

BIOLOGICAL SCIENCES

Explore the living world through hands-on experience in the lab and in the field

Discover the inner workings of living organisms from molecules to ecosystems in our Biological Sciences program. As our largest and most popular major, the Biological Sciences program is designed to give you the degree you want — through self-designed concentrations, independent study, research projects, internships, job shadows, study abroad, and more.

You'll work with faculty mentors to customize your degree around your interests, allowing you to focus your learning in these diverse areas of study:

- Biology Teaching
- Biomaterials
- Cancer biology
- Ecology
- Genomics
- Microbiology
- Pre-Professional Health (Dental, Medical, Optometry, Pharmacy, Physician Assistant, Physical/Occupational Therapy, Veterinary, etc.)

All students, in consultation with their advisor, develop a self-designed concentration where they select a group of upper-level courses that represents their interest.

Research is central to this program, empowering you to explore, question and invent. Side-by-side with your classmates and professors, you'll conduct experiments in our state-of-the-art labs: general biology, advanced biology, microbiology, general chemistry and organic chemistry, as well as the cell culture research lab, microbiology research lab, and molecular biology research lab.

You'll also have the opportunity to apply your skills in the real world through experiential learning, including:

- robust job shadows at the Elliot Hospital Laboratory and other local medical facilities
- internships at Manchester Water Works, ARMI (Advanced Regenerative Manufacturing Institute), and biotechnology firms on campus in our Biotechnology Innovation Center as well as in the nearby Millyard
- summer research courses at Shoals Marine Laboratory
- study away opportunities such as investigating biological diversity in Belize or microbial ecology in Iceland

Through diverse areas of study, faculty experts and hands-on experience, you'll be prepared for success in graduate, medical or professional studies, and careers in industries from healthcare to agriculture to education.

Programs

- [Biological Sciences \(A.S.\)](#)
- [Biological Sciences Major \(B.A.\)](#)
- [Biological Sciences Minor](#)

Courses

Biological Science (BSCI)

BSCI 401 - The Secret Lives of Whales

Credits: 4

The evolution and classification of whales living in their global ocean ecosystem will be investigated along with the influence and impact of humans on whale populations throughout history. Current research methods used to perform whale research will be presented. The implementation and current status of the effects of regulation, enforcement, management on the conservation of whale populations will be discussed. The impact of climate change, pollution and ocean water quality will be investigated.

Attributes: Biological Science(Discovery)

Grade Mode: Letter Grading

BSCI 410 - Contemporary Health Issues

Credits: 4

This course exposes students to the three major dimensions of health - physical, emotional, and social. Nutrition, infectious diseases, substance abuse and addiction, mental health, sexual health, aging and stress management are among the issues that will be discussed. Students will learn to intelligently relate health knowledge to the social issues of the day.

Attributes: Biological Science(Discovery)

Grade Mode: Letter Grading

BSCI 421 - Diseases of the 21st Century

Credits: 4

Provides a basic understanding of several different diseases that may be prevalent over the next century. Treatment and prevention of the disease are also discussed. Students will acquire a basic understanding of the research methodologies underlying several fields within the biological sciences, such as microbiology, immunology, and molecular biology. Agents of biological warfare are also discussed.

Attributes: Biological Science(Discovery)

Prerequisite(s): ENGL 401 with a minimum grade of D-

Equivalent(s): UMST 599G

Grade Mode: Letter Grading

BSCI 432 - Medical Terminology

Credits: 2

This course is an introduction to medical terminology. The origin, roots, prefixes and suffixes of common scientific and medical terms are examined. Course is totally online and includes assigned online interactive material. Appropriate for biology majors, prePA, premed, and other interested majors.

Grade Mode: Letter Grading

BSCI 450 - The Small Microbial World

Credits: 0 or 4

An introduction to the invisible world of microbes and microorganisms and their impact on human life and ecosystems. Laboratory will be an opportunity for science and non-science students to learn the scientific method while they participate in citizen or crowdsourced science and contribute to scientific knowledge. Vaccines, antibiotics, and other topics will be presented.

Attributes: Biological Science(Discovery); Discovery Lab Course

Grade Mode: Letter Grading

Special Fee: Yes

BSCI 599 - Special Topics in Biology**Credits:** 1-4

This course explores and investigates topics in biology that would not normally be covered in other courses in the curriculum.

Repeat Rule: May be repeated for a maximum of 12 credits.**Grade Mode:** Letter Grading**BSCI 620 - Global Science Exploration****Credits:** 4

This course includes a spring break trip abroad investigating living organisms in their natural habitat. Students will participate in pre-trip seminars on the country, local flora, fauna and habitats they will visit. Students will design a project to integrate their personal interests and objections with in-country investigation. Post-trip seminar will focus on preparation of project and its presentation. May be repeated if the spring break trip is to a different country.

Attributes: Writing Intensive Course**Prerequisite(s):** (BIOL 413 with a minimum grade of C- and BIOL 414 with a minimum grade of C-) or (BIOL 411 with a minimum grade of C- and BIOL 412 with a minimum grade of C-).**Repeat Rule:** May be repeated for a maximum of 8 credits.**Grade Mode:** Letter Grading**Special Fee:** Yes**BSCI 650 - Antibiotic Discovery****Credits:** 0 or 4

Advanced students with microbiology experience will participate in a research project focused on the discovery of novel antibiotics from soil bacteria. Each student will work with faculty to generate hypotheses and carry out one or more short antibiotic discovery and/or antibacterial chemical experiments. Satisfies the Advanced Microbiology requirement for Biotechnology majors. No credit earned if previously taken BSCI 797/ Antibiotic Discov Research and BSCI 798/Antibiotic Discovery.

Attributes: Writing Intensive Course**Prerequisite(s):** (BMS 503 with a minimum grade of C- and BMS 504 with a minimum grade of C-) or BSCI 450 with a minimum grade of C-.**Grade Mode:** Letter Grading**Special Fee:** Yes**BSCI 670 - Clinical Pathophysiology****Credits:** 4

This course covers the principles and mechanisms of disease at the cellular, tissue, organ, and system levels, including responses to cell injury, death and adaptation, and inflammation. Acute and chronic disease processes as well as trauma are used to both understand the impact of these processes on body function as well as a means to gain a better understanding of integrative body systems. No credit if credit earned for BMS 794 or UMST 599 Clinical Pathophysiology.

Prerequisite(s): (BIOL 413 with a minimum grade of C- and BIOL 414 with a minimum grade of C-) or (BMS 507 with a minimum grade of C- and BMS 508 with a minimum grade of C-) or (BIOL 411 with a minimum grade of C- and BIOL 412 with a minimum grade of C-).**Equivalent(s):** BMS 704**Grade Mode:** Letter Grading**BSCI 680 - Pharmacology****Credits:** 4

This course is designed to cover the concepts of basic pharmacology and drug therapy. It includes examination of the body systems and the related drugs therapy within each system. It explores the basic drug groups, key similarities and differences among drugs in each group. Emphasis is placed on the mechanism of action for each group and how these medications act in relation to normative and pathophysiology. The therapeutic use and adverse effects of drugs as well as understanding recreational drug use will be included. No credit if credit received for UMST 599 Pharmacology.

Prerequisite(s): (BIOL 413 with a minimum grade of C- and BIOL 414 with a minimum grade of C-) or (BMS 507 with a minimum grade of C- and BMS 508 with a minimum grade of C-) or (BIOL 411 with a minimum grade of C- and BIOL 412 with a minimum grade of C-).**Mutual Exclusion:** No credit for students who have taken BMCB 760.**Grade Mode:** Letter Grading**BSCI 692 - Evolutionary Medicine****Credits:** 4

This course introduces the theory of evolution by natural selection and the influence of evolutionary theory on our understanding of the cause and treatment of human disease. Topics covered include evolutionary theory, natural selection, human evolution, pathogen evolution, evolutionary mismatch, and the evolution of aging, cancer, and reproduction.

Attributes: Writing Intensive Course**Prerequisite(s):** GEN 604 with a minimum grade of C-.**Grade Mode:** Letter Grading**BSCI 695 - Exploring Biology Teaching****Credits:** 1-4

Students assist in teaching labs in undergraduate courses supervised by the lab coordinator/instructor. Responsibilities include facilitating lab endeavors, giving a presentation, and writing a report.

Repeat Rule: May be repeated for a maximum of 4 credits.**Equivalent(s):** BIOL 695**Grade Mode:** Letter Grading**BSCI 701 - Senior Seminar I****Credits:** 1

To be taken during the last two semesters of the senior year as students complete their Capstone project. Course emphasizes written and oral communication, discussion of current topics in biology, and career guidance. Fall and spring semester.

Grade Mode: Credit/Fail Grading**BSCI #735 - Cell Biology****Credits:** 4

This course is an upper level biology class that expands on the basic knowledge of cellular structure and function. The focus is on molecular biology and cell signaling. Experiments by preeminent scientists are explored and analyzed.

Prerequisite(s): BIOL 413 with a minimum grade of C- and BIOL 414 with a minimum grade of C- and CHEM 403 with a minimum grade of C- and CHEM 404 with a minimum grade of C-.**Equivalent(s):** BMCB 605**Grade Mode:** Letter Grading

BSCI 737 - Microbial Genomics**Credits:** 0 or 4

Microbial genomics (primarily bacteria and bacteriophages) and genome-scale approaches to addressing questions in microbial physiology and pathogenesis are the focus of the course. Large-scale sequencing projects, genome structure and evolution, metagenomics, and other challenges in comparative genomics are discussed. Hands-on wet laboratory and bioinformatics projects are included in this laboratory-lecture course.

Prerequisite(s): GEN 604 with a minimum grade of C- and BMS 503 with a minimum grade of C- and BMS 504 with a minimum grade of C-.

Grade Mode: Letter Grading**Special Fee:** Yes**BSCI 740 - Aquatic Microbiology****Credits:** 4

Lectures and labs focus on Lake Massabesic and its use as the source of supply as the drinking water for approximately 160,000 New Hampshire residents. The course covers a basic history of the Lake, the importance of watershed protection, EPA regulations, and standards and the various techniques and methods available to analyze water for basic quality. No credit for students who have earned credit for UMST 599 Aquatic Microbiology.

Attributes: Writing Intensive Course

Prerequisite(s): BMS 503 with a minimum grade of C- and BMS 504 with a minimum grade of C-.

Grade Mode: Letter Grading**Special Fee:** Yes**BSCI 750 - Cancer Biology: From Benchtop Research to Therapeutic Interventions****Credits:** 4

The development and progression of cancer can be defined by several molecular and cellular biological characteristics. In this course, we will utilize primary literature to begin to understand (1) how specific cellular processes are altered during cancer initiation and progression; (2) how different cancers and the genetic landscape underlying them are being studied using models in the laboratory; and (3) how innovative therapeutics are being designed to target tumors based upon their individual molecular signatures.

Prerequisite(s): GEN 604 with a minimum grade of C-.

Grade Mode: Letter Grading**BSCI 792 - Research****Credits:** 1-4

Advanced independent research under the direction of a faculty mentor. Content area to be determined in consultation with faculty member. Prereq: permission. Up to 4 credits may be applied to self-designed concentration. Up to 4 credits may be applied to the Capstone requirement. Fall and spring semester.

Repeat Rule: May be repeated for a maximum of 8 credits.

Grade Mode: Credit/Fail Grading**BSCI 793 - Internship****Credits:** 1-4

Field-based learning opportunities in the biological sciences through placement in the appropriate outside agency, under the direction of a faculty mentor and representative of outside agency. Content area to be determined in consultation with faculty mentor. Up to 4 credits may be applied to self-designed concentration. Up to 4 credits may be applied to the Capstone requirement. Fall and spring semester.

Repeat Rule: May be repeated for a maximum of 8 credits.

Grade Mode: Credit/Fail Grading**BSCI #794 - Clinical Microbiology Internship****Credits:** 4

Advanced instruction in clinical bacteriology, mycology, parasitology, and/or virology at a local hospital or reference laboratory. Isolation, identification, determination of antibiotic sensitivities, and modern advanced testing for common pathogens are emphasized.

Prerequisite(s): BMS 602 with a minimum grade of C-.

Equivalent(s): BMS 751, BMS 761**Grade Mode:** Credit/Fail Grading**BSCI 795 - Independent Study****Credits:** 1-4

Advanced individual study under the direction of a faculty mentor. Content area to be determined in consultation with faculty mentor. Up to 4 credits may be applied to self-designed concentration. Up to 4 credits may be applied to the Capstone requirement. Fall and spring semester.

Repeat Rule: May be repeated for a maximum of 8 credits.

Grade Mode: Credit/Fail Grading**BSCI 797 - Special Topics in Biology****Credits:** 1-4

This course explores and investigates topics in biology and biotechnology that would not normally be covered in other courses in the curriculum.

Repeat Rule: May be repeated for a maximum of 12 credits.

Grade Mode: Letter Grading**BSCI 798 - Special Laboratory Topics in Biology****Credits:** 0-4

This laboratory course explores and investigates advanced topics in biology that would not normally be covered in other courses in the curriculum.

Repeat Rule: May be repeated for a maximum of 12 credits.

Grade Mode: Letter Grading

Faculty

[Biological Sciences Faculty](#)