MARINE BIOLOGY AND ECOLOGY

Dept. Code: MBE

Marine Biology and Ecology

The Bachelor of Science in Marine Biology and Ecology teaches fundamental concepts and precepts in ecology, physiology and organismal-environmental interactions. The educational goals are to understand the range of significant biological concepts from the molecular biology of DNA to how species interactions are affected by environmental change. These educational goals are enhanced by active research experiences that catalyze a student's understanding of the scientific process. This program is designed for students with a strong interest in academic research, graduate school, and professional careers that require critical thinking skills. For these high performing students, this program will develop competencies with which to successfully advance their careers.

While it is not required, there is enough flexibility in the Bachelor of Science in Marine Biology and Ecology program to allow students to do a minor or even a second major in the College of Arts and Sciences or other Schools. Students wishing to do a second major should review these disciplines for additional requirements.

MBE 504. Biology of Marine Mammals. 3 Credit Hours.
The purpose of this class is to introduce students to the biology, evolution, taxonomy, physiology, natural history, behavior, conservation, and management of marine mammals.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MBE 505. Marine Mammal Disease and Medicine. 3 Credit Hours.
This course will cover the basics (theory and application) of marine mammal disease and medicine. Applications will focus on the medical management of managed care and wild populations.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MBE 506. Procedures in Marine Mammal Health and Disease. 1 Credit Hour.
The aim of this course is to provide the student with more in-depth exposure and study of various practical health related techniques/skills that are integral to marine mammal health and disease assessment. While the procedures are most applicable to marine mammals in managed care, several of the procedures can be adapted and/or are used in study of wild marine mammals. Health and disease assessment procedures will be divided into the following five categories/areas: physical examination and behavioral assessment; multimodal and advanced diagnostics (eg., electrocardiogram, ultrasound, etc.); sample collection (types, procedures); clinical pathologic (eg., hematology, biochemistry, serology) interpretation; gross and histopathologic necropsy techniques and interpretation.
Components: LEC.
Grading: GRD.
Typically Offered: Summer.

MBE 507. Marine Mammal Applied Behavior Analysis and Managed Care. 3 Credit Hours.
This course involves a thorough examination of specific aspects of marine mammal managed care and conservation programs, with an emphasis on behavior management, analysis, and modification as a basis for adaptive response to changing environments both in-situ and ex-situ. Coursework will also focus on health management and assessment, emergency handling and transportation, government regulations, and wildlife conservation.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MBE 514. Tropical Marine Biology. 3 Credit Hours.
In this intensive one-week field course, students are introduced to the ecology, biology, and interconnections of all of South Florida's major marine habitats through a combination of lectures and field excursions from UM's remote private island research station in the Florida Keys.
Requisite: Senior Status.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MBE 515. Tropical Marine Ecology. 3 Credit Hours.
Marine ecology with emphasis on tropical ecosystems and local habitats. Physical environmental and biotic adaptations, population, and community ecology are discussed. Field exercises in mangrove, sea grass, and coral reef ecosystems are also included.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.
MBE 518. Reef Coral Biology, Ecology, and Conservation. 3 Credit Hours.
Scleractinian (stony) corals are the principal builders of contemporary coral reefs and their unique biology underpins the ecological success of reef ecosystems in the world's shallow tropical seas. This class covers the physiology and ecology of these critical organisms, the environmental factors governing their health, and their biotic interactions with other species. Examples of topics covered include algal symbiosis, calcification, reproduction, taxonomy, microbial ecology, competition with macroalgae, and herbivory, with insights at all levels from molecules to ecosystems. A special focus is on the decline of coral reefs due to anthropogenic stressors including climate change and coral bleaching, diseases, nutrient pollution, overfishing, and ocean acidification.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MBE 521. Field Techniques and Instrumentation in Tropical Marine Ecology. 3 Credit Hours.
This course covers the instrumentation and field techniques commonly used to characterize the structure and function of the three dominant ecosystems in the tropics and subtropics, i.e. coral reefs, seagrass beds and mangroves.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MBE 522. Marine Microbial Dynamics. 3 Credit Hours.
An overview of the function of microbes in the ocean from a chemical perspective, building a quantitative understanding of cellular needs and metabolic functions, and the role these microbial processes play in controlling chemical fluxes and biogeochemical cycles in the ocean.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MBE 529. Population Genetics and Genomics. 3 Credit Hours.
This course provides an introduction to population genetics, which examine the evolutionary processes that affect genomes of natural populations: mutation, genetic drift, natural selection, and gene flow.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MBE 532. Marine Mammal Research Techniques. 3 Credit Hours.
The goal of this course is to provide an overview of the field of marine mammal research (historic, current, and future), hands-on training in applied research skills relevant to the field of marine mammalogy, as well as an understanding of the biological and ecological significance of captive and wild research and contributions to management and conservation.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

MBE 535. Practical Computing for Biologists. 3 Credit Hours.
Practical Computing for Biologists is a problem-centric course that provides resources for biologists to analyze the increasingly complex data sets generated by new technologies. Flexible, scalable tools will be covered to accomplish a diversity of tasks using open source software. Topics will include: regular expressions, command line operations, Python programming, and bioinformatics pipelines. Exercises relevant to the students' needs will be used to illustrate and develop new skills. After doing several assigned homework problems, students will have an opportunity to develop a bioinformatic analysis on their own data set.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

MBE 539. Oceanic Productivity. 3 Credit Hours.
History, methods, and current topics relevant to studies of marine primary production. Magnitude and fate of primary production in the sea is essential to understand secondary production, the success of fisheries recruitment, and global climate.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.
**MBE 542. Oceans and Human Health. 3 Credit Hours.**
The objective of this interdisciplinary course is to provide students with introductory knowledge of the broad and relatively young field of Oceans and Human Health. The focus is the present, future, and potential effects of oceanic processes and aquatic organisms on human health, and vice versa. These diverse factors reflect the physical, chemical, biotic and social processes which require an integration of information and knowledge from the medical, marine and social sciences. The course covers harmful algal blooms, marine microbes, and global climate change as well as an overview of coastal impacts and remedies (e.g., drugs from the sea and marine models) through a series of coordinated lectures and case studies on human health, physical environment, and oceanographic processes. Prerequisite: Permission of instructor.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall.

**MBE 550. Analytical Techniques in Marine Biology. 2 Credit Hours.**
Theory and applications of selected analytical techniques necessary to conduct quantitative research in marine biology (e.g., electrophoresis, metabolite assays, enzyme assays, radioisotope methodology). One hour lecture followed by three hour laboratory per week.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**MBE 574. Special Topics. 1-4 Credit Hours.**
Lectures, research projects or directed readings in special topics related to Marine Biology and Fisheries.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**MBE 576. Diseases of Marine Organisms. 3 Credit Hours.**
Infectious, genetic, and environmentally induced diseases of marine fishes and invertebrates as well as diagnostic methods, cellular, and molecular pathology. Lecture, 3 hours.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Offered by Announcement Only.

**MBE 578. Evolutionary Genetics. 3 Credit Hours.**
A Graduate course that presents and overview from "New Evolutionary Synthesis" (1900) to Evolutionary Genomics. The critical points to emphasize is the importance of standing genetic variation, the role of neutral evolutionary process versus evolution by natural selection and how a evolution perspective provides meaning insights into the biology.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Fall.

**MBE 586. Fish Physiology. 3 Credit Hours.**
Ecology, dispersal, and modes of life of fishes. Adaptations by larvae and adults to various habitats are covered as well as the effects of man on fish faunas and the importance of fishes to various ecological systems. Lecture, 3 hours.

**Requisite:** Senior Status.

**Components:** LEC.

**Grading:** GRD.

**Typically Offered:** Spring.