

Biological Sciences

A Biological Sciences degree is available in a traditional broad-based sequence or in an Environmental Science option.

Biological Sciences Standard Option

Biological Sciences is a comprehensive field of biology that prepares students for a variety of careers in human health, environmental science, conservation, and plant and animal biology. With its many areas of emphasis, the program integrates studies in zoology, botany, and biological sciences and offers students the flexibility to customize their field of study to align course selection with educational and professional goals. The program integrates broad-based biology foundation classes with specializations such as biomedical science or conservation biology, in later years. With appropriate course selection, the Biological Sciences degree also can provide a broad understanding of the complex relationship between the living and nonliving world. Students will be able to choose a research based course that focuses on plants, wildlife, antibiotics, or learning.

Environmental Science Option

Environmental Science is characterized by an integrative, multidisciplinary approach to environmental issues of concern to humans. This represents an exciting, rewarding area of science, which requires an especially strong academic background and an ability to think both analytically and comprehensively.

For students interested in careers that address solving environmental problems, there is the Biological Sciences major with an Environmental option. This rigorous option incorporates balanced studies in the natural sciences (biology, chemistry, physics, and earth sciences) with social sciences (economics, political science, and sociology). It also involves technology, business, law, ethics, and human relations and behavior. Students interested in this option should visit with an adviser to obtain the specific requirements. Environmental Science students may not pursue a minor in Biology.

Biological Sciences Education and Comprehensive Science Education Majors

Students interested in Biological Sciences Education (<http://bulletin.ndsu.edu/past-bulletin-archive/2017-18/undergraduate/colleges/human-development-education/education/teaching-specialty-biological-sciences>) or Comprehensive Science Education (<http://bulletin.ndsu.edu/past-bulletin-archive/2017-18/undergraduate/colleges/human-development-education/education/teaching-specialty-comprehensive-science>) are encouraged to declare a double major in the discipline and in education (i.e., Biological Sciences Education and Biological Sciences). Such double majors may be earned by successful completion of a few additional credits. Students should contact advisers in Biological Sciences for details.

Students who intend to teach life sciences in the secondary schools should make their intentions known to the School of Education and consult with a biology education adviser in the Department of Biological Sciences (<https://www.ndsu.edu/biology>) early in their programs to make certain that they have a well-designed program and take the professional education courses required for state teacher certification.

The Comprehensive Science Education major is designed to prepare the secondary general science teacher. This major is an especially good preparation for students who may find themselves teaching several different science courses. Information about curriculum and other requirements is available from the School of Education (<https://www.ndsu.edu/education>) and the education adviser in the Department of Biological Sciences. Biological Sciences Education and Comprehensive Science Education majors cannot pursue a minor in Biology.

Major Requirements

Major: Biological Sciences - Standard

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

General Education Requirements for Baccalaureate Degree

- A list of approved general education courses is available here (<http://bulletin.ndsu.edu/past-bulletin-archive/2017-18/academic-policies/undergraduate-policies/general-education/#genedcoursestext>).
- General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review the major, minor, and program emphases requirements for minimum grade restrictions, should they apply.

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3

Science and Technology (S) [†]	10
Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† May be satisfied with courses required in the major. Review major requirements to determine if a specific upper division writing course is required.

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail

Code	Title	Credits
Biological Sciences Core Requirements - Standard Option		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 189	Skills for Academic Success ¹	1
BIOL 252	Plant and Animal Diversity	3
BIOL 270 or BIOL 271 or BIOL 272	Antibiotic Drug Discovery Wildlife Ecology and Conservation: An undergraduate research course Research Experience: Learning in Biology	3
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
BIOL/ZOO 364 or ZOO 370	General Ecology Cell Biology	3
BIOL 491	Seminar	2
Electives: Select 15 credits of any 300 or 400 level courses offered in the department:		15
BIOL 479	Biomedical Genetics and Genomics	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
BIOL 483	Cellular Mechanisms of Diseases	
BOT 372	Structure and Diversity of Plants and Fungi	
BOT 380	Plant Physiology	
BOT 414	Plant Systematics	
BOT 460	Plant Ecology	
ZOO 360	Animal Behavior	
ZOO 410	Comparative Chordate Morphology	
ZOO 444	Vertebrate Histology	

ZOO 450	Invertebrate Zoology	
ZOO 452	Ichthyology	
ZOO 454	Herpetology	
ZOO 456	Ornithology	
ZOO 460	Animal Physiology	
ZOO 462	Physiological Ecology	
ZOO 464	Endocrinology	
ZOO 465	Hormones and Behavior	
ZOO 475	Conservation Biology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	
ZOO 482	Developmental Biology	

Related Required Courses

MATH 146 or MATH 165	Applied Calculus I (May satisfy general education category R) Calculus I	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category s)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
Select one of the following:		3 or 8
CHEM 240	Survey of Organic Chemistry	
CHEM 341 & 341L & CHEM 342 & CHEM 342L	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one of the following:		3 or 8
PHYS 120	Fundamentals of Physics (May satisfy general education category S)	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory (May satisfy general education category S)	

Total Credits 54-60

¹ BIOL 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take BIOL 189.

Department NOTES

- Students may not minor in biology with this major

Major Requirements**Major: Biological Sciences - Environmental Science Option**

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

General Education Requirements for Baccalaureate Degree

- A list of approved general education courses is available here (<http://bulletin.ndsu.edu/past-bulletin-archive/2017-18/academic-policies/undergraduate-policies/general-education/#genedcoursestext>).
- General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review the major, minor, and program emphases requirements for minimum grade restrictions, should they apply.

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ENGL 110	College Composition I	12

ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

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Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

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BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 189	Skills for Academic Success ¹	1
BIOL 359	Evolution	3
BIOL 491	Seminar	2
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL/ZOO 364	General Ecology	3
BIOL 480	Ecotoxicology	3
Select one of the following:		3-4
BOT 372	Structure and Diversity of Plants and Fungi	
BOT 380	Plant Physiology	
BOT 414	Plant Systematics	
BOT 431	Intermediate Genetics	
BOT 450	Range Plants	
BOT 460	Plant Ecology	
Electives: Select 12 credits from the following:		12
BOT 380	Plant Physiology	
BOT 431	Intermediate Genetics	
ZOO 370	Cell Biology	
ZOO 444	Vertebrate Histology	

ZOO 460	Animal Physiology	
ZOO 464	Endocrinology	
ZOO 482	Developmental Biology	
BOT 372	Structure and Diversity of Plants and Fungi	
ZOO 360	Animal Behavior	
ZOO 410	Comparative Chordate Morphology	
ZOO 450	Invertebrate Zoology	
ZOO 452	Ichthyology	
ZOO 454	Herpetology	
ZOO 456	Ornithology	
ZOO 458	Mammalogy	
BIOL 481	Wetland Science	
BOT 450	Range Plants	
BOT 460	Plant Ecology	
BIOL 270	Antibiotic Drug Discovery	
ZOO 465	Hormones and Behavior	
ZOO 462	Physiological Ecology	
ZOO 475	Conservation Biology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	

Related Required Courses

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
MATH 146	Applied Calculus I	4
MATH 147	Applied Calculus II	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 410	Soils and Land Use	3
STAT 330	Introductory Statistics	3

Select one from the following: 3 or 4

GEOL 428	Geochemistry	
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	

Select one of the following: 7 or 10

CHEM 240 & BIOC 260	Survey of Organic Chemistry and Elements of Biochemistry	
CHEM 341 & 341L & CHEM 342 & BIOC 460	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Foundations of Biochemistry and Molecular Biology I	

Total Credits 80-91

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Department notes

- Students may not minor in biology with this major

Minor Requirements**Biological Sciences Minor****Minor Requirements**

Required Credits: 17

Code	Title	Credits
Required Courses		
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
BIOL 151	General Biology II	3
BIOL 151L	General Biology II Laboratory	1
Select one of the following:		3-4
BOT 314		
BOT 372	Structure and Diversity of Plants and Fungi	
BOT 380	Plant Physiology	
BOT 460	Plant Ecology	
Electives	Department approved 300-400 level courses	6
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Botany and Zoology majors may not minor in Biological Sciences.