

MARINE, ESTUARINE AND FRESHWATER BIOLOGY MAJOR (B.S.)

<https://colsa.unh.edu/biological-sciences/program/bs/marine-estuarine-and-freshwater-biology>

Description

The Major in Marine, Estuarine and Freshwater Biology is intended to give students interested in the fields of marine and freshwater biology the background to pursue careers, including potential advanced study, in this area of biology. The major builds on a broad set of basic scientific courses represented by a core curriculum in math, chemistry, physics and biology. The background in basic science is combined with a series of required and elective courses in the aquatic sciences from watershed to ocean. The goal is to provide a solid foundation of knowledge in freshwater, estuarine and marine biology while having the flexibility to focus on particular areas of scientific interest from molecular biology to ecosystem studies. Students will have the opportunity to specialize in areas of their own interest, such as aquaculture and fisheries or animal behavior.

The University's location and facilities provide unique opportunities for the study of aquatic organisms and systems due to its access to the seacoast and the lakes region of New Hampshire, White Mountain National Forest, and the presence of two coastal marine laboratories, as well as estuarine and freshwater facilities. There is a strong teaching and research emphasis on ecological and physiological processes in aquatic plants, animals and ecosystems. A major strength of the program is the hands-on approach to teaching combined with an emphasis on involving undergraduate students in research.

Requirements

| Code | Title | Credits |
|---------------------------------|---|---------|
| Biological Sciences Core | | |
| BIOL 412 | Introductory Biology: Evolution, Biodiversity and Ecology | 4 |
| BIOL 411 | Introductory Biology: Molecular and Cellular | 4 |
| BIOL 541 | General Ecology | 4 |
| BMS 503 & BMS 504 | General Microbiology and General Microbiology Laboratory | 5 |
| GEN 604 | Principles of Genetics | 4 |
| CHEM 403 | General Chemistry I | 4 |
| CHEM 404 | General Chemistry II | 4 |
| CHEM 545 & CHEM 546 | Organic Chemistry and Organic Chemistry Laboratory | 5 |
| BMCB 658 & BMCB 659 | General Biochemistry and General Biochemistry Lab | 5 |
| MATH 424B | Calculus for Life Sciences | 4 |
| or BIOL 633 | Quantitative Reasoning and Analysis for Life Sciences | |
| or BIOL 711 | Applied Biostatistics II | |
| BIOL 528 | Applied Biostatistics I | 4 |
| PHYS 401 | Introduction to Physics I | 4 |

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| PHYS 402 | Introduction to Physics II | 4 |
| MEFB Required Courses | | |
| MEFB 401 | Marine Estuarine and Freshwater Biology: Freshmen Seminar | 1 |
| MEFB 503 | Introduction to Marine Biology | 4 |
| MEFB 525 | Introduction to Aquatic Botany | 4 |
| MEFB 527 | Aquatic Animal Diversity | 4 |
| Choose one Freshwater course: | | 4 |
| MEFB 719 | Field Studies in Lake Ecology (C) | 4 |
| or MEFB 717 | Lake Ecology | |
| Choose one Physiology/Function course: | | 4-5 |
| ZOOL 625 & ZOOL 626 | Principles of Animal Physiology and Animal Physiology Laboratory | |
| or ZOOL 773 | Physiology of Fish | |
| Choose one Marine or Estuarine course: | | 4 |
| MEFB 725 | Marine Ecology | |
| or ZOOL 750 | Biological Oceanography | |
| MEFB Electives: Choose 3 | | |
| Evolution, Systematics and Biodiversity | | |
| BIOL 566 | Systematic Botany | 4 |
| GEN 713 | Microbial Ecology and Evolution | 4 |
| MEFB 625 | Introduction to Marine Botany | 4 |
| MEFB 722 | Marine Phycology | 4 |
| ZOOL 518 | Vertebrate Morphology | 5 |
| ZOOL 542 | Ornithology | 4 |
| ZOOL 628 | Marine Invertebrate Evolution and Ecology | 5 |
| ZOOL 690 | Evolution (C) ¹ | 4 |
| ZOOL 710 | Ichthyology | 4 |
| MEFB 510 | Field Ornithology (SML) | 4 |
| MEFB 630 | Biodiversity and Biology of Marine Invertebrates (SML) | 4 |
| MEFB 754 | Anatomy and Function of Marine Vertebrates (SML) | 4 |
| Fisheries and Aquaculture | | |
| ZOOL 610 | Principles of Aquaculture | 4 |
| ZOOL 710 | Ichthyology | 4 |
| ZOOL 750 | Biological Oceanography ¹ | 4 |
| ZOOL 772 | Fisheries Biology | 3 |
| ZOOL 773 | Physiology of Fish ¹ | 4 |
| MEFB 702 | Sustainable Marine Fisheries (SML) | 4 |
| Marine, Estuarine and Freshwater Ecology | | |
| NR 744 | Biogeochemistry | 4 |
| ESCI 501 | Introduction to Oceanography | 4 |
| GEN 713 | Microbial Ecology and Evolution | 4 |
| NR 504 | Freshwater Resources | 4 |
| NR 703 | Watershed Water Quality Management | 4 |
| NR 711 | Wetland Ecology and Management | 4 |
| MEFB 625 | Introduction to Marine Botany | 4 |
| MEFB 717 | Lake Ecology ¹ | 4 |
| MEFB 719 | Field Studies in Lake Ecology (C) ¹ | 4 |
| MEFB 725 | Marine Ecology (C) ¹ | 4 |
| MEFB 732 | Lake Management (C) | 4 |
| MEFB 747 | Aquatic Plants in Restoration/Management | 4 |

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| ZOOL 628 | Marine Invertebrate Evolution and Ecology | 5 |
| ZOOL #721 | Aquatic Invasive Species (C) | 4 |
| ZOOL 733 | Behavioral Ecology (C) | 4 |
| ZOOL 750 | Biological Oceanography ¹ | 4 |
| MEFB 515 | Marine Environmental Science and Conservation (SML) | 4 |
| MEFB 674 | Ecology and Marine Environment (SML) | 4 |
| MEFB 714 | Field Animal Behavior (SML) | 4 |
| MEFB 751 | Research in Marine Biology (SML, C) | 4 |
| Physiology, Behavior and Cell Biology | | |
| ANSC 701 | Physiology of Reproduction | 4 |
| BIOL 701 | Plant Physiology | 5 |
| BMCB 605 | Eukaryotic Cell and Developmental Biology | 4 |
| BMS 716 | Public Health: Food- and Water-borne Diseases | 4 |
| MEFB 714 | Field Animal Behavior (SML) | 4 |
| MEFB 727 | Algal Physiology | 3 |
| ZOOL 625 & ZOOL 626 | Principles of Animal Physiology and Animal Physiology Laboratory ¹ | 5 |
| ZOOL 733 | Behavioral Ecology | 4 |
| ZOOL 773 | Physiology of Fish ¹ | 4 |
| ZOOL 777 | Neuroethology | 3 |
| Research and Special Projects ² | | |
| BIOL 600 | Field Experience (C) | 1-4 |
| BIOL 795 | Independent Investigations (C) | 1-4 |
| BMS 795 | Investigations in Biomedical Science (C) | 1-8 |
| MEFB 732 | Lake Management (C) | 4 |
| MEFB 730 | Underwater Research (SML, C) | 4 |
| MEFB 751 | Research in Marine Biology (SML, C) | 4 |
| TECH 797 | Undergraduate Ocean Research Project (C) ³ | 2 |
| ZOOL 795 | Special Investigations (C) | 1-4 |

Capstone

¹ Courses used to satisfy MEFB major requirements may not also be used to satisfy the 3 required electives.

² Primary focus of the project must be Marine, Estuarine and/or Freshwater.

³ Year long course - 2 credits each semester

Courses marked with (SML) are courses taught in the summer at the Shoals Marine Laboratory.

Courses marked with (C) can be used to fulfill the Capstone requirement.

Courses listed in more than one category will satisfy requirements in only one category.

One 600 or 795 experience totaling three or more credits or any two 795 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 experiences for more than one major required course.

The capstone explores areas of interest based on the integration of prior learning. The capstone requirement may be satisfied through a course, created work or product, or some form of experiential learning (e.g., honors thesis, mentored research project, and other special student

activity). 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 MEFB. 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.

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. In addition, students should 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 for details <http://marine.unh.edu/sml/> or the Cornell web site at www.sml.cornell.edu (<http://www.sml.cornell.edu>)). 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.

Pre-health Professional Program

MEFB majors who wish to pursue postgraduate degrees in the health care professions should visit www.unh.edu/premed-advising (<http://www.unh.edu/premed-advising>). The following elective courses will be helpful in preparing for admission to post-baccalaureate programs in the health professions and for their required aptitude examinations: BMS 702, ZOOL 518, ZOOL 625 and ZOOL 626, BMCB 605, BMCB 751 and BMCB 752, ANSC 511 and ANSC 512.