

# Biological Sciences

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

## 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/2014-15/undergraduate/colleges/human-development-education/education/teaching-specialty-biological-sciences>) or Comprehensive Science Education (<http://bulletin.ndsu.edu/past-bulletin-archive/2014-15/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 their advisers or the Office of Registration and Records (<http://www.ndsu.edu/bulletin/offices/registrar>) for details, and are encouraged to declare their primary and secondary majors with the Office of Registration and Records, Ceres 110 (<http://www.ndsu.edu/bulletin/buildings/ceres>).

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 (<http://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 (<http://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.

Required Degree Credits to Graduate: 122

### General Education Requirements

#### First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
----------	---	---

#### Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

#### Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
----------	-------------------------	---

#### Science & Technology (S):

10

The 10 credits required in the Science and Technology category will be fulfilled with requirements of the major.

**Humanities & Fine Arts (A): Select from current general education list** 6

**Social & Behavioral Sciences (B): Select from current general education list** 6

**Wellness (W): Select from current general education list** 2

**Cultural Diversity (D): Select from current general education list**

**Global Perspectives (G): Select from current general education list**

Total Credits 40

## College Requirements

**Bachelor of Science (BS) Degree** – An additional 6 credits in Humanities or Social Sciences\*

**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.

\* 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

<b>General Education Requirements</b>	40	
<b>Science and Mathematics College Requirements</b>	6-12	
<b>Biological Sciences Core Requirements - Standard Option</b>		
BIOL 150	General Biology I	4
& 150L	and General Biology I Laboratory	

BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 359	Evolution	3
BIOL 491	Seminar	2
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL/ZOO 364	General Ecology	3
ZOO 370	Cell Biology	3
Select one of the following:		3-4
BOT 314	Plant Systematics	
BOT 372	Structure and Diversity of Plants and Fungi	
BOT 380	Plant Physiology	
BOT 460	Plant Ecology	
Electives: Select 12 credits from the following:		12
BOT 380	Plant Physiology	
ZOO 380	Vertebrate Histology	
ZOO 460	Animal Physiology	
ZOO 464	Endocrinology	
ZOO 482	Developmental Biology	
BOT 314	Plant Systematics	
BOT 372	Structure and Diversity of Plants and Fungi	
ZOO 280	Comparative Chordate Morphology	
ZOO 360	Animal Behavior	
ZOO 450	Invertebrate Zoology	
ZOO 452	Ichthyology	
ZOO 454	Herpetology	
ZOO 456	Ornithology	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
BOT 460	Plant Ecology	
ZOO 462	Physiological Ecology	
ZOO 475	Conservation Biology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	
<b>Related Required Courses</b>		
Chemistry:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
Math:		
MATH 146	Applied Calculus I	4
Physics:		
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
Organic Chemistry & Biochemistry: Select one of the following groups:		7-10
Group One:		
CHEM 240	Survey of Organic Chemistry	
CHEM 260	Elements of Biochemistry	
Group Two:		

CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
BIOC 460	Foundations of Biochemistry and Molecular Biology I	
Earth Science: Select 2 from the following:		6-8
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	
SOIL 210	Introduction to Soil Science	
SOIL 217	Introduction to Meteorology & Climatology	
<b>Degree Requirements: Potential 15 credits to reach 122</b>		15
Total Credits		122-134

## Department Requirements

- Students may not minor in biology with this major

## Major Requirements

### Major: Biological Sciences - Environmental Science Option

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

Required Degree Credits to Graduate: 122

## General Education Requirements

### First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
----------	---	---

### Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

### Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
----------	-------------------------	---

### Science & Technology (S):

The 10 credits required in the Science and Technology category will be fulfilled with requirements of the major.

**Humanities & Fine Arts (A): Select from current general education list** 6

**Social & Behavioral Sciences (B): Select from current general education list** 6

**Wellness (W): Select from current general education list** 2

**Cultural Diversity (D): Select from current general education list**

**Global Perspectives (G): Select from current general education list**

Total Credits		40
---------------	--	----

## College Requirements

**Bachelor of Science (BS) Degree** – An additional 6 credits in Humanities or Social Sciences\*

**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.

\* 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.

<b>General Education Requirements</b>	40
<b>Science and Mathematics College Requirements</b>	6-12
<b>Biological Sciences Core Requirements - Environmental Science Option</b>	
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 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 314	Plant Systematics
BOT 372	Structure and Diversity of Plants and Fungi
BOT 380	Plant Physiology
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 380	Vertebrate Histology
ZOO 460	Animal Physiology
ZOO 464	Endocrinology
ZOO 482	Developmental Biology
BOT 314	Plant Systematics
BOT 372	Structure and Diversity of Plants and Fungi
ZOO 280	Comparative Chordate Morphology
ZOO 360	Animal Behavior
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
ZOO 462	Physiological Ecology
ZOO 475	Conservation Biology
ZOO 476	Wildlife Ecology and Management
ZOO 477	Wildlife and Fisheries Management Techniques

### Related Required Courses

Earth Sciences:

GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 410	Soils and Land Use	3

Chemistry:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4

Select one from the following: 3-5

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

Select one of the following groups: 7-10

Group One:

CHEM 240	Survey of Organic Chemistry
CHEM 260	Elements of Biochemistry

Group Two:

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

Math:

MATH 146	Applied Calculus I	4
MATH 147	Applied Calculus II	4

Physics:

PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4

Total Credits 122-134

## Program notes

- Students may not minor in biology with this major

## Minor Requirements

### Biological Sciences Minor

#### Minor Requirements

Required Credits: 17

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	Plant Systematics	
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.