BIOLOGY MAJOR (B.S.)

https://colsa.unh.edu/biological-sciences/program/bs/biology-major

Description

Biology is one of the most popular science majors since it provides a broad background in the biological sciences while allowing flexibility and specialization within the major. It integrates theoretical and practical (hands-on laboratory and field work) courses in different aspects of the biology of multi cellular life. It encompasses the study of structural and functional relationships of living organisms at the molecular, cellular, and organismal level, the interactions of living systems with the environment and with each other, and the evolutionary relationships of life. Our goal is to create an environment for those with a scholarly interest in the biological sciences, and to extend their understanding, awareness, and appreciation of the diversity inherent in the biological sciences. Our major is aimed at promoting an excellent education in biological sciences by involving undergraduate students in a strong interaction with faculty both in the classroom and in research laboratories.

The biology major prepares students for post graduate degrees in the biological and medical fields, and for job opportunities in industry (environmental, biomedical, pharmaceutical, and biotechnological) and governmental research, and secondary school teaching. Completion of the four-year undergraduate program plus a fifth-year internship will be necessary for biology teaching certification. Students who plan to enter medical, dental, or related professional schools are advised to confer with their faculty adviser to work the requirements for these programs into their academic majors.

Core courses in the biology major are from departments that contribute to the biological sciences community at UNH. The core curriculum consists of introductory and upper-level science courses plus seven additional courses in the biological sciences; three of these must be selected from course lists in three broad categories.

While students are advised to declare the biology major as incoming first-year students to assure adequate program planning, transfer into this major at a later stage is also possible. Several of the other biological science majors share the same biology core curriculum. For the first to two years, it is quite easy to change to or from these other majors.

Requirements

Biology Core Curriculum

The biology courses in the core curriculum constitute an integrated sequence that train students in the basic skills and concepts of knowledge inherent in the biological sciences. The biology core allows a student to obtain a broad background in biology, and in the related physical sciences and math that provide a foundation for success in understanding biological principals.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 400</td>
<td>Professional Perspectives on Biology ¹</td>
<td>1</td>
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<tr>
<td>BIOL 412</td>
<td>Introductory Biology: Evolution, Biodiversity and Ecology</td>
<td>4</td>
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<tr>
<td>BIOL 411</td>
<td>Introductory Biology: Molecular and Cellular</td>
<td>4</td>
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Biology Electives

In addition to the biology core curriculum, students must complete seven biology elective courses. One course must be taken from each of the three categories/disciplines; the other four electives can be chosen from the category lists or can be any other biological sciences course with approval of the student's adviser. At least two of these must be courses with labs. The last four courses must be 500-level or above. There must be one animal-identified course (A) and one plant-identified course (P). One capstone experience, supervised and approved within the major, is required of all seniors. The capstone requirement is completed in the senior year, and may be satisfied by a course (C), created work or product, or some form of experiential learning (e.g., honors thesis, mentored research project, and other special student activity). A complete list of approved courses in each category/discipline is available from the student’s adviser, the Department of Biological Sciences office, and the biology website at colsa.unh.edu/dbs/biology. (http://colsa.unh.edu/dbs/biology) Corequisite lecture and lab courses count as one course.

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<tr>
<td>BIOL 541</td>
<td>Ecology</td>
<td>4</td>
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<tr>
<td>BMS 503 &amp; BMS 504</td>
<td>General Microbiology and General Microbiology Laboratory</td>
<td>5</td>
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<tr>
<td>GEN 604</td>
<td>Principles of Genetics</td>
<td>4</td>
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<tr>
<td>CHEM 403 &amp; CHEM 404</td>
<td>General Chemistry I and General Chemistry II</td>
<td>8</td>
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<tr>
<td>MATH 424B or MATH 425</td>
<td>Calculus for Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 528</td>
<td>Applied Biostatistics</td>
<td>4</td>
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<tr>
<td>PHYS 401 &amp; PHYS 402</td>
<td>Introduction to Physics I and Introduction to Physics II</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 545 &amp; CHEM 546</td>
<td>Organic Chemistry and Organic Chemistry Laboratory ²</td>
<td>5</td>
</tr>
<tr>
<td>BMCB 668 &amp; BMCB 659</td>
<td>General Biochemistry and General Biochemistry Lab</td>
<td>5</td>
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Total Credits: 56

¹ BIOL 400 Professional Perspectives on Biology is required only for first-year biology majors.
² Students exploring pre-health professions should take a full year of Organic Chemistry (CHEM 651/653 and CHEM 652/654).

Category 1: Form and Function (Morphology, Anatomy and Physiology)

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<thead>
<tr>
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<tbody>
<tr>
<td>ANSC 511</td>
<td>Anatomy and Physiology (A)</td>
<td>4</td>
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<tr>
<td>ANSC 512</td>
<td>Anatomy and Physiology (A)</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 701</td>
<td>Physiology of Reproduction (A)</td>
<td>4</td>
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<tr>
<td>BIOL 701</td>
<td>Plant Physiology (P)</td>
<td>4</td>
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<tr>
<td>BIOL 702</td>
<td>Lab Techniques in Plant Physiology and Biochemistry (P, C)</td>
<td>4</td>
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<tr>
<td>BMS 507</td>
<td>Human Anatomy and Physiology I (A)</td>
<td>4</td>
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<tr>
<td>BMS 508</td>
<td>Human Anatomy and Physiology II (A)</td>
<td>4</td>
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<tr>
<td>BMS 702</td>
<td>Endocrinology</td>
<td>4</td>
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<tr>
<td>NR 625</td>
<td>Physiological Ecology</td>
<td>4</td>
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<tr>
<td>BMS 718</td>
<td>Mammalian Physiology (A)</td>
<td>4</td>
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<tr>
<td>ZOOL 518</td>
<td>Vertebrate Morphology (A)</td>
<td>5</td>
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ZOOL 625 Principles of Animal Physiology (A, ZOOL 626 Lab optional) 3
ZOOL 773 Physiology of Fish (A) 4
ZOOL 777 Neuroethology: The Neural Basis of Animal Behavior 3
MEFB 754 Anatomy and Function of Marine Vertebrates (SML, A) 4

Category 2: Genetics/Development (including molecular biology and bioinformatics)
ANSC 612 Genetics of Domestic Animals (A) 4
BMCB 605 Principles of Cell Biology 4
GEN 704 Genetics of Prokaryotic Microbes 5
GEN 705 Population Genetics 3
GEN 706 Human Genetics (A) 4
GEN 711 Genomics and Bioinformatics 4
GEN 771 Molecular Genetics 4
GEN 772 Evolutionary Genetics of Plants (P, C) 4
GEN 774 Techniques in Plant Genetic Engineering and Biotechnology (P, C) 4
ZOOL 529 Developmental Biology (A) 4
ZOOL 736 Genes and Behavior (A, C) 4

Category 3: Evolution, Ecology and Biodiversity (including population biology)
BIOL 510 Mushrooms, Molds, and Mildews: Introduction to the Fungal Kingdom 4
BIOL 550 Mushroom Madness 3
BIOL 566 Systematic Botany (P) 4
BIOL 601 Biology and Ecology of Plants (P) 4
BIOL 704 Plant-Microbe Interactions (P) 3
BIOL 720 Plant-Animal Interactions (P) 4
BIOL 752 New England Mushrooms: a Field and Lab Exploration 4
GEN 715 Molecular Evolution 4
MEFB 510 Field Ornithology (SML, A) 4
MEFB 530 Evolution and Marine Diversity 4
MEFB 625 Introduction to Marine Botany (P) 4
MEFB 630 Biodiversity and Ecology of Marine Invertebrates (SML, A) 4
MEFB 674 Ecology and Marine Environment (SML) 4
MEFB 714 Field Animal Behavior (SML, A, C) 4
MEFB 717 Lake Ecology 4
MEFB 725 Marine Ecology (C) 4
MEFB 747 Aquatic Plants in Restoration/Management (P) 4
NR 506 Forest Entomology (A) 4
NR 642 Introduction to Biogeography 4
NR 660 Ecology and Biogeography of New Zealand 5
NR 663 Applied Directed Research in New Zealand (C) 4
NR 712 Mammalogy (A) 4
NR 713 Quantitative Ecology 4
NR 765 Community Ecology 4
ZOOL 542 Ornithology (A) 4
ZOOL 555 Introduction to Entomology 4
ZOOL 613 Animal Behavior (A) 5
ZOOL 628 Marine Invertebrate Evolution and Ecology (A) 5

ZOOL 690 Evolution (C) 4
ZOOL 708 Stream Ecology 4
ZOOL 710 Elasmobranchs and Bony Fishes (A) 4
ZOOL 733 Behavioral Ecology (A, C) 4

Other Elective Options
BIOL 633 Data Analysis for Life Science 4
BIOL 675 Medical Botany 4
BIOL 700 Current and Controversial Issues in Biology 4
BIOL 711 Experimental Design & Analysis 4
BMCB 753 Cell Culture 5
BMS 602 Pathogenic Microbiology 5
BMS 655 Human and Animal Parasites (A) 3
BMS 703 Infectious Disease and Health 4
BMS 706 Virology 5
& BMS 708 and Virology Laboratory 5
BMS 711 Toxicology 4
HMP 501 Epidemiology and Community Medicine 4
MEFB 631 Ecotoxicology and Quantitative Reasoning 4
NSB 727 Animal Communication (A) 4
NSB 728 Research Methods in Animal Behavior (A) 4
PSYC 531 Psychobiology 4
SAFS 651 Plant Pathology (P) 4
ZOOL 610 Principles of Aquaculture 4
ZOOL 726 Conservation Behavior 4
ZOOL 750 Biological Oceanography 4

Note: It is strongly recommended that students participate in an exchange semester at another university, or in a field-oriented program or internship. There are many exchange opportunities available in which a full semester of credits toward the major may be earned. It is further recommended that students explore possibilities of one or more semesters of independent investigation (research projects). For details, students should contact their adviser. Financial support is available for most of these programs. In addition, students can explore the courses at the Shoals Marine Laboratory (SML), which provides an excellent setting for several "field-oriented" courses during the summer. Often there is financial support available for the SML programs. (See the SML website at https://marine.unh.edu/SML or the Cornell website at http://www.shoalsmarinelaboratory.org for details.)

One 600, 695, 795, or 796 experience totaling three or more credits or any two 795-796 experiences of two credits each can fulfill one course requirement in any category with adviser approval. A Petition for Academic Variance approved by the chair of the Department of Biological Sciences is required to count 795-796 experiences for more than one major-required course. Students should check the biology website colsa.unh.edu/dbs/biology (http://colsa.unh.edu/dbs/biology) and the UNH online catalog for updates and current course offerings.

Academic Requirements
To receive the B.S. degree in biology, students must complete 128 credit hours with at least a 2.0 cumulative grade-point average for completion of the degree. All UNH Discovery Program requirements, biology core curriculum requirements, plus seven additional courses from the biological sciences, and a capstone experience or course must be taken. The capstone explores areas of interest based on the integration of prior learning. Departments are responsible for certifying that graduating
seniors have met the capstone requirement for their majors. A minimum grade of C- is required in all biological science courses that are counted toward the requirements for a degree in biology. Students who expect to compete successfully for post-baccalaureate programs should attain a cumulative GPA of 3.0 or higher by the end of the sophomore year and maintain it at that level.