

MAR

Marine Sciences

MAR 101-E Long Island Sound: Science and Use

An introduction to one of the region's most important coastal marine environments—Long Island Sound. The course traces the origin and development of the Sound; presents an overview of the natural physical, biological, chemical, and geological processes that characterize it; explores its importance to society and assesses how society's uses of the Sound have affected it; evaluates attempts to manage it; and looks at the future of the Sound.

3 credits

MAR 104-E Oceanography

An examination of the World Ocean and the processes that control its major features and the life that inhabits it. Suitable for non-science majors.

3 credits

MAR 301 Environmental Microbiology

Microbiological mediation of natural processes in marine, freshwater, soil, and groundwater habitats, as well as microbial potential for remediation of pollutants and public health issues. The course includes a survey of taxonomic and metabolic diversity, elementary cell biology, nutrition, environmental controls on physiology and adaptations, biogeochemical cycles, and modern methods of sampling and analysis. Not for credit in addition to BIO 357.

Prerequisites: BIO 202; CHE 131 or 141

4 credits

MAR 302 Marine Microbiology and Microbial Ecology

Introduction to the evolution, diversity, and importance of the microbial flora of the sea. Lectures highlight the physiological distinctions and ecological functions of each of the major microbial groups (viruses, bacteria, fungi, protozoans, algae). Particular emphasis is placed on the role of these microorganisms in many of the elemental (geochemical) cycles of the oceans. Aspects of the microbiota as agents of environmental pollution or detoxification are also discussed.

Prerequisites: BIO 201 and 202; CHE 132 or 142

Advisory Prerequisite: MAR 301

3 credits

MAR 303 Long Island Marine Habitats

The study of six representative marine environments around Long Island. Students visit the sites on weekly field trips, measuring environmental parameters and identifying common plants and animals. Using qualitative and quantitative methods in the field and in laboratory sessions, the class determines major factors that control the biological community in each habitat.

Prerequisites: U3 or U4 standing; BIO 201

Advisory Prerequisites: AMS 110 or other statistics course; MAR 101 or 104 or 333

4 credits

MAR 304-E Waves, Tides, and Beaches

A survey of water waves and tides, including both a description of the phenomena and the basic theory of waves and sediment transport. This background forms the basis for a description of shore processes including beaches, shoreface dynamics, and coastal erosion. Areas of current research are also discussed.

Prerequisite: MAT 127 or 132 or 142 or AMS 161

Advisory Prerequisites: MAR 101 or 104 or 333; PHY 122/124 or 126 or 132/134 or 142

3 credits

MAR 305 Experimental Marine Biology

Students design and conduct experiments in the laboratory and at local field sites, collect and analyze data, and use scientific literature to interpret and present results in papers and oral presentations.

Prerequisites: U3 or U4 standing; BIO 201.

Advisory Prerequisites: CHE 131 or 141; AMS 110 or other statistics course; MAR 101 or 104 or 333

3 credits

MAR 308 Principles of Instrumental Analysis

The development of familiarity in the laboratory with the techniques and instrumentation used in environmental analytical chemistry, emphasizing determination of trace inorganic species. Primary emphasis on applications utilizing the absorption of emission of electromagnetic radiation. Topics include metal determinations in sediment and in river water using molecular ultraviolet-visible and atomic absorption spectrometry.

Prerequisites: CHE 132/134 or 142/144

3 credits

MAR 315-H Conservation Biology and Marine Biodiversity

The fundamental concepts of Conservation Biology, a new synthetic field that incorporates principles of ecology, biogeography, population genetics, systematics, evolutionary biology, environmental sciences, sociology, anthropology, and philosophy toward the conservation of biological diversity. Examples drawn from the marine environment emphasize how the application of conservation principles varies from terrestrial, aquatic, and marine realms.

Prerequisite: BIO 351 or 353

3 credits

MAR 318 Engineering Geology and Coastal Processes

Fundamental concepts of soil, sediment, and rock mechanics and the physics of surficial processes. Application is made to problems of geotechnical and coastal engineering. Topics include consolidation, loose boundary hydraulics, slope stability, underground excavations and beach and tidal inlet stability, and channel sedimentation. This course is offered as both GEO 318 and MAR 318.

Prerequisites: GEO 122 or GEO 102 and 112; MAT 127 or 132 or 142 or 171 or AMS 161

3 credits

MAR 320 Limnology

The physical, chemical, and biological aspects of lakes and ponds. The morphology of lake basins, physics of water movement, water chemistry, and ecology of organisms are explored through lecture and laboratory instruction. The laboratory portion of the course includes field sampling to investigate temporal variation in water chemistry and plankton biology, and laboratory experiments to demonstrate important concepts.

Prerequisites: BIO 201; CHE 131 or 141

4 credits

MAR 333-H Coastal Oceanography

Aspects of physical, biological, chemical, and geological processes that characterize coastal marine environments. Topics include such natural phenomena as upwelling, particle transport, benthic/pelagic coupling, and barrier island processes, as well as the impacts of society on the Coastal Ocean.

Prerequisites: MAT 125 or 131 or 141 or AMS 151; completion of D.E.C. category E

3 credits

MAR 334-E Remote Sensing of the Environment

A study of the theory of remote sensing and its application in the fields of atmospheric science and oceanography. A discussion of the interaction of electromagnetic radiation with rough surfaces and the atmosphere is followed by a treatment of sensors and

platforms. The remainder of the course is devoted to data processing techniques involved in remote sensing.

Prerequisite: One of the following: ENS/PHY 119, PHY 127, PHY 132/134, or PHY 142

3 credits

MAR 336 Marine Pollution

A review of the sources, transport, and fate of toxic and non-toxic contaminants in the ocean. The interactions of biological, chemical, and physical processes that control the cycling and toxicity of contaminants are considered. Contaminants include metals, oil, halogenated hydrocarbons, radioactive wastes, excess nutrients, plastics, and solid wastes.

Prerequisites: BIO 201; CHE 131 or 141; MAR 333

3 credits

MAR 340-H Environmental Problems and Solutions

A detailed examination of the scientific, social, and legal aspects of important environmental problems, including global climate change, the depletion of atmospheric ozone, acid rain, rain forests and the loss of biodiversity, and energy conservation, as well as case histories of problems such as the use of DDT, environmental carcinogens, and lead poisoning.

Prerequisites: U3 or U4 standing; one course in chemistry or biology

3 credits

MAR 346 Marine Sedimentology

A study of sedimentology in the marine environment, including an introduction to fluid mechanics, sediment transport theory, quantitative models of sedimentation, and dynamic stratigraphy.

Prerequisites: GEO 102 or 122; PHY 126 or 132/134 or 142

3 credits

MAR 349 Introduction to Biological Oceanography

An examination of the processes which produce and maintain the abundances, composition, and temporal variations of organisms in the ocean. The roles of biological processes in global cycles and the food chain, beginning with microbes and progressing through fisheries, are also covered. Weekly three-hour laboratory or field sessions present methods used in observational and experimental studies.

Prerequisites: CHE 131 and 132; BIO 201

4 credits

MAR 350 Introduction to Ocean Physics

An introduction to hydrodynamics, contemporary ideas on ocean circulation, and the application of acoustics and optics to ocean technologies. Not for credit in addition to MAR 352.

Prerequisites: ENS/PHY 119 or PHY 121/123 or 125 or 131/133 or 141; MAT 127 or 132 or 142 or 171 or AMS 161

2 credits

MAR 351 Introduction to Ocean Chemistry

Chemical principles applied to the study of the oceans. How chemical tracers are used to determine the geological, physical, and biological characteristics of present and past oceans. Other topics include physical marine chemistry, nutrient and carbon cycling, organic geochemistry, isotope geochemistry, sediment chemistry and diagenesis, air-sea exchange and controls on carbon dioxide, and estuarine geochemistry.

Prerequisites: CHE 132 and one MAR course

3 credits

MAR 352 Introduction to Physical Oceanography

An introduction to the physical properties, motion of, and forces that drive the movement of fluids (air and water) on the earth. Physical oceanographic processes that range in scale from several mm to 1000s of km will be studied. This course will introduce the student to the physics of the marine environment and the tools

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(physical, mathematical, scientific) to study these waters. Environments ranging from pelagic to estuarine will be examined. Not for credit in addition to MAR 350.

Prerequisites: MAT 126, 132, or 142; PHY 119, 121, 125, 131 or 141

Corequisite: MAR 353

2 credits

MAR 353 Physical Oceanography Laboratory

An introduction to the measurements, equipment, and data processing techniques used to study the motion of fluids (air and water) on the earth. Students will learn to use scientific instruments, design sampling strategies, and utilize previously collected data sets to study both local and global processes. At-sea collection and analysis of data will be emphasized.

Pre- or co-requisite: MAR 350 or 352

1 credit

MAR 366 Plankton Ecology

An introduction to the biology of the plant and animal plankton present in the sea. Techniques of collection, enumeration, and identification of phytoplankton and zooplankton are described. Life histories are studied and factors that influence seasonal changes in species and biomass are examined.

Prerequisites: BIO 201 and 202

3 credits

MAR 370 Marine Mammals

The biology of the major groups of marine mammals, including cetaceans, pinnipeds, and sirenians. Topics include evolutionary history and adaptation, thermoregulation, locomotion and foraging, diving physiology and behavior, communication and sensory systems, social behavior, reproduction, energetics, distribution patterns, exploitation, and conservation.

Prerequisites: BIO 201 and 203

3 credits

MAR 371 The Biology and Conservation of Marine Birds and Sea Turtles

A survey of the basic biology of marine birds and sea turtles, with an emphasis on species endemic to the Northeast U.S. Topics covered include origins, taxonomy and systematics, anatomy, organ systems, reproduction, nutrition, migration, and conservation status. Weekly lectures will be supplemented with three field trips, of which the student must attend at least two.

Prerequisites: BIO 201 and 203

3 credits

MAR 375 Marine Mammal and Sea Turtle Rehabilitation

An intensive hands-on course designed to introduce students to the topics of marine mammal and sea turtle biology as they relate to rehabilitation and research. Students will be exposed to marine mammal and sea turtle ecology, conservation issues, management, and research in the context of wildlife rehabilitation. Through active participation in the rehabilitation activities at the New York State's only marine mammal rescue facility, instructive lectures, writing, reading assignments, quizzes, tests, and research, students will be offered the opportunity to be thoroughly immersed in the field of marine mammal and sea turtle rehabilitation.

Prerequisite: BIO 201 or permission of instructor

3 credits

MAR 380 Ichthyology

The biology of fishes. This course focuses on the diversity of fishes and the physiological, anatomical, ecological, and behavioral adaptations that allow them to populate a wide range of niches and environments. Field and laboratory work provide students with practical experience in collecting, identifying, and studying fish.

Prerequisites: BIO 201; BIO 328 or 344 or 346

3 credits

MAR 384 Diseases of Aquatic Organisms

Fundamental and current issues pertaining to host/pathogen interactions in the aquatic environment. By the end of this course, students should have a basic understanding of disease processes in aquatic organisms; knowledge of the tools used for disease diagnosis; and an appreciation of disease management tools available today. This course will emphasize the role of the environment as an important player in infectious and non-infectious diseases.

Prerequisites: BIO 202 and 203

3 credits

MAR 385 Principles of Fishery Biology and Management

The theory, techniques, history, and practical problems of fishery management, with emphasis on Long Island fisheries. Three field trips outside regularly scheduled class meetings are required.

Prerequisites: BIO 201; MAT 125 or 131 or 141 or AMS 151

3 credits

MAR 388 Tropical Marine Ecology

This travel course surveys organisms (invertebrates, fishes and algae) and habitats (coral reefs, sea grass meadows and mangrove forests) within tropical marine coral reef ecosystems. The course consists of formal lectures, demonstrations and instructor-led field trips and involves snorkeling, SCUBA diving, reefwalking and underwater photography. Students will develop individual research projects requiring field observations and collecting data and will write a research proposal and final research papers.

Prerequisites: BIO 201 and permission of instructor

4 credits

MAR 392-H Waste Management Issues

Conventional and innovative approaches to waste reduction, recycling, and reuse. The environmental impacts of waste on the terrestrial and marine environment are introduced as are the complex social, political, and scientific issues of making sound policy decisions.

Prerequisites: EST 202; or MAT 123 and one D.E.C. category and course

3 credits

MAR 393 Waste Treatment Technologies

This course examines technologies such as wastewater management, solid waste practices, and drinking water treatments that minimize the effects of human wastes. Pollution prevention, especially for marine environments, is also discussed.

Prerequisites: EST 202; or MAT 123 and one D.E.C. category E course

3 credits

MAR 394-H Environmental Toxicology and Public Health

Principles of toxicology are presented and problems associated with major classes of toxic chemicals to human and environmental health are examined. Case studies dealing with current waste management issues are also discussed. This course is offered as both BCP 394 and MAR 394.

Prerequisites: BIO 201; CHE 131 or 141

Advisory Prerequisite: CHE 321

3 credits

MAR 395 Topics in Marine Environmental Sciences

Semester supplements to this *Bulletin* contain specific description when course is offered. May be repeated as the topic changes.

Prerequisite: One upper-division MAR course

3 credits

MAR 447 Readings in Marine Science

Tutorial readings in the marine sciences. These courses may be repeated but no more than 3 credits may be used toward Marine Science or Marine Vertebrate Biology major requirements.

Prerequisite: Permission of instructor and SoMAS undergraduate director

1-3 credits, S/U grading

MAR 475 Undergraduate Teaching Practicum

A practicum in the techniques of teaching marine sciences courses. Each student assists a faculty member in a regularly scheduled class. The student may be required to attend all classes and meets with the faculty member at regularly scheduled times. Students may assist in laboratories, hold recitation or review sessions, propose questions for examinations, and review already graded assignments.

Prerequisites: U3 or U4 standing; permission of instructor and SoMAS Undergraduate Programs Director

3 credits, S/U grading

MAR 487 Research in Marine Sciences

A student may conduct research for credit. May be repeated.

Prerequisite: Permission of instructor and SoMAS Undergraduate Programs Director

0-6 credits

MAR 488 Internship

Participation in research at off-campus laboratories or in the activities of public and private agencies and organizations. May be repeated up to a limit of 12 credits.

Prerequisites: Permission of instructor and SoMAS Programs Director

0-6 credits, S/U grading