School of Arts and Sciences

BIOLOGICAL SCIENCES

www.pitt.edu/~biology

As one biology professor at Pitt puts it, "Intro to Biology—that's life!" Whether it's physiology, biochemistry, ecology, or genetics, the biological sciences seek to examine and understand the intricate and amazing fabric of our living world. It is an especially exciting time to do so—major advances in biological and medical research seem to make headlines and magazine covers on a weekly basis. Some of the exciting research being conducted by University of Pittsburgh faculty in this department includes vaccine development for bacterial infectious diseases, understanding cardiac arrythmias through computer simulations, the conservation of wild plant species, gene function in developmental biology, and the use of biological agents for environmental remediation, such as in oil spills.

The undergraduate program in biological sciences introduces students to many fascinating, significant topics in biology, while providing a firm background in basic biological principles and practices. The curriculum combines lecture and laboratory work with field study, opportunities for undergraduate research and teaching, internships, and the chance to interact closely with faculty and fellow students. As biological sciences majors, students can select from a variety of upper-level courses to individualize their studies and reflect their particular interests.

An undergraduate degree in biological sciences can be used for employment in a field where general familiarity with biological topics would be required or helpful. This includes biological or medical research laboratories, biological or pharmaceutical supply industries, scientific libraries and museums, scientific journalism, and industries whose products or byproducts have a potential impact on the environment. It also fulfills the basic requirements for admission to medical and dental schools, other health professional schools, and many graduate programs, and is often chosen by undergraduates interested in attending a program in physical therapy, secondary education, or public health.

Required Courses
(University Honors College equivalents of some of these courses are also available.)

Freshman and Sophomore Years:

1. **Biology Courses**

BIOSC 0150 Foundations of Biology 1* (3 cr.)
BIOSC 0050 Foundations of Biology Laboratory 1* (1 cr.)
This course and concurrent lab are the first of a two-part introductory biology series (followed by BIOSC 0160 and 0060). The cellular and chemical basis of life and the processes common to all living organisms, such as nutrition, metabolism, gas and fluid transport, and hormonal and neuronal control are covered.
BIOSC 0160 Foundations of Biology 2* (3 cr.)
BIOSC 0060 Foundations of Biology Laboratory 2* (1 cr.)
The second part of the two-part introductory biology series, this course and concurrent lab focus on populations of organisms and their genetics, reproduction, ecology, and evolution through lecture and laboratory work. Students will attend one lab at the Carnegie Museum of Natural History.
BIOSC 0350 Genetics (3 cr.)
This lecture course examines the role of genes as the basis for molecular inheritance and the distribution and activity of genes in populations.

BIOSC 0370 Ecology (3 cr.)
Through lectures and readings, this course provides a broad introduction to the topic of ecology on the organismal, population, community, and ecosystem levels.

or

BIOSC 1130 Evolution (3 cr.)
As an introduction to biological evolution, this course emphasizes how the history of life is studied in the context of scientific methodology. Topics addressed include inheritance and variation, population genetics, natural selection, adaptation, the fossil record, phylogenetics, and the origin of evolutionary novelties, including molecular characters. This course is usually taken in the junior or senior year.

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2. **Chemistry Courses**
   CHEM 0110 General Chemistry 1* (4 cr.)
   CHEM 0120 General Chemistry 2* (4 cr.)
   CHEM 0310 Organic Chemistry 1 (3 cr.)
   CHEM 0320 Organic Chemistry 2 (3 cr.)
   CHEM 0330 Organic Chemistry Laboratory 1 (1 cr.)
   CHEM 0340 Organic Chemistry Laboratory 2 (1 cr.)

3. **Math/Quantitative Courses**
   It is advisable to complete these courses in the freshman year.

   MATH 0220 Analytical Geometry and Calculus 1 (4 cr.)
   MATH 0230 Analytical Geometry and Calculus 2 (4 cr.)

   OR

   STAT 1000 Applied Statistical Methods (4 cr.)

Computer Proficiency: It is strongly recommended that you become familiar with the computers and software for word processing, electronic mail, database, and Internet access by the end of the freshman year. This may be achieved by participating in various credit or noncredit courses and workshops offered by Computing Services and Systems Development. or by peer or self-instruction.

Junior and Senior Years:

1. **BIOSC 1000 Introductory Biochemistry (3 cr.)**
   This course emphasizes the relationship between chemical structure and biological function, covering topics such as protein structure and synthesis, nucleic acid structure and synthesis, biological catalysis and pathways, and regulation of intermediary metabolism. It is designed for students who do not wish to major in biochemistry. Alternately, this requirement can be fulfilled by taking both BIOSC 1810 Macromolecular Structure and Function (3 cr.) and BIOSC 1820 Metabolic Pathways (3 cr.). If this option is taken, students are only required to take an additional 12 credits in BIOSC courses rather than 15 credits as described below.

2. **Physics Courses**
   PHYS 0110 Introduction to Physics 1 (3 cr.)

   OR

   PHYS 0111 Introduction to Physics 2 (3 cr.) (algebra-based)
   PHYS 0104 Basic Physics for Science and Engineering 1 (3 cr.)
   PHYS 0105 Basic Physics for Science and Engineering 2 (3 cr.)
   PHYS 0106 Basic Physics for Science and Engineering 3 (calculus-based) (3 cr.)

   Recommended: PHYS 0212 Introduction to Laboratory Physics (2 cr.) or PHYS 0219 Basic Laboratory Physics for Science and Engineering (2 cr.) is required for admission to many graduate programs, all medical schools, and some dental schools.

3. **Electives**
   Fifteen credits in BIOSC courses, including lectures above the 1000 level and at least two laboratory courses or one laboratory and one field course above the level of BIOSC 0060 Foundations of Biology Laboratory 2. The following courses cannot be used to fulfill this requirement: BIOSC 0800 Biology for Nonmajors 1, BIOSC 0810 Biology for Nonmajors 2, BIOSC 1901 Independent Study, BIOSC 1903 Undergraduate Research, BIOSC 1904 Undergraduate Honors Research, or BIOSC-WRIT courses.

   Note: Up to six credits from a list of approved courses offered by the anthropology and neuroscience departments may be used toward the biological sciences major.

Related Area: The School of Arts and Sciences requires that students complete 12 credits in a topic complementing their major. This is fulfilled by the required work in chemistry.

Biological Sciences Course List

Courses are three credits unless otherwise noted.

0050 Foundations of Biology Laboratory 1
0060 Foundations of Biology Laboratory 2
0150 Foundations of Biology 1
0160 Foundations of Biology 2
0350 Genetics
0370* Ecology
0390* Ecology Laboratory

Upper-Level Courses—BIOSC 0060 and 0160 are prerequisites for all of the following courses except 1380, 1901, 1903, and 1904.

1000 Introductory Biochemistry
1010 Writing in Biological Sciences
1030 Commercial Microbiology
1050 Special Topics in Marine Biology
1060 Special Topics in Biology
1120 Biostatistics
1130 Evolution
1140* Behavioral Ecology
1160* Forest Ecology
1170* Limnology
1180* Ecology of Amphibians and Reptiles
1190* Aquatic Entomology
1200 Vertebrate Morphology
1210 Vertebrate Morphology Laboratory
1230* Avian Ecology
1240 Human Skeletal Analysis
1250 Human Physiology
1260* Aquatic Botany
1270* Ecology of Fish
1280 Microbial Genetics
1290 Microbial Genetics Laboratory
1291 Microbial Genetics Writing Practicum
1300* Vertebrate Community Ecology
1320 Population Biology
1330* Field Botany
1350 Introduction to Plant Biology
1360* Microbial Ecology
1370 Biogeography
1380 Global Ecology
1390* Ecology of Invertebrates
1410* Mammology (Vertebrate Ecology)
1450 Histology: Development and Differentiation
1460 Economic Botany
1470 Biophysical Chemistry
1480 Embryology
1490 Embryology Laboratory
1500 Cell Biology
1510 Cell Biology Laboratory
1511 Cell Biology Writing Practicum
1520 Developmental Biology
1530 Developmental Biology Laboratory
1550 Ecology and Evolution Seminar
1551 Ecology and Evolution Writing Practicum
1560 Cell and Developmental Biology Seminar
1570 Microbiology Seminar
1580 Biochemistry Seminar
1590* Special Topics in Biological Science
1600* Stream Ecology
1690 Experience in Undergraduate Teaching
1730 Virology
1740 Virology Laboratory
1750 Immunology Laboratory
1760 Immunology
1810 Macromolecular Structure and Function
1820 Metabolic Pathways
1830 Biochemistry Laboratory
1850 Microbiology
1855 Introduction to Experimental Microbiology
1860 Microbiology Laboratory
1870 Animal Physiology
1880 Animal Physiology Laboratory
1890 Advanced Topics in Microbiology
1901 Independent Study
1903 Undergraduate Research
1904 Undergraduate Honors Research
1940 Molecular Biology
1950 Molecular Genetics Laboratory
1951 Molecular Genetics Laboratory Writing Practicum

*Summer field courses taught at Pymatuning Laboratory of Ecology

Courses for Nonmajors
0800 Biology for Nonmajors 1
0810 Biology for Nonmajors 2

Opportunities for Graduates with a BS in Biological Sciences

Employment opportunities include laboratory/research technicians in medical, industrial, and university laboratories; careers with public health, environmental, food and drug agencies, ranging from research to education and outreach; or sales work for pharmaceutical products, laboratory equipment and supplies, or industrial equipment in areas such as large-scale fermentation or wastewater treatment.

Many students elect to continue their education, going on to technical one-year programs in areas of nuclear medicine, cytotechnology, emergency medical techniques, respiratory therapy, and medical technology; certification and master's programs in secondary education for science and/or biology; Master of Science programs in biological sciences, public health, environmental studies, biotechnology, toxicology, forensic science, genetic counseling, and education; or health professional schools such as medicine, dentistry, veterinary medicine, optometry, podiatry, physical therapy, physician's assistant, etc. The core requirements of our four majors include the basic science courses needed to apply to health professional programs; research-oriented PhD programs that prepare individuals for university teaching and research, high-level government and industrial research, and administration positions; and other programs.

For information on the department's three other majors—ecology and evolution, microbiology, and molecular biology, please contact:
University of Pittsburgh
School of Arts and Sciences
Biological Sciences Advising Office
Langley Hall, Fourth Floor
Pittsburgh, PA 15260
Christine Berliner, 412-624-4819, christin@pitt.edu
Dale Pasino, 412-624-4273, dap60@pitt.edu
www.pitt.edu/~biology

For information on other majors, please contact:
University of Pittsburgh
Office of Admissions and Financial Aid
Alumni Hall, 4227 Fifth Avenue
Pittsburgh, PA 15260
412-624-PITT
E-mail: oafa@pitt.edu
www.oafa.pitt.edu

Special Programs

Pymatuning Laboratory of Ecology
The University's Pymatuning Laboratory of Ecology is a field station, located 100 miles north of Pittsburgh, that is dedicated to environmental education and ecological research. Students can take courses at this unique facility and do research in its labs from May through August. In each three-week course, students receive hands-on experience exploring ecological systems in the surrounding forests, wetlands, and bodies of water, and live in on-site housing facilities located beside Pymatuning Lake. Recreational activities include canoeing, bird watching, and volleyball.

Internships
There are many internship opportunities for students who would like to explore a particular interest or career path while earning academic credit. In the past, students have conducted internships in the School of Medicine's Department of Pathology, the Pennsylvania Department of Environmental Protection, the Allegheny County Coroner's Office, the Western Pennsylvania School for Blind Children, the Carnegie Museum of Natural History, and the tropical forests of Panama.

Undergraduate Research
We encourage undergraduate students to become involved in research in a field that interests them. By working with a research scientist, you will experience scientific research firsthand, use techniques and equipment not usually accessible to undergraduate students, and develop closer working relationships with faculty members. Undergraduate research also can help you focus your career path and prepare you for employment or a graduate or professional program. Research opportunities are available in a variety of settings, including labs in the Departments of Biological Sciences, Chemistry, or Neuroscience; Pymatuning Laboratory of Ecology; the School of Medicine; the Graduate School of Public Health; University hospitals; the University of Pittsburgh Cancer Institute; and the Western Psychiatric Institute and Clinic. Students usually pursue undergraduate research in their junior and senior years or during summers.

Volunteer Opportunities
There are many healthcare facilities associated with the University and in Pittsburgh where students are welcome to volunteer and gain valuable experience. Volunteer hours are often a requirement of admission to a health professional program. Consult the Department of Biological Sciences advising office for information on volunteer opportunities.

Study Abroad
Studying abroad is an exciting way to add an international perspective to your undergraduate education and strengthen your credentials as a graduate. Since only about 8 percent of American students have studied abroad, this experience distinguishes you when you enter the job market or pursue graduate study. Studying abroad allows you to broaden your personal experience and gain an appreciation of other cultures while earning credits toward your degree. Scholarships are available, and financial aid is applicable. Biological sciences students who are interested in studying abroad should be aware that the possibilities to do so are abundant. There are programs in Australia—James Cook University, Griffith University, Macquarie University, and University of Sydney; Denmark; Ireland—University College Cork and University of Limerick; England—University of Sussex, University of Reading, and University of North London; Costa Rica; and Africa—University of Cape Town (South Africa), Tanzania.