Topics in Biological Anthropology	3

Biochemistry Courses

	Credits
BBMB 405 Biochemistry II	3
BBMB 411 • Techniques in Biochemical Research	4
BBMB 420 Mammalian Biochemistry	3
BBMB 430 Prokaryotic Diversity and Ecology	3
BBMB 440 • Microbial Phys, Diversity, & Genetics Lab	4

Biomedical Studies Courses

	Credits
B M S 329 Anat & Phys of Domestic Animals	3
B M S 401 • Intro Aquatic Animal Medicine	1
B M S 438 Principles of Physiology	4
B M S 448 • Principles of Human Gross Anatomy	4

Entomology Courses

	Credits
ENT 370 • Insect Biology	3
ENT 374 Insects and our Health	3
ENT 374L • Insects and our Health Laboratory	1
ENT 375 Plant Protection Using Natural Enemies	3
ENT 425 • Aquatic Insects	3
ENT 471 • Insect Ecology	3

Food Science & Human Nutrition Courses

	Credits
FS HN 360 Adv. Human Nutrition & Metabolism	3
FS HN 362 Nutrition in Growth and Development	3
FS HN 364 Nutrit. & Prevention of Chronic Disease	3
FS HN 367 Medical Terminology	1

Genetics Courses

	Credits
GEN 340 Human Genetics	3
GEN 409 Molecular Genetics	3
GEN 410 Analytical Genetics	3

Geology Courses

	Credits
GEOL 406 Geology Field Course	1-2
GEOL 412 Micropaleontology	3

Health Studies Courses

	Credits
H S 350 Human Diseases	3

Horticulture Courses

	Credits
HORT 321 Horticulture Physiology	3
HORT 322 • Plant Propagation	3

Kinesiology Courses

	Credits
KIN 355 Biomechanics	3
KIN 363 Basic Electrocardiography	2

Microbiology Courses

	Credits
MICRO 302 Biology of Microorganisms	3
MICRO 302L • Microbiology Lab	1
MICRO 310 Medical Microbiology	3
MICRO 310L • Medical Microbiology Lab	1
MICRO 320 Molecular and Cellular Bacteriology	4
MICRO 360 Global Health	3
MICRO 402 Microbial Genetics and Genomics	3
MICRO 408 Virology	3
MICRO 420 Food Microbiology	3
MICRO 475 Immunology	3
MICRO 475L • Immunology Laboratory	1

Natural Resource Ecology & Management Courses

	Credits
A ECL 321 • Fish Biology	3
A ECL 366 • Natural History of Iowa Vertebrates	3
A ECL 415 • Ecol. of Freshwater Inverts/Plants/Algae	3
A ECL 418 • Stream Ecology	3
A ECL 442 Aquaculture	3
A ECL 454 Principles of Wildlife Disease	3
FOR 302 • Silviculture	3
NREM 301 • Natural Resource Ecology & Soils	4
NREM 345 • Natural Resource Photogrammetry & GIS	3
NREM 357 • Midwestern Prairie Plants	1
NREM 358 • Forest Herbaceous Layer	1
NREM 390 Fire Ecology and Management	3
NREM 407 • Watershed Management	4
NREM 446 • Integrating GPS & GIS for Nat. Res.	3
NREM 452 • Ecosystem Management	3

Plant Pathology Courses

	Credits
PL P 408 Principles of Plant Pathology	3
PL P 416 Forest Insects & Diseases	3
PL P 416L • Forest Insects & Diseases Laboratory	1
PL P 477 Bacterial-Plant Interactions	3
PL P 494 Seed Pathology	2

Psychology Courses

	Credits
PSYCH 310 Brain and Behavior	3
PSYCH 315 Drugs and Behavior	3

Toxicology Courses

	Credits
TOX 401 Principles of Toxicology	3
TOX 450 Pesticides in the Environment	3

Iowa Lakeside Laboratory – courses taken in summer at Iowa Lakeside Lab often count towards advanced biology requirements. Please check for available courses on the Lakeside Lab web page (<https://iowalakesidelab.org/>) and consult your advisor for those that apply to the degree program.