

Biology (BIOL)

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The objectives of the Department of Biology are to provide students with:

- An understanding of living matter in its relation to the inorganic and organic world, and in the variety of forms in which it is manifested,
- An awareness of the complexity of the interactions between organisms and between the living and non-living worlds,
- A sense of the continuity of life,
- An appreciation of what the scientific method can achieve in biology,
- A knowledge of the structure and function of the human body, and
- Understanding of the human role in Christian stewardship of the environment.

A student who successfully meets these objectives will be prepared to:

- Enter graduate or professional programs in biology or the health care professions
- Prepare for teaching biology in secondary or middle schools and to
- Enter careers related to the biological sciences

Major requirements for the B.A. degree in Biology

Required semester hours

36 sh

Prerequisites and supporting courses

CHEM 1150 and 1160; CHEM 2310 or 1021 and 1031

Required core courses

1. The four Introductory Biology courses: 12 sh (BIOL1250, 1260, 1270, 1280).
2. BIOL 3210 or BIOL 3230
3. One of BIOL 3150, 3180 or 3190
4. Upper Division Biology credit 16 sh (courses numbered 2100 or above), 6 upper division courses that could include up to 4 sh of internship and/or independent study
5. No more than a total of 8 sh of the BIOL 2100 or BIOL 4020 can apply to the major.
6. Pass BIOL 4901 - Comprehensive Exam

Notes and restrictions

Biology majors must take a biology comprehensive exam and receive a minimum passing grade during the last year prior to graduation.

Honors

To be accepted into the Biology Honors Program:

1. The applicant must have received credit for three biology courses above BIOL 1280.
2. The applicant must have received credit for one year of General Chemistry.

To complete the Biology Honors program students must:

1. Complete 44 sh of biology, which should include BIOL 1250, 1260, 1270, 1280 or BIOL 1270, 1280, 1350, 1360 and 4 sh of BIOL 4020 (seminar) or the Biology 2100 series (2100-2170), BIOL 2950, and BIOL 4000.

- A maximum of 4 sh of BIOL 4000 credit can be counted toward the major.
2. Complete the following supporting courses: one year of Organic Chemistry and one semester of Calculus or Statistics.
 3. A Biology GPA of 3.50.
 4. Completion of 4sh of Directed Research (BIOL 4930) or an internship with a research component.
 5. Take the Biology Comprehensive Exam and receive a passing grade at or above the 75th percentile. For general Departmental Honors requirements and BIOL 4000 course description, see appropriate sections of this catalog.

Major requirements for the B.S. degree in Biology

Required semester hours

44 sh

Prerequisites and supporting courses

CHEM 1150, 1160, 2310

Required core courses

1. The four introductory Biology courses: 12 sh (BIOL 1250, 1260, 1270, 1280).
2. BIOL 3210 or BIOL 3230
3. One of BIOL 3150, 3180 or 3190
4. Upper division Biology credit: 24 sh (courses numbered 2100 or above). Eight upper division courses must include 4 sh of internship and/or directed research or honors research.
5. No more than a total of 8 sh of the BIOL 2100 or BIOL 4020 can apply to the major.
6. Pass BIOL 4901 - Comprehensive Exam

Notes and restrictions

Biology majors must take a biology comprehensive exam and receive a minimum passing grade during their last year prior to graduation.

Honors

To be accepted into the Biology Honors program:

1. The applicant must have received credit for three biology courses above BIOL 1280.
2. The applicant must have received credit for one year of General Chemistry.

To complete the Biology Honors program students must:

1. Complete 44 sh of biology, which should include BIOL 1250, 1260, 1270, 1280, and 4 sh of BIOL 4020 (seminar) or the Biology 2100 series (2100-2170), BIOL 2950, and BIOL 4000.
 - A maximum of 4 sh of BIOL 4000 credit can be counted toward the major.
2. Complete the following supporting courses: 1 year of Organic Chemistry and one semester of Calculus or Statistics.
3. A Biology GPA of 3.50
4. Completion of 4 sh of Directed Research (BIOL 4930) or an internship with a research component.

5. Take the Biology Comprehensive Exam and receive a passing grade of at or above the 75th percentile. For general Departmental Honors requirements and BIOL 4000 course description, see appropriate sections of this catalog.

Major requirements for the B.S. degree in Clinical Laboratory Science

Required semester hours

40 sh (32 sh taken during the clinical training year)

Prerequisites and supporting courses

BIOL 2910, 2930, 3210, 3230, 3620

CHEM 1150, 1160, 2310, and 2320

STAT 1490

Required core courses

1. Two introductory Biology courses: 8 sh (BIOL 1250, 1260).
2. Topics in Clinical Lab Science: 32 sh (BIOL 4960 registered concurrently during clinical training year with topics including Microbiology I, Microbiology II, Immunology, Chemistry, Phlebotomy, Hematology, Body Fluids, and Education/Management)

Notes and restrictions

Clinical laboratory science majors must be accepted into and complete a program in Clinical Laboratory Science/Medical Technology for the professional training phase of the curriculum.

Major requirements for the B.A. degree in Environmental Science

Required semester hours

36 sh

Prerequisites and supporting courses

CHEM 1150, 1160, 2310 or 1021 and 1031, 2510

NPD 2000 Environmental Ethics, BIOL 4950 or equivalent

Required core courses

1. Four Introductory Biology courses: 10 sh (BIOL 1180, 1260, 1270, 1280).
2. 4 sh (BIOL 3180)
3. Upper Division Biology credit 22 sh from the following courses: BIOL 2110, 2115, 2120, 2125, 2130, 2160, 3150, 3170, 3190, 3200, 3790, 3890, 4950, PHYS 1070
4. Pass BIOL 4901 - Comprehensive Exam

Notes and restrictions

Biology majors must take a biology comprehensive exam and receive a minimum passing grade during the last year prior to graduation.

Major requirements for the B.S. degree in Environmental Science

Required semester hours

44 sh

Prerequisites and supporting courses

CHEM 1150, 1160, 2310, 2510

NPD 2000 Environmental Ethics, BIOL 4950 or equivalent

Required core courses

1. Four Introductory Biology courses: 10 sh (BIOL 1180, 1260, 1270, 1280).
2. 4 sh (BIOL 3180)
3. Upper Division Biology credit 30 sh
 - 4 sh BIOL 4930 or 4970
 - 26 sh from BIOL 2110, 2115, 2120, 2125, 2130, 2160, 3150, 3170, 3190, 3200, 3790, 3890, 4950, PHYS 1070
4. Pass BIOL 4901 - Comprehensive Exam

Notes and restrictions

Biology majors must take a biology comprehensive exam and receive a minimum passing grade during the last year prior to graduation.

Minor requirements in Biology

Required semester hours

26 sh

Required core courses

Required courses:

1. The four introductory Biology courses: 12 sh
2. Upper division Biology credit: 14 sh

A minimum of 8 sh must be chosen from 4 sh Biology courses numbered 2000 or above.

GE Designates a course that fulfills all or part of a General Education (G.E.) requirement; see the General Education Program section of the catalog for more information.

1160 **Microbes and Society (2 sh)** GE

This course will focus on the importance of microbes in our world. Their role in disease, decomposition, biotechnology and products for health will be emphasized. The laboratory will concentrate on microbial identification, role in food production and spoilage, and problem solving ability.

1180 **Introduction to Environmental Science (2 sh)** GE

Survey of fundamental ecological principles supporting human society, Examination of the effect human beings have on the earth's support system and the other living things with which humans share the earth. The role of values and ethical implications of environmental decision-making. Field trips to a variety of urban support systems: water purification, waste treatment, solid waste management. Lab included.

1250 **Introduction to Human Anatomy (4 sh)** GE

Includes structure and organization of human organ systems emphasizing skeletal, muscular, digestive, circulatory, respiratory, nervous, and urogenital systems. Lab included. It is recommended that the student complete one year of high school laboratory science.

1260 **Introduction to Cell Biology (4 sh)** GE

Includes cell systems, cell cycles, cell function, energy relationships and metabolic systems, biological control systems, protein synthesis, genetics. Lab included. It is recommended that the student complete one year of high school laboratory science.

1270 Introduction to Zoology (2 sh)

Survey of selected invertebrate and vertebrate types. Relationships of organisms with each other and with their environment. Lab included. Prerequisite: BIOL 1250 or 1260.

1280 Introduction to Botany (2 sh)

Survey of the plant kingdom from algae to the flowering plants. Basic life processes including photo responses, cellular and plant systems development, reproductive cycles, flowering and fruiting responses. Environmental succession and plant climax communities. Lab included. Prerequisite: BIOL 1250 or 1260.

2100 Topics in Biology (2 sh)

Selected topics in biology offered on a rotating basis. Example topics: Phylogenetic Theory, Topics in Physiology, Endocrinology, Virology, Medical Parasitology, Advanced Human Anatomy. Lab included with some topics. Some topics will have prerequisites (see annual class schedule).

2110 Economic Botany (2 sh) GE

Influence of plants on human, economic, social, and political history, and the plants people have chosen to protect and cultivate. Numerous field trips include plant production facilities, bakery, commercial greenhouse, apple orchard, farm, and meetings with resource persons working with cultivated plants. Two one night fieldtrips and weekly lab included.

2115 Prairie and Ranch Resources (2 sh) GE

A two week summer field based course taking place on the prairies of central South Dakota. Factors forming and affecting native tall and mid-grass prairie will be examined. The impact of modern row crop and grazing animal agriculture upon prairie resources will be evaluated. Each student will participate in a field ecology assessment of water quality, prairie dog colony, or nesting bird habitat quality. A course trip fee over and above tuition will be assessed. Instructor consent is required.

2120 Ecology of the Boreal Forest (2 sh) GE

A two week summer wilderness canoe trip to the Canadian Province of Ontario and its Woodland Caribou Provincial Park. Students will fly by floatplane to an interior lake and wilderness camp and canoe 8 days and travel over 40 miles to be picked up by vehicle at the conclusion of the trip. Forces of fire ecology, environmental factors, indigenous culture, park management, and the impact of modern culture upon the Boreal Forest will be examined and experienced. A course trip fee of \$1500 will be assessed. Students need a valid passport. Trip runs from August 14th through August 28th. Instructor consent required.

2125 Tropical Ecology of Costa Rica (2 sh) GE

Field based course examining the forces affecting living species in Costa Rica. After a series of weekly on campus meetings to review basic ecology and human culture of Costa Rica, students will travel during spring break for an 8 day field trip to Costa Rica. Traveling by motor coach and boat the course will examine high altitude volcanic effects, mountain tropical forest habitat, and low-land tropical forest along the Pacific Ocean in southwest Costa Rica. A course trip fee over and above tuition will be assessed, a valid passport required. Instructor consent is required.

2130 Ecology of Iceland (2 sh) GE

A field based course exploring the forces affecting living species in Iceland. This course is offered during the summer session [May term]. An initial series of on-campus sessions provides preparation for a two week trip to Iceland. The trip will explore areas including the geothermal areas, glaciers, and coastal regions of Iceland. Travel

by motor coach will follow the ring road, visiting all major regions of the island. Emphasis will be given to factors such as physical factors of the environment and island biogeography. Expected elements include a whale watching expedition and a visit to a puffin breeding colony. Environmental issues including international fishing, impact of geothermal and hydroelectric energy development, and population genetics will be discussed as they relate to Icelandic and global concerns. A course trip fee over and above tuition will be assessed. Student will need a valid passport. The course may be offered in conjunction with a 2 sh Topics in Physics course. Instructor consent is required.

2910 Microbiology (4 sh)

Selected aspects of morphology, classification, physiology, cultivation, and staining of microorganisms; relation of microorganisms to sanitation, agriculture, and industry. Disease production by microorganisms and the role of the immune system in resistance mechanisms. Lab included. Prerequisite: BIOL 1260.

2930 Advanced Human Physiology (4 sh)

Structure and function of the circulatory, respiratory, endocrine, muscular, digestive, excretory, and reproductive systems of the body. Lab included. Prerequisite: BIOL 1250.

2950 Medical Parasitology (2 sh)

This course emphasizes the geography, life cycles, clinical presentations and impact of parasitic diseases on global health. Protozoans, nematodes, trematodes, cestodes and arthropods will be covered. Students should have completed human anatomy and microbiology prior to this course. Prerequisite: BIOL 1250, 2910.

3140 Histology (4 sh)

Micro-anatomy of vertebrate tissues with emphasis on mammals. Lab included. Prerequisite: BIOL 1250, 1260.

3150 Biodiversity and Evolution (4 sh)

This course examines the efforts to understand biological origins and diversity. Patterns and principles of biodiversity and the significance of diversity will be considered. Emphasis will be placed on the principles and process of evolution rather than on the products of evolution. The class will include lecture, discussion, and workshop elements. Prerequisite: BIOL 1250, 1260.

3160 Exercise Physiology (4 sh)

Study of human anatomy and physiology with emphasis on neuromuscular and cardiorespiratory systems, stressing the effects of exercise on those systems. Lab included. Cross-listed with EXS 3160. Prerequisite: BIOL 1250.

3170 Native Wildflowers, Trees and Shrubs of The Great Lakes Region (4 sh)

A survey of the native spring wildflowers, common trees and shrubs of the Great Lakes Region. Particular attention will be given to the use of taxonomic keys and field guides in field identification as well as information on the general ecology of each species. Weekly field trips to local and regional forest preserves, natural areas and a weekend field trip to Southern Illinois will be required. Lab included. Prerequisite: BIOL 1280.

3180 Ecology (4 sh)

Study of living and non-living factors in biotic communities and their interaction in controlling the structure and development of various ecosystems. Principles of succession, population dynamics, and conservation. Lab included. Prerequisite: BIOL 1270, 1280.

- 3190 Ethology (Animal Behavior) (4 sh)**
An introduction to the study of ethology (animal behavior) with emphasis on the development of behavioral patterns, orientation, maintenance behavior, and social behavior. Three supplemental field trips per term. Lab included. Prerequisite: BIOL 1250, 1270.
- 3200 Natural History of the Vertebrates (4 sh)**
This course will focus on the identification, habitat and natural history, and life history of vertebrates. Biodiversity and Strategies for survival are central themes. Fish, amphibians, reptiles, birds and mammals will be included with an emphasis on the vertebrates of North America.
- 3210 Genetics (4 sh)**
An introduction to Mendelian and non-Mendelian inheritance patterns as well as molecular genetics and biotechnology. The laboratory includes fruit fly genetics and standard DNA cloning techniques. Prerequisite: BIOL 1260.
- 3230 Molecular Biology (4 sh)**
A study of genes and gene regulation of living matter at the molecular level. Particular attention will be given to modern biotechnology, genomics, and gene functions. Prerequisite: BIOL 1260, 2910.
- 3510 Embryology (4 sh)**
Germ cell formation, fertilization, cleavage, gastrulation, and organogenesis in vertebrates. Extra-embryonic membranes and their functions. Study of the frog, the chick, and the pig. Lab included. Prerequisite: BIOL 1250, 1260, 1270.
- 3530 Neuroscience Systems (4 sh)**
Topics included but not limited to neuroanatomy of the central and peripheral nervous systems, and the neural networks of motor/sensory pathways, special senses, movement, language, emotion, and memory. Relevant diseases and conditions corresponding to the topics covered will also be discussed. Laboratory included. Prerequisite: BIOL 1250
- 3610 Medical Microbiology (2 sh)**
Identification of pathogenic organisms. A study of infectious diseases caused by these organisms. A study of the major antimicrobial agents used for the treatment of the common microbial diseases. Interpretation of laboratory tests used to identify pathogenic organisms. Lab included. Prerequisite: BIOL 1250, 1260, 2910.
- 3620 Immunology (2 sh)**
A detailed study of the immune system, stressing its role in protecting humans from the pathogenic microbes. The problems associated with hypersensitivity, immunodeficiency, and autoimmunity will be covered. The basis of clinically important immunological tests used in the diagnosis of infectious diseases will be presented. Lab included. Prerequisite: BIOL 1250, 1260, 2910.
- 3790 Advanced Topics in Botany (3 or 4 sh)**
Advanced topics in botany, taught at the Morton Arboretum through the ACCA Botany Consortium. Topics include medical botany, plant-soil associations, fungi, horticulture, woody plants of the Western Great Lakes Region and plant-animal associations. Students must provide their own transportation to the Arboretum. Lab included. Prerequisite: BIOL 1280.
- 3890 Marine and Aquatic Biology (4 sh)**
Advanced topics in marine and aquatic biology. May include extended field trips using the research facilities of the Shedd Aquarium. Topics with field trips may have enrollment restrictions and require special application and approval. Extended field trips will incur additional expense. Topics may include: introduction to marine biology, and field research in Bahamian reptiles. Some topics may require additional prerequisites or instructor approval. Repeatable. Taught at Shedd Aquarium. Lab included. Prerequisite: BIOL 1270, 1280.
- 4000 Departmental Honors in Biology (4 sh)**
Honors Independent Study in Biology. Lab included.
- 4020 ACCA Seminar (1 sh)**
Discussion of current topics in selected areas of biological research. Held at various ACCA (Associated Colleges of the Chicago Area) Institutions. These seminars are coordinated by professors from member schools and utilize research specialists from the Chicago area as speakers. Student must be of third or fourth year standing.
- 4901 Biology Comprehensive Exam (0 sh)**
Comprehensive examination of major requirements.
- 4930 Directed Research in Biology (2-4 sh)**
This course is open to Biology majors with at least a GPA of 2.5 in at least 20 semester hours of Biology taken at North Park. Students will work under the direction of a faculty mentor on a novel research project. Permission of the faculty mentor and the departmental chairman is required prior to enrollment in this course. A maximum of 4 sh may be taken.
- 4950 AuSable Institute of Environmental Studies (4-8 sh)**
Courses and field work at the Au Sable Institute in Michigan. Course topics include Land Resources, Natural Resources, Ethnobotany and Ecological Agriculture, Field Botany, Animal Ecology, Water Resources, Aquatic Biology, and Ecology of the Indian Tropics. Lab included. Departmental approval required.
- 4960 Topics in Clinical Lab Science (1-6 sh)**
This course is open only to Clinical Lab Science majors and only during the clinical year of their training. Topics include but are not limited to Microbiology, Immunology, Chemistry, Blood Bank, Hematology, Body Fluids, Education and Management. Course may be taken concurrently and for up to 32 semester hours of credit.
- 4970 Internship in Biology (1-4 sh)**
On-site apprenticeship in area business or organization. A maximum of 4 semester hours of credit can count toward the major. The student must have completed at least 16 sh of credit in biology and have a GPA of at least 3.00 in Biology. Departmental approval required. Please refer to the internship section for additional requirements. Lab included with some topics.