Marine Sciences (MARN)

marinesciences.uconn.edu

5010. Biological Oceanography

Three credits. Not open for credit to students who have passed MARN 4010.

Structure and function of marine food webs, from primary producers to top trophic levels; interaction of marine organisms with the environment; energy and mass flow in food webs; elemental cycling; coupling between pelagic and benthic environments.

5012. Marine Invertebrate Biology

Three credits. Prerequisite: Instructor consent.

Comparative examination of major adaptations and functional responses of marine invertebrates to biotic and abiotic factors in the marine environment. Field trips required.

5014. Marine Phytoplankton Ecology and Physiology

Three credits.

The physiology of marine phytoplankton, environmental factors affecting their growth and photosynthesis in the ocean, the oceanographic processes responsible for the temporal and spatial distributions of phytoplankton biomass and production, and current topics in phytoplankton research.

5015. Techniques in Marine Molecular Biology

Three credits. Not open to students who have passed MARN 3015.

Principles and technology in molecular genetics, including nucleic acid purification and manipulation, DNA fingerprinting, gene cloning and sequencing, phylogenetic analysis, and detection of gene expression.

5016. Marine Zooplankton

Three credits. Prerequisite: EEB 2244 or 2245, or MARN 5010; instructor consent required.

Bioenergetics, life history, population and community ecology of zooplankton, and role of zooplankton in aquatic biogeochemical cycles.

5017. Plankton Ecology

Three credits. Prerequisite: Instructor consent. Recommended preparation: the equivalent of one year of biology, chemistry and physics courses.

Ecology of planktonic organisms (bacteria, protista and metazoa). The evolutionary ecology concept, methods of research, special features of aquatic habitats; adaptations to aquatic environments; population biology; predation, competition, life histories, community structure, and role of plankton in ecosystem metabolism.

5018. Ecology of Fishes

Three credits.

General concepts in fish ecology such as distribution, feeding, bioenergetics, growth, larval fish ecology, biotic interactions, life history evolution and other contemporary research topics.

5030. Chemical Oceanography

Three credits.

Composition, origin and solution chemistry of seawater and the marine biogeochemical cycles of salts, elements and gases. Distributions and transfer in the marine environment through chemical equilibria, rates, redox, partitioning, ocean circulation, biological cycles and crustal exchanges.

5031. Aqueous Geochemistry

Three credits.

Application of chemical theory (thermodynamic equilibrium approaches and kinetics) to understanding the geochemistry of the Earth's aqueous systems, with a focus on the ocean and coastal ecosystems.

5032. Coastal Pollution and Bioremediation

Three credits.

Overview of processes and compounds leading to pollution in the nearshore marine environment. The impact of pollution on the marine food web and its response is emphasized. Alleviation of pollution through metabolism of organisms, including bacteria, seagrasses and salt marshes.

5033. Marine and Atmospheric Processes of Global Change

Three credits.

Fundamentals of marine and atmospheric processes in global biogeochemistry. Evaluation of atmospheric, biological and chemical processes that contribute to global change.

5036. Advanced Chemical Oceanography

Three credits.

Major global biogeochemical cycles of the major elements, nutrients, gases, organic matter, and trace elements and the impact of climate change and ocean acidification. Biogeochemical cycling of toxic trace metals, and transfer of substances at the air and sediment interfaces.

5050. Geological Oceanography

Three credits.

Concepts in geological oceanography, including the role of plate tectonics in the control of the Earth and ocean system, fundamentals of biosphere-geosphere interaction over geologic timescales, and the reconstruction of past climates using marine sediment archives.

5060. Dynamic Physical Oceanography

Three credits.

Global energy balance. General circulation in the oceans and atmosphere. Thermodynamics and stability. Fundamental fluid mechanics. Surface gravity waves. Geophysical fluid mechanics. Tides and other long waves. Theories of global circulation.

5061. Advanced Dynamical Oceanography

Three credits. Prerequisite: MARN 5060; instructor consent required.

Ocean thermodynamics; dynamics of rotating; homogeneous fluids; ocean circulation; western boundary currents; the thermocline, oceanic fronts.

5064. Air-Sea Interaction

Three credits. Prerequisite: MARN 5060.

Processes controlling the exchange of momentum, heat and mass across the air-sea interface. Topics include atmospheric and oceanic stratification, wind-wave-current interaction, wave breaking, bubble generation, heat budgets, flux parameterizations and instrumentation.

5065. Physical Oceanography

Three credits.

Overview of physical properties and dynamics influencing the oceans and coastal waters. Descriptions of global water property distributions, surface mixed layer, pycnocline, surface heat fluxes, and major ocean currents. Introduction to dynamics of ocean circulation, waves, tides, and coastal circulation.

5066. River Influences on the Marine Environment

Three credits. Recommended preparation: calculus and general physics.

Influences of rivers on estuaries, coastal and open ocean water properties, energy budgets and ecosystems including inputs of buoyant waters, sediments and pollutants and variability from storms, seasons, human alterations and climate change. Recommended preparation: calculus and general physics.

5067. Synoptic Meteorology

Three credits.

Fundamental processes of atmospheric synoptic meteorology, including the governing equations of motion, atmospheric stability, quasi-geostrophic theory, extratropical cyclogenesis, and frontogenesis.

5200. Oceanographic Data Analysis

Three credits.

Programming, data input/output, and graphing with advanced scientific analysis software. Analysis of temporal and spatial patterns in oceanographic datasets using multivariate regression, harmonic analysis, Fourier and wavelet transforms, empirical orthogonal functions, and three-dimensional mapping.

5210. Experimental Design in Marine Ecology

Three credits. Not open for credit to students who have passed MARN 4210Q.

Introduction to experimental design and data analysis for marine biology and ecology. Analysis and visualization of experimental data using the statistical software package R. Topics include analysis of variance, replication and pseudoreplication, factorial designs, and significance testing.

5500. Professional Development in Marine Sciences

Three credits.

Survey of practical skills required for professional integration into the scientific community, including proposal writing, scientific and public presentations, manuscript preparation and publication, scientific peer review, resume building, and interview skills.

5501. Marine Sciences Seminar

Two credits. May be repeated for a maximum of six credits.

Intensive reading, evaluation and critical discussion of current interdisciplinary topics presented at weekly departmental research seminars.

5812. Seminar in Marine Biodiversity and Conservation

Three credits. Not open to students who have passed MARN 3812.

Critical examination of state-of-the-art research, policy and regulatory frameworks of marine conservation biology and associated environmental, cultural, and socio-economic implications. Topics may include aquaculture, endangered species, strandings, biomedicine, ocean pollution, and marine protected areas. Research projects to be conducted at Mystic Aquarium.

5830. Seminar in Oceanography

Two credits. Prerequisite: Instructor consent. May be repeated for a maximum of eight credits.

Readings and discussions of current literature in oceanography. Topics vary each semester: Biological, Chemical, Physical, Geological.

5893. Research

Variable (1-6) credits. Prerequisite: Instructor consent. May be repeated for credit.

Field and laboratory research covering selected topics of marine sciences.

5895. Independent Study

Variable (1-6) credits. Prerequisite: Instructor consent.

A reading course for pursuing specialized work in marine sciences. Open to undergraduate students with permission. Designate the field of special interest by use of the appropriate section symbol.

5899. Independent Study

Variable (1-6) credits. May be repeated for credit with change in content or instructor.

Independent study under the direction of a faculty member.

5995. Special Topics

Variable (1-6) credits. May be repeated for credit with change in content.

6001. Mathematical Models in Marine Sciences

Two credits. Prerequisite: At least nine credits of Marine Sciences graduate courses.

Examples of the formulation of quantitative models of marine systems with a review of some particularly useful mathematical methods (differential equations, operational methods, numerical solution techniques), emphasizing the computation of predictions.

6002. Mathematical Models in Marine Sciences: Practicum

Two credits. May be repeated for a maximum of eight credits.

Individual term projects relating to mathematical modeling in the marine sciences.

6010. Advanced Biological Oceanography -- Pelagic Processes

Three credits.

Pelagic communities, ecosystem structure and function, bioenergetic constraints, population dynamics, consequences of global climate and environmental change, and advances in the field driven by technological innovation.

6011. Advanced Biological Oceanography - Benthic Processes

Three credits. Prerequisite: MARN 5010 or instructor consent.

Physical and physiological constraints on the benthos, benthic-pelagic coupling, species interactions, community assembly and dynamics, and anthropogenic impacts.

6031. Stable Isotope Biogeochemistry

Three credits. Prerequisite: MARN 4030W or 5030 or instructor consent.

Overview of important stable isotopic systems used to study biogeochemical cycling of bioactive elements. Focus will be on carbon, nitrogen, and oxygen isotopic systems with an introduction to sulfur, silicic acid, and trace metals.

6088. Variable Topics

Variable (1-6) credits. May be repeated for credit with change in content.