

IOWA STATE UNIVERSITY

BACHELOR OF SCIENCE IN BIOLOGY

A Bachelor of Science (B.S.) degree in Biology requires a minimum of 120 credits and a 2.0 or higher cumulative grade point average (GPA). Up to 65 semester hours earned at two-year colleges may be applied, as can 16 semester hours of technical credit. Credits from 4-year colleges may be applied without limit, but at least 32 credits must be taken from Iowa State University. The final 32 credits must also be taken at ISU, with exceptions granted for National Student Exchange (NSE) programs and study abroad.

BIOLOGY MAJOR REQUIREMENTS

Students are required to complete a set of core biology courses, advanced biology electives, and supporting sciences to complete the Biology major. There are no grade minimums for these courses but students must maintain a 2.0 GPA for the biology core and advanced biology electives.

Biology Core Courses (23.5 credits)

Course #	Course Title	Credits
BIOL 1100 + BIOL 1110 or BIOL 1120	Introduction to Biology + Opportunities in Biology or Transfer Student Orientation	1 to 1.5
BIOL 2110 + BIOL 2110L	Principles of Biology I (plus lab)	4
BIOL 2120 + BIOL 2120L	Principles of Biology II (plus lab)	4
BIOL 3120	Ecology (with lab)	4
BIOL 3130 + BIOL 3130L	Principles of Genetics (plus lab)	4
BIOL 3140	Principles of Molecular Cell Biology	3
BIOL 3150	Biological Evolution	3

Advanced Biology Electives (21 credits)

Select 21 credits of upper-level (3000+) life science coursework from the approved list (see pages 3 and 4). Upper-level life science courses not on the approved list may also be used with departmental permission. At least 9 credits of advanced biology electives must be from BIOL, EEOB, or GDCB course offerings (page 3), and 2 courses must include a laboratory/field component. Courses with a laboratory/field component are indicated with a • next to the course number on pages 3 and 4.

Supporting Science Requirements (24+ credits)

Students must complete a minimum of two semesters of calculus and/or statistics, one semester of general chemistry, one semester of organic chemistry, one semester of biochemistry, and one semester of physics. Many students majoring in Biology take additional coursework in these areas based on requirements for their professional or career aspirations.

Supporting Sciences: Mathematics and Statistics Pathways (7 to 11 credits)

LAS Pathways (pick one)	Courses Required	Credits
Calculus & Statistics	Survey of Calculus (MATH 1600) or Calculus I (MATH 1650) & Principles of Statistics (STAT 1040)	7 to 8
Statistics Only	Principles of Statistics (STAT 1040) & Intermediate Statistical Concepts and Methods (STAT 3010)	7 to 8
Calculus Only	Calculus I (MATH 1650) & Calculus II (MATH 1660)	8
CALS Pathways (pick one)	Courses Required	Credits
Calculus & Statistics	Survey of Calculus (MATH 1600) or Calculus I (MATH 1650) & Principles of Statistics (STAT 1040)	7 to 8
Mathematics & Statistics	College Algebra (MATH 1400), Preparation for Calculus (MATH 1430), or Applied Trigonometry (MATH 1450) & Principles of Statistics (STAT 1040) & Intermediate Statistical Concepts and Methods (STAT 3010)	10 to 11

Introduction to Statistics (STAT 101) may also be used in place of STAT 104.

Supporting Sciences: Chemistry Pathways (12 to 23 credits)

	1-Semester Pathway	Credits	2-Semester Pathway	Credits
General Chemistry	College Chemistry (CHEM 1630+L)	5	General Chemistry I (CHEM 1770+L) & General Chemistry II (CHEM 1780+L)	10
Organic Chemistry	Elementary Organic Chemistry (CHEM 2310+L)	4	Organic Chemistry I (CHEM 3310+L) & Organic Chemistry II (CHEM 3320+L)	8
Biochemistry	Principles of Biochemistry (BBMB 3160)	3	Biochemistry I (BBMB 4040) & Biochemistry II (BBMB 4050)	6

Students studying for cellular/molecular, genetics, pre-med/health, or pre-vet should plan on the 2-semester pathway due to graduate and professional school requirements in those fields. Students studying for conservation, ecology, organismal biology, and evolution can take the 1-semester pathway.

Supporting Sciences: Physics Pathways (5 to 10 credits)

1-Semester Pathway	Credits	2-Semester Pathway	Credits
Physics for the Life Sciences (PHYS 1150+L)	5	General Physics I (PHYS 1310+L) & General Physics II (PHYS 1320+L)	10

Students studying for pre-med and some pre-health fields should plan on the 2-semester pathway due to graduate and professional school requirements.

Advanced Biology Electives

Course #	Course Title	Cr	Sem	Course #	Course Title	Cr	Sem
BIOL 3110X	Genome Editing and Engineering	1	F	BIOL 4210	Biological Principles of Aging	3	SS
BIOL 3180	Introduction to Ecosystems	3	S	BIOL 4230	Developmental Biology	3	S
BIOL 3190	Analysis of Environmental Systems	3	S	BIOL 4230L •	Developmental Biology Lab	1	S
BIOL 3220	Intro Bioinformatics & Comp. Biology	3	F	BIOL 4280	Cell Biology	3	S
BIOL 3280	Molec. & Cell Bio of Human Disease	3	F	BIOL 4300	Principles of Plant Physiology	3	S
BIOL 3350	Human & Animal Physiology	3	S	BIOL 4340	Endocrinology	3	S
BIOL 3350L •	Human & Animal Physiology Lab	1	S	BIOL 4360	Neurobiology	3	F
BIOL 3360	Eco. & Evolutionary Animal Phys.	3	S	BIOL 4510 •	Plant Evolution and Phylogeny	4	alt F
BIOL 3440	Human Reproduction	3	S	BIOL 4540 •	Plant Anatomy	4	alt F
BIOL 3490 •	Genome Perspective in Biology	3	S	BIOL 4550 •	Bryophyte and Lichen Biodiversity	3	S
BIOL 3500 •	Comprehensive Human Anatomy	4	F, SS	BIOL 4560 •	Principles of Mycology	3	F
BIOL 3510 •	Comparative Chordate Anatomy	5	S	BIOL 4570	Herpetology	2	F
BIOL 3520 •	Vertebrate Histology	4	alt S	BIOL 4570L •	Herpetology Lab	1	F
BIOL 3530	Introductory Parasitology	3	S	BIOL 4580	Ornithology	2	S
BIOL 3540	Animal Behavior	3	F	BIOL 4580L •	Ornithology Lab	1	S
BIOL 3540L •	Animal Behavior Lab	1	F	BIOL 4590	Mammalogy	2	S
BIOL 3550	Plants and People	3	S	BIOL 4590L •	Mammalogy Lab	1	S
BIOL 3560 •	Dendrology	4	F	BIOL 4620	Evolutionary Genetics	3	F
BIOL 3570	Biology of Plants	3	F	BIOL 4640	Wetland Ecology	3	S
BIOL 3580 •	Bee Biology, Mngm't, & Beekeeping	3	F	BIOL 4650	Macroevolution	3	Alt S
BIOL 3640	Invertebrate Biology	3	F	BIOL 4710	Introductory Conservation Biology	3	S
BIOL 3650 •	Vertebrate Biology	4	F	BIOL 4740	Plant Ecology	3	S
BIOL 3660 •	Plant Systematics	4	S	BIOL 4760	Functional Ecology	3	alt S
BIOL 3700 •	GIS for Ecology & Env't Science	1-6	F, S	BIOL 4830	Environmental Biogeochemistry	3	alt S
BIOL 3710 •	Ecological Methods	3	F	BIOL 4840	Ecosystem Ecology	3	alt S
BIOL 3750	Marine Ecol. & Ecosystem Dynamics	3	S	BIOL 4850	Community Ecology	3	S
BIOL 3950	Professional Dev't in Biological Sci.	2	F	BIOL 4860	Aquatic Ecology	3	F
BIOL 4010	Bioinformatics of Sequences	3	Alt F	BIOL 4860L •	Aquatic Ecology Lab	1	F
BIOL 4020	Introduction to Pathology	3	F	BIOL 4870	Microbial Ecology	3	F
BIOL 4030	Introduction to Pathology II	3	S	BIOL 4880 •	Identification of Aquatic Organisms	1	F, S
BIOL 4060	Bioinformatics of OMICS	3	S	BIOL 4890 •	Population Ecology	3	Alt F
BIOL 4140	Life History and Reproductive Strat.	3	Alt F	BIOL 4920	Preparing for Grad School in Biology	1	F
				BIOL 4950	Seminar (various topics)	1-3	any

Students are encouraged to make experiential learning part of their advanced biology coursework. A maximum of 7 credits of these courses may be applied towards advanced biology electives and include: BIOL 4900 (Independent Study, 2 cr. max), BIOL 4910• (Undergraduate Teaching Experience, 2 cr. max), BIOL 4940• (Biology Internship, 6 cr. max), and BIOL 4990• (Undergraduate Research, 6 cr. max).

Biology students may also incorporate field-based learning into their advanced biology electives through courses such as BIOL 3930• (North American Field Trips), BIOL 3940• (International Field Trips), BIOL 4800• (Studies in Marine Biology), BIOL 4810• (Summer Field Studies), and coursework at Iowa Lakeside Lab (<https://iowalakesidelab.org/>).

Advanced Biology Electives

Agronomy Courses

Course #	Course Title	Cr	Sem
AGRON 3160	Crop Structure-Function Relation.	3	F, S
AGRON 3170	Principles of Weed Science	3	F
AGRON 3380 •	Seed Science & Technology	3	F
AGRON 3540	Soils & Plant Growth	3	F, S
AGRON 4210	Introduction to Plant Breeding	3	F

Animal Science Courses

ANS 3130	Exercise Physiology of Animals	3	F, S
ANS 3190	Animal Nutrition	3	F, S
ANS 3310	Domestic Animal Reproduction	3	F, S
ANS 3320 •	Lab Methods in Animal Reproduct.	1	F, S
ANS 3330	Embryo Transfer & Related Tech.	3	F
ANS 3340 •	Embryo Transfer Lab	1	F
ANS 3370	Lactation	3	S
ANS 3450	Growth & Dev't of Domestic Anim.	3	S
ANS 3520 •	Genetic Improvm't of Domestic An.	3	F, S
ANS 4190	Advanced Animal Nutrition	2	F

Anthropology Courses

ANTHR 3070 •	Biological Anthropology	3	S
ANTHR 3170	Primate Behavior, Ecol. & Evol.	3	F
ANTHR 3190 •	Skeletal Biology	3	S
ANTHR 4240	Forensic Anthropology	3	alt S

Biochemistry Courses

BBMB 4050	Biochemistry II	3	any
BBMB 4110 •	Techniques in Biochem Research	4	F
BBMB 4200	Mammalian Biochemistry	3	F
BBMB 4300	Prokaryotic Diversity & Ecology	3	alt S

Biomedical Sciences Courses

BMS 3290	Anat. & Phys. of Domestic Animals	3	S
BMS 4010 •	Intro Aquatic Animal Medicine	1	S
BMS 4380	Principles of Physiology	4	F
BMS 4480 •	Princ. of Human Gross Anatomy	4	S

Entomology Courses

ENT 3700 •	Insect Biology	3	F
ENT 3740	Insects & Our Health	3	S
ENT 3740L •	Insects & Our Health Lab	1	S
ENT 3750	Plant Protection Nat'l Enemies	3	alt S
ENT 4250	Aquatic Insects	3	alt S
ENT 4710 •	Insect Ecology	3	alt F

Food Science & Human Nutrition Courses

FSHN 3600	Advanced Nutrition & Metabolism	3	F
FSHN 3620	Nutrition & Health Throughout Life	3	S
FSHN 3640	Nutrition & Prevention of Disease	3	F
FSHN 3670	Medical Terminology	1	any

Genetics Courses

GEN 3400	Human Genetics	3	any
GEN 4090	Molecular Genetics	3	F
GEN 4100	Analytical Genetics	3	S

Geology Courses

GEOL 4060	Geology Field Course	1-2	any
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Health Studies Courses

Course #	Course Title	Cr	Sem
HS 3500	Human Diseases	3	S

Horticulture Courses

HORT 3210	Horticulture Physiology	3	F
HORT 3220 •	Plant Propagation	3	S

Kinesiology Courses

KIN 3550	Biomechanics	3	any
KIN 3580	Exercise Physiology	3	any
KIN 3630	Basic Electrocardiography	3	alt F

Microbiology Courses

MICRO 3020	Biology of Microorganisms	3	any
MICRO 3020L •	Microbiology Lab	1	F, S
MICRO 3100	Medical Microbiology	3	F
MICRO 3100L •	Medical Microbiology Lab	1	F
MICRO 3200	Molecular & Cellular Bacteriology	4	S
MICRO 3600	Global Health	3	F
MICRO 4020	Microbial Genetics & Genomics	3	alt F
MICRO 4080	Virology	3	F
MICRO 4200	Food Microbiology	3	F
MICRO 4750	Immunology	3	S
MICRO 4750L •	Immunology Lab	1	S

Natural Res. Ecology & Management Courses

AECL 3210 •	Fish Biology	3	S
AECL 3660 •	Natural Hist. of Iowa Vertebrates	3	S
AECL 4150 •	Stream Ecology	3	alt F
AECL 4420	Aquaculture	3	S
AECL 4540	Principles of Wildlife Disease	3	S
FOR 3020 •	Silviculture	4	S
NREM 3010 •	Natural Resource Ecology & Soils	4	F
NREM 3450 •	Nat. Res. Photogrammetry & GIS	3	S
NREM 3570 •	Midwestern Prairie Plants	1	F
NREM 3900	Fire Ecology and Management	3	F
NREM 4070 •	Watershed Management	4	S
NREM 4460 •	Integrating GPS & GIS Nat. Res.	3	F
NREM 4520 •	Ecosystem Management	3	S

Plant Pathology Courses

PLP 4080 •	Principles of Plant Pathology	3	F, S
PLP 4160 •	Forest Insects & Diseases	3	F
PLP 4770	Bacterial-Plant Interactions	3	alt S
PLP 4940	Seed Pathology	2	alt F
PLP 4940L •	Seed Pathology Lab	1	alt F

Psychology Courses

PSYCH 3100	Brain & Behavior	3	F, S
PSYCH 3150	Drugs & Behavior	3	F, S

Toxicology Courses

TOX 4010	Principles of Toxicology	3	F
TOX 4500	Pesticides in the Environment	3	S

UNIVERSITY AND COLLEGE REQUIREMENTS

In addition to meeting requirements for their major, all students at Iowa State University are expected to complete university-wide degree requirements and college-level general education requirements. Students can major in Biology either through the College of Agriculture and Life Sciences (CAL S) or the College of Liberal Arts and Sciences (LAS).

University Requirements (16 credits)

Course #	Course Title or Requirement	Credits
ENGL 1500	Critical Thinking and Communication	3
ENGL 2500	Written, Oral, Verbal, and Electronic Composition	3
LIB 1600	Introduction to College Level Research	1
(varies)	Advanced Communication (determined by major/college)	3
(varies)	International Perspectives	3
(varies)	U.S. Diversity	3

A grade of “C” or higher is required in ENGL 1500, ENGL 2500, and for advanced communications. For additional information about English requirements, including test-out and placement, see: <http://www.engl.iastate.edu/isucomm/>. For a list of courses that meet International Perspective and U.S. Diversity, see: <http://www.registrar.iastate.edu/students/div-ip-guide>

College Requirements (12 to 30 credits)

Requirement	College of Liberal Arts and Sciences (LAS)	Cr	College of Agriculture and Life Sciences (CAL S)	Cr
Career Preparation	LAS 2030	1	none required	-
World Language	3+ years in high school or 1010 & 1020 college language study	0 - 8	none required	-
Advanced Comm.	public speaking (e.g. SP CM 2120) or advanced writing (e.g. ENGL 3120)	3	public speaking (SP CM 2120, COMST 2140, or AGEDS 3110)	3
Mathematics	met by Biology major coursework	-	met by Biology major coursework	-
Science	met by Biology major coursework	-	met by Biology major coursework	-
Arts & Humanities	For a list of courses see: http://www.las.iastate.edu/students/academics/general-education/	12	For a list of courses see: https://www.cals.iastate.edu/student-services/humanities	3
Social Sciences	For a list of courses see: http://www.las.iastate.edu/students/academics/general-education/	9	For a list of courses see: https://www.cals.iastate.edu/student-services/social-sciences	3
Ethics	none required	-	For a list of courses see: https://www.cals.iastate.edu/student-services/ethics	3

All students in LAS must also complete 45 credits of 3000+ level coursework, 38 of which are met by completing the minimum requirements of the Biology major. The remaining 7 should be met with general education courses, secondary majors, minors, or electives.