

# Biology

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Biology is one of the fastest growing fields of science and its study is relevant to all humans. Students in the Biology program develop and understanding of how living systems work, the relationships among all organisms, and how each organism affects its environment. It is a broad discipline that provides numerous opportunities for students. Our program offers students a strong foundation in biological principles coupled with chemistry and physics. Students in the program 1) are afforded comprehensive and diverse course and field experiences, 2) perform scientific research, and 3) receive the personal attention that helps them achieve their future career goals.

## Mission Statement

It is the mission of the Biology Program to 1) engage students that seek a wide variety of professional careers founded in the biological sciences, 2) expand an understanding of biology for students outside the field, and 3) provide learning and research experiences that increase every student's ability to know the natural world.

## Learning Outcomes for Biology, BS and for Biology, Minor

Upon completion of this program, students can:

**Outcome 1:** Demonstrate basic competence in the principles and theories used in the natural sciences, including:

- Identify major historical figures and/or precedents.
- Define key concepts and principles.
- Describe theories and/or methods accurately.

**Outcome 2:** Define, describe, and apply the scientific method, including:

- Identify steps of the scientific method and its correct application.
- Formulate a testable hypothesis.
- Outline an experiment, analyze and interpret results.

**Outcome 3:** Convey ideas using language and presentation skills specific to the natural sciences, including:

- Write well-constructed essay and/or formal lab report.
- Design and articulate an oral group or individual presentation.
- Develop skills in providing constructive feedback.
- Independently write a scientific paper.

**Outcome 4:** Use critical thinking to synthesize information, evaluate assumptions and claims, and draw evidence-based conclusions, including:

- Organize information gathered from several sources, including peer-reviewed.
- Synthesize and communicate material correctly.
- Critically extend or defend evidence-based conclusions

## Bachelor of Science Biology (No Minor Required)

Learning outcomes: Students will describe the structure and function of cellular components. Students will describe, discuss and give examples of macro and micro evolution. Students will recognize and explain interrelationships and dependencies between abiotic and biotic components of ecosystems. Students will apply the scientific method when testing hypotheses, designing and conducting experiments. The student will design and conduct an undergraduate research project under the guidance of the course faculty. Students will prepare a library research paper, using only peer-reviewed journal articles, which compares and contrasts two or more taxa. The student will prepare and present an electronic oral presentation of their undergraduate research project. The student will demonstrate appropriate gel electrophoresis and sample loading techniques. The student will demonstrate appropriate field population sampling. The student will demonstrate appropriate aseptic technique using bacteria.

Code	Title	Credits
General Education Core ( <a href="https://catalognow.msun.edu/general-education-core/general-education-core/">https://catalognow.msun.edu/general-education-core/general-education-core/</a> )		33
<b>Common Science Core</b>		
BIOB 160	Principles of Living Systems	4

BIOB 161	Principles Living Systems Lab	1
BIOO 220	General Botany	3
BIOO 221	Gen Botany Lab	2
BIOO 380	Zoology	3
BIOO 381	Zoology Lab	2
CHMY 141	College Chemistry I	5
CHMY 142	College Chemistry Lab I	0
CHMY 143	College Chemistry II	5
CHMY 144	College Chemistry Lab II	0
PHSX 205	College Physics I	3
PHSX 206	College Physics I Laboratory	1
PHSX 207	College Physics II	3
PHSX 208	College Physics II Laboratory	1
<b>Required Program Courses</b>		
BIOE 370	General Ecology	4
BIOE 371	General Ecology Lab	0
BIOB 485	Molecular Biology and Genetics	4
BIOB 486	Molecular Biology Genetics Lab	0
CHMY 321	Organic Chemistry I	3
CHMY 322	Organic Chemistry Lab I	2
STAT 216	Introduction to Statistics	3
BIOB 420	Evolution	4
NSCI 450	Undergraduate Research I	3
COMX 111	Intro to Public Speaking	3
Select twelve (12) credits from the following:		12
BIOB 450	Molecular Biology Techniques	
BIOB 451	Molecular Biology Technqus Lab	
BIOE 410	Field Biology Methods	
BIOE 411	Field Biology Methods Lab	
BIOE 428	Freshwater Ecology	
BIOE 429	Freshwater Ecology Lab	
BIOH 201	Human Anat Phys I	
BIOH 202	Human Anat & Phys I Lab	
BIOH 211	Human Anat Phys II	
BIOH 212	Human Anat Phys II Lab	
BIOM 250	Microbiology for Hlth Sciences	
BIOM 251	Microbiology Hlth Sciences Lab	
BIOM 400	Medical Microbiology	
BIOM 401	Medical Microbiology Lab	
BIOO 462	Entomology	
BIOO 463	Entomology Lab	
BIOO 470	Ornithology	
BIOO 471	Ornithology Lab	
GEO 314	Intro to Paleontology	
NSCI 451	Undergraduate Research II	
Advisor Approved Electives or Minor		16
<b>Total minimum credits required for degree</b>		<b>120</b>

## Minor Biology

Code	Title	Credits
<b>Required Courses (BIOB, BIOE, BIOM, BIOO, and NSCI are CAT III)</b>		
BIOB 160	Principles of Living Systems	4
BIOB 161	Principles Living Systems Lab	1
BIOM 250	Microbiology for Hlth Sciences	3
BIOM 251	Microbiology Hlth Sciences Lab	1
BIOO 220	General Botany	3
BIOO 221	Gen Botany Lab	2
BIOO 320	General Botany II	4
BIOO 321	General Botany II Laboratory	0
BIOO 380	Zoology	3
BIOO 381	Zoology Lab	2
BIOE 428	Freshwater Ecology	4
BIOE 429	Freshwater Ecology Lab	0
BIOB 420	Evolution	4
<b>Total minimum credits required for minor</b>		<b>30</b>