MAR

Marine Sciences

MAR 101: 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.

DEC: E
SBC: SNW
3 credits

MAR 104: Oceanography
An examination of the World Ocean and the chemical, geological, biological, and physical processes that control its major features and the life that inhabits it. Students will also explore human interactions with the marine environment. This course has an associated fee when offered during the summer. Please see www.stonybrook.edu/coursefees for more information.

DEC: E
SBC: SNW
3 credits

MAR 301: Environmental Microbiology
Microbiological mediation of natural processes in marine, freshwater, soil, and groundwater habitats, as well as public health issues and microbial potential for remediation of pollutants. Lectures include 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. Labs introduce students to fundamental microbiological methods currently used in environmental, public health, and clinical settings. Not for credit in addition to MAR 302. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: B 202; CHE 131 or 141
4 credits

MAR 302: Marine Microbiology and Microbial Ecology

Introduction to the evolution, diversity, and importance of micro-organisms in the sea. Lectures highlight the phylogenies, physiologies and ecological functions of each major microbial group (viruses, bacteria, fungi, protista, algae). Particular emphasis is placed on the role of these micro-organisms in many of the elemental (geochemical) cycles of the oceans. Course explores the microbial ecology of most major marine habitats. Not for credit in addition to MAR 301.

Prerequisites: BIO 201 and BIO 202; CHE 132 or CHE 142
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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: U3 or U4 standing; BIO 201
Advisory Prerequisites: AMS 110 or other statistics course; MAR 101 or 104 or 333
SBC: STEM+
4 credits

MAR 304: 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, and coastal erosion. The variety of the world’s coastal environments will be differentiated in terms of physical processes. The behavior of beaches also will be examined. This course is suitable for non-science majors as well as providing students majoring in geology, engineering or other sciences with the foundation for more advanced study.

Prerequisites: U3/U4 status or MAR 101 or MAR 104
Advisory prerequisites: MAR 101, MAR 104, or MAR 333
DEC: E
SBC: STEM+
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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

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
SBC: STEM+
3 credits

MAR 308: Environmental Instrumental Analysis
The study and detection of substances in the environment using instrumental analysis. Topics include metal determinations in sediment and in river water using molecular spectrometry. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: CHE 132/134 or 142/144
SBC: STEM+, TECH
3 credits

MAR 315: Marine Conservation
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 201
DEC: H
SBC: ESI, STAS
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.
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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: BIO 201; CHE 131 or 141
SBC: STEM+
4 credits

MAR 330: 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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: BIO 201; CHE 131 or 141
SBC: STEM+
4 credits

MAR 331: 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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: MAT 125 or 131 or 141 or AMS 151; completion of D.E.C. category E
DEC: H
SBC: STAS
3 credits

MAR 332: Remote Sensing of the Environment
A study of the theory and practice 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
DEC: E
SBC: STEM+, TECH
3 credits

MAR 333: 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 CHE 141
Advisory Prerequisite: MAR 104 or MAR 333
3 credits

MAR 340: 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
DEC: H
SBC: STAS
3 credits

MAR 341: Introduction to Ocean Chemistry
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 (physical, mathematical, scientific) to study these waters. Environments ranging from pelagic to estuarine will be examined. Not for credit in addition to MAR 350. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Prerequisites: MAT 125, MAT 132, or MAT 142; PHY 126 or PHY 132/134 or PHY 142
SBC: STEM+
3 credits

MAR 342: Introduction to Physical Oceanography
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 or PHY 125 or PHY 131 or PHY 141; MAT 127 or 132 or 142 or 171 or AMS 161
2 credits

MAR 343: 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.
Prerequisite: CHE 132 and one MAR course
SBC: STEM+
3 credits

MAR 344: Introduction to Biological Oceanography
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 or PHY 125 or PHY 131 or PHY 141
2 credits

MAR 345: Coastal Cultural Experience
An experiential learning course designed to introduce students to the rich coastal marine culture of New York and the northeastern United States. Through targeted readings and participation in weekly faculty-led field trips in the greater Long Island area, students will develop an understanding of how the coastal environment and maritime traditions have shaped the region's culture. This course has an associated fee. Please see

Stony Brook University: www.stonybrook.edu/ugbulletin
www.stonybrook.edu/coursefees for more information.

Pre- or corequisite: MAR 356
Advisory Prerequisite: Enrollment in the Semester by the Sea Program

SBC: ESI, EXP+
2 credits

MAR 356: Maritime Traditions of New England
This class will survey the traditions and historical development of the sea, with an emphasis on the fishing, whaling, and seafaring history and rich contemporary coastal culture of the Northeastern United States. Students will examine how we have understood our roles in connection with the ocean by reading and discussing selections from numerous historical journals, books and primary sources as well as literature in which seafaring traditions are discussed and/or demonstrated. Excursions in the co-required Coastal Cultural Experience course allow students to explore the maritime setting of the works discussed in the course.

Pre- or corequisite: MAR 355
DEC: K
SBC: SBS, USA
3 credits

MAR 357: Unsinkable Technologies: History of Maritime Science and Technology
This course exposes students to advances in maritime science and technology. Students will learn to think critically about the processes in which contemporary societal needs and concerns both locally and globally influence maritime technological as well as the ways in which advances in maritime science and technologies have shifted public attitudes through time. By understanding how societies and technology have impacted and shaped each other over time, students will have a broader understanding of regional and global communities. This course does permit completion of the WRTD requirement.

Prerequisite: U3/U4 status; WRT 101 or WRT 102
DEC: H
SBC: ESI, STAS
3 credits

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; BIO 202
3 credits

MAR 370: Marine Mammals
The biology of the major groups of marine mammals, including cetaceans, pinnipeds, and sirensians. 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.

This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: BIO 201; BIO 203
3 credits

MAR 373: Marine Apex Predators: Ecology and Conservation
The removal of apex predators is one of the most pervasive impacts of humans on Earth's ecosystems. In the past few decades we have started to recognize how the loss of these species has caused substantial changes in terrestrial ecosystem diversity and function, mediated by changes in prey population dynamics and behavior. It is only recently that we have realized that changes in the abundance of apex predators in the ocean (e.g., sharks, marine mammals, tuna and other large predatory bony fish) may be causing similar changes in coastal and pelagic marine ecosystems. In this course we will (1) review the biology of key marine apex predators, (2) explore how 'top down' processes (predation and intimidation of prey) can influence marine ecosystems and (3) review the status of marine apex predators and how this relates to the current state of ocean ecosystems. We will draw from the primary literature, from both the terrestrial and marine realms, and host outside speakers who study these animals in the field.

Prerequisite: BIO 201 and either BIO 202 or BIO 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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 201 or permission of instructor
3 credits

MAR 376: Biology and Conservation of Sea Turtles
This course provides an overview of the biology of sea turtles, and highlights different solutions to challenges these organisms face while living in the marine environment. We begin by discussing biological adaptations and ecological processes, and will then examine these concepts in relation to conservation and management issues facing different sea turtle species. This course will be primarily lecture-based, although we will take advantage of additional learning opportunities, such as necropsies conducted with the Riverhead Foundation. MAR 376 may not be taken for credit in addition to MAR 371. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: BIO 201
Advisory prerequisite: BIO 203
3 credits

MAR 377: Biology and Conservation of Seabirds
This course provides an overview of the biology of seabirds, covering basic and applied aspects of seabird biology. We examine specific biological adaptations (e.g., morphological and physiological adaptations for diving and flying) in the first third of the course, and review population-level processes and behavioral patterns (e.g., population ecology and migration) in the second part of the course. The last third of the course applies this knowledge of seabird biology and ecology to current conservation issues and management efforts, both within the United States and internationally. MAR 377 may not be taken for credit in addition to MAR 371.

Prerequisite: BIO 201
Advisory prerequisite: BIO 203
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 identifying, classifying, and studying fish. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: U3 or U4 standing; BIO 201
Advisory Prerequisite: BIO 203
SBC: ESI, WRTD
3 credits

MAR 382: Introduction to Next Generation Sequencing and its applications across fields
An introduction to the Newest DNA sequencing technologies and how they are used to answer questions regarding organism's evolution, biology and ecology. The course will provide technical and analytical details on functional genomics approaches including comparative genomics, population genomics, epigenomics, transcriptomics, metagenomics and metatranscriptomics. Throughout the course, recent studies will be discussed to understand the role of the technology in advancing knowledge. These examples will span across fields of biology and will include, but not be limited to: cancer research, fisheries management, ecotoxicology, evolutionary biology, parasitology, phylogeny of animals, symbiosis, conservation biology, and adaptation to environmental stressors.

Prerequisite: C or higher in BIO 201, BIO 202, and BIO 204, or permission of the instructor
SBC: STEM+
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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisites: BIO 201, 202, and 203
SBC: STEM+
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. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

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

MAR 386: Ecosystem Science for Fisheries Management
Provides an overview of the scientific basis behind and the models that are typically used to inform Ecosystem-based Fisheries Management (EBFM). The course will review single species fisheries models with which students should be familiar. Extensions of single-species models, multispecies models and full systems models will be introduced. Advantages and disadvantages of each approach will be presented and how to implement the science into Fisheries Management will be discussed. The course requires familiarity with quantitative methods, but emphasizes current literature and case studies as main learning elements.

Prerequisite: MAR 385 or instructor approval
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
SBC: ESI, EXP+, STEM+
4 credits

MAR 390: Aquaculture
This course covers the fundamentals of aquaculture including basic seawater system design and setup, culturing techniques for both phytoplankton and zooplankton, and both historic and contemporary topics within the industry. Students will also witness natural and induced spawning events of various ornamental species, and raise the larvae acquired through stage one metamorphosis.

Prerequisite: BIO 201; U3 or U4 standing
Advisory Prerequisite: BIO 203
DEC: E
SBC: ESI, STEM+
3 credits

MAR 392: 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: GEO 101 or CHE 131 or ENS/PHY 119
DEC: H
SBC: STAS
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: 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
DEC: H
SBC: ESI, STAS
3 credits

MAR 395: Topics in Marine Environmental Sciences
May be repeated as the topic changes. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Prerequisite: One upper-division MAR course
3 credits

MAR 396: Topics in Marine Sciences
May be repeated as the topic changes.

Prerequisite: One upper-division MAR course
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
1-4 credits, S/U grading

MAR 458: Speak Effectively Before an Audience
A zero credit course that may be taken in conjunction with any ATM, ENS, or MAR course that provides opportunity to achieve the learning outcomes of the Stony Brook Curriculum's SPK learning objective.
Pre- or corequisite: WRT 102 or equivalent; permission of the instructor
SBC: SPK
0 credit, S/U grading

MAR 459: Write Effectively in ATM, ENS, MAR and MVB
A zero-credit course that is taken in association with a 300- or 400-level course approved by the major. MAR 459 provides opportunity to practice the skills and techniques of effective academic writing and satisfies the learning outcomes of the Stony Brook Curriculum's WRTD learning objective.
Corequisite: an approved upper-division course in the major (see list of approved courses at http://tinyurl.com/jy676vt)
SBC: WRTD
0 credit, 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
SBC: EXP+
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
SBC: EXP+
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
SBC: EXP+
0-6 credits, S/U grading