MARINE SCIENCES (MSCI)

MSCI 103. Marine Ecology. 4 Units
Prerequisite(s): Ecology, statistics; or concurrent registration in MSCI 104.
Term Typically Offered: Fall, Spring

Field-oriented introduction to the interrelationships between marine and estuarine organisms and their environment with emphasis on quantitative data collection and analysis. Lecture two hours; laboratory six hours.

MSCI 104. Quantitative Marine Science. 4 Units
Prerequisite(s): College mathematics.
Term Typically Offered: Fall, Spring

Mathematical methods for the analysis of biological, chemical and physical data from the marine environment; experimental design, parametric and nonparametric statistics. Lecture three hours; laboratory three hours.
Note: Not for major credit.

MSCI 105. Marine Science Diving. 3 Units
Prerequisite(s): Upper division science major status, thorough physical examination, ability to pass swimming test.
Term Typically Offered: Fall, Spring

Skin SCUBA diving course, pool-training culminates in ten ocean dives. Topics covered included diving physics, physiology, diving environments, night diving and research diving. Successful completion gives NAUI and MLML certification. Lecture one hour; laboratory six hours.
Note: Not for major credit.

MSCI 112. Marine Birds and Mammals. 4 Units
Prerequisite(s): Upper division college vertebrate zoology or instructor permission; MSCI 103 recommended.
Term Typically Offered: Fall, Spring

Systematic, morphology, ecology and biology of marine birds and mammals. Lecture two hours; laboratory six hours.

MSCI 113. Marine Ichthyology. 4 Units
Prerequisite(s): College zoology or equivalent or instructor permission; MSCI 103 recommended.
Term Typically Offered: Fall, Spring

Description of the taxonomy, morphology, and ecology of marine fishes. Both field and laboratory work concentrate on the structure, function and habits of marine fishes and the ecological interactions of these fishes with their biotic and abiotic surroundings. Lecture two hours; laboratory six hours.

MSCI 124. Marine Invertebrate Zoology I. 4 Units
Prerequisite(s): College zoology or instructor permission; MSCI 103 recommended.
Term Typically Offered: Fall, Spring

Field oriented introduction to the structure, systematics, evolution, and life histories of the major and minor marine phyla. Lecture two hours; laboratory and six hours.

MSCI 125. Marine Invertebrate Zoology II. 3 Units
Prerequisite(s): College zoology or instructor permission; MSCI 103 and MSCI 124 recommended.
Term Typically Offered: Fall, Spring

Field oriented introduction to the structure, systematics, evolution and life histories of the minor marine invertebrate phyla. Lecture one hour; laboratory and field six hours.

MSCI 131. Marine Botany. 4 Units
Prerequisite(s): MSCI 103 recommended.
Term Typically Offered: Fall, Spring

Introduction to the plants of the sea, marshes, and dunes, with emphasis on the morphology, taxonomy and natural history of seaweeds and vascular plants. Lecture two hours; laboratory six hours.

MSCI 135. Physiology of Marine Algae. 4 Units
Prerequisite(s): MSCI 103, MSCI 131, and MSCI 144. Lecture two hours; laboratory six hours.
Term Typically Offered: Fall, Spring

Physiological basis for understanding the adaptation of marine algae to their environment. Topics include respiration, enzyme activity, and biochemical composition. Hands-on experience in basic electronic instrumentation, chemical separations, optical measurements, culturing methods, and radioisotope techniques.

MSCI 141. Geological Oceanography. 4 Units
Prerequisite(s): MSCI 142, MSCI 143; may be taken concurrently.
Term Typically Offered: Fall, Spring

Study of the structures, physiography and sediments of the sea bottom and shoreline. Lecture two hours; laboratory and field six hours.

MSCI 142. Physical Oceanography. 4 Units
Prerequisite(s): College algebra, college physics recommended.
Term Typically Offered: Fall, Spring

Introduction to the nature and causes of various oceanic motions including currents, waves, tides, and mixing and the Physical properties of seawater. Limited use of calculus. Lecture three hours; laboratory three hours.

MSCI 143. Chemical Oceanography. 4 Units
Prerequisite(s): One year of college chemistry.
Term Typically Offered: Fall, Spring

Introduction to the theoretical and practical aspects of the chemistry of the oceans, including major salts, dissolved gases, nutrient ions, carbonate system, transient tracers, and shipboard sampling techniques. Lecture two hours; laboratory six hours.

MSCI 144. Biological Oceanography. 4 Units
Prerequisite(s): General biology, general chemistry.
Term Typically Offered: Fall, Spring

Ocean as an ecological system. Emphasis will be on the complexity of organismal-environmental interaction of the plankton, the transfer of organic matter between trophic levels and nutrient cycles. Laboratory sessions will include methods in sampling, shipboard techniques, identification of the plankton, and current analytical techniques. Lecture two hours; laboratory six hours.

MSCI 175A. Coastal Geol Processes. 1 Unit
Term Typically Offered: Fall, Spring

MSCI 175B. Intro To Marine Science. 1 Unit
Term Typically Offered: Fall, Spring

MSCI 180. Independent Study. 1 - 4 Units
Prerequisite(s): Instructor permission.
Term Typically Offered: Fall, Spring

Faculty-directed study of selected research problems; open to undergraduate students with adequate preparation. Three hours work per unit.

MSCI 201. Library Research Methods. 1 Unit
Prerequisite(s): Graduate standing in the Marine Science M.S. program and instructor permission.
Term Typically Offered: Fall, Spring

Students will gain advanced understanding of the nature of scientific information. Provides the framework for using and evaluating a variety of information sources in marine and ocean sciences. Strong emphasis will be placed on developing critical skills to interweave knowledge of the history of science into the context of bibliographic tools including the digital realm. Lecture: three hours.

MSCI 202. Oceanographic Instrumentation. 4 Units
Prerequisite(s): MSCI 141, MSCI 142 and instructor permission.
Term Typically Offered: Fall, Spring

Principles of instruments used in oceanographic research, introduction to electronics, and applications of instrument measurements. Emphasis will vary from CTD profilers, current meters, radiometry and chemical measurement. Lecture two hours; laboratory six hours.

MSCI 204. Sampling and Experimental Design. 4 Units
Prerequisite(s): MSCI 103, MSCI 104.
Term Typically Offered: Fall, Spring

Discussion of random sampling, systematic sampling, subsampling, survey techniques, and design of single and multifactorial experiments using randomized and block experimental designs: basic design of experiments and field sampling will be covered. Biases and problems of sampling marine biota will be presented and discussed by critiquing relevant literature. Lecture four hours.

MSCI 208. Molecular Ecology: Concepts and Methods. 4 Units
Prerequisite(s): Basic cellular/molecular biology course; consent of instructor.
Term Typically Offered: Fall, Spring

Use of genetic information affecting interactions of organisms with environment. Lectures on molecular markers used to assess diversity in communities, characterize spatial/temporal variation in species composition, assess genetic variability in populations, discriminate/reveal kinship among individuals, and detect/quantify gene expression important in organismal responses to environmental fluctuation. Basic molecular methods (DNA and RNA isolation/amplification/cloning/sequencing) taught. Students projects as budget permits. Enrollment limited. Lecture 2 hours; laboratory 6 hours.

MSCI 211. Ecology of Marine Birds and Mammals. 4 Units
Prerequisite(s): MSCI 103, MSCI 104, MSCI 112.
Term Typically Offered: Fall, Spring

Community approach to the ecology of marine birds and mammals using experimental and sampling methodology; examine the distribution, abundance, trophic ecology, and behaviors of birds and mammals in Elkhorn Slough and Monterey Bay. Lecture two hours; laboratory six hours.

MSCI 212. Advanced Topics in Marine Vertebrates. 4 Units
Prerequisite(s): MSCI 112 or MSCI 113 and instructor permission.
Term Typically Offered: Fall, Spring

Advanced consideration of the ecology, physiology and phylogeny of fishes, birds, reptiles or mammals, emphasizing current literature and research. Topics and emphasis will vary with term and instructor. Lecture two hours; laboratory six hours.
Note: May be repeated once for credit.

MSCI 212A. Adv Ichthyology. 4 Units
Term Typically Offered: Fall, Spring

MSCI 212B. Ichthyoplankton. 4 Units
Term Typically Offered: Fall, Spring

MSCI 212C. Marine Bird+Mammal Ecolgy. 4 Units
Term Typically Offered: Fall, Spring

MSCI 212D. Sampling+Expermntl Design. 4 Units
Term Typically Offered: Fall, Spring

MSCI 221. Advanced Topics in Marine Invertebrates. 4 Units
Prerequisite(s): MSCI 124 and instructor permission.
Term Typically Offered: Fall, Spring

Advanced considerations of the ecology, physiology and phylogeny of the various invertebrate phyla emphasizing current literature and research. Topics will vary from term to term. Lecture two hours; laboratory six hours.
Note: May be repeated for credit when topics change.

MSCI 221A. Marine Symbioses. 4 Units
Term Typically Offered: Fall, Spring

MSCI 231. Biology Of Seaweeds. 4 Units
Prerequisite(s): MSCI 131 or instructor permission.
Term Typically Offered: Fall, Spring

Lecture-discussions in algal development, reproduction, and ecology. Extensive reading of original literature. Ecologically oriented individual research projects involving laboratory culture and field experimentation. Lecture two hours; laboratory six hours.

MSCI 233A. Adv Marine Ecology. 4 Units
Term Typically Offered: Fall, Spring

MSCI 233B. Sampling+Expermntl Design. 4 Units
Term Typically Offered: Fall, Spring

MSCI 233C. Coastal Ecology-Gulf of California. 3 Units
Prerequisite(s): MSCI 103, MSCI 104, MLML SCUBA certified, graduate status, instructor permission.
Term Typically Offered: Fall, Spring

Field-oriented examination of the interrelationships between intertidal and shallow subtidal organisms and their environment in the Gulf of California, Mexico. Information from lectures and review of primary literature on the ecology of the region will be used to write a research proposal. 1 hour lecture, 6 hours laboratory.

MSCI 233D. Immune Respn Marine Orgns. 2 Units
Term Typically Offered: Fall, Spring

MSCI 234. Advanced Biological Oceanography. 4 Units
Prerequisite(s): MSCI 144.
Term Typically Offered: Fall, Spring

Experimental techniques in biological oceanography with emphasis on problems important to plankton ecology. Includes lectures, labs, and discussions of current research problems. An individual research project involving analytical tools will be required. Lecture two hours; laboratory six hours.

MSCI 242. Plate Tectonics. 3 Units
Prerequisite(s): MSCI 141 or instructor permission.
Term Typically Offered: Fall, Spring

Historical background, modern theory, and geo-physical evidence of continental drift sea floor spreading and plate tectonics. Examinations of the impact of the recent revolution in historical geology. Lecture three hours.

MSCI 248. Marine Benthic Habitat Techniques. 4 Units
Prerequisite(s): Graduate standing and instructor permission.
Term Typically Offered: Fall, Spring

Collection and interpretation of geophysical data used to characterize marine benthic habitats. Basic geophysical principles will be reviewed. Application of techniques to identify and characterize marine benthic habitats, including echosounders, multibeam bathymetry and backscatter, sidescan sonar, seismic profiling, and GIS. Lecture two hours; laboratory six hours.

MSCI 251. Marine Geochemistry. 4 Units
Prerequisite(s): MSCI 143, quantitative analysis, one year calculus or instructor permission.
Term Typically Offered: Fall, Spring

Geochemical processes in the oceans: thermodynamics of low temperature aqueous reactions, processes occurring at the sea floor and air-sea interface. Lecture two hours; laboratory six hours.

MSCI 261. Ocean Circulation and Mixing. 4 Units
Prerequisite(s): MSCI 142; college physics strongly recommended or instructor permission.
Term Typically Offered: Fall, Spring

Mathematical description of the distribution of properties (salinity density, etc.) in the oceans relating to physical and biochemical processes. Equations of motion, geotropic method, and theory of distribution of variables. Lecture two hours; laboratory six hours.

MSCI 262. Satellite Oceanography. 4 Units
Prerequisite(s): MSCI 142, MSCI 144, or instructor permission. MSCI 263 strongly recommended.
Term Typically Offered: Fall, Spring

Physical principles of remote sensing with application to the oceans including satellite image processing methods. Labs involve use of PC and Unix workstation. Lecture two hours; laboratory six hours.

MSCI 263. Application of Computers in Oceanography. 4 Units
Prerequisite(s): College math and instructor permission.
Term Typically Offered: Fall, Spring

Lecture, discussion and technical programming with MATLAB for computation and visualization with applications in marine sciences. Use of existing program libraries for data I/O and analysis. Semester project required. Lecture two hours; laboratory six hours.

MSCI 271. Population Biology. 3 Units
Prerequisite(s): MSCI 103, MSCI 104; or instructor permission.
Term Typically Offered: Fall, Spring

Principles of the interaction among marine organisms that result in the alteration of population structures. Techniques for assessment and management of populations. Lecture two hours; laboratory three hours.

MSCI 272. Subtidal Ecology. 4 Units
Prerequisite(s): MLML diver certification and marine ecology (knowledge of marine algae, invertebrates, and statistics recommended).
Term Typically Offered: Fall, Spring

Ecology of nearshore rocky subtidal populations and communities with emphasis on kelp forests. Lectures and discussions of original literature. Field work with SCUBA including group projects on underwater research techniques and community analysis, and individual research on ecological questions chosen by the student. Lecture two hours; laboratory six hours.

MSCI 274A. Electron Micros+Microanl. 3 Units
Term Typically Offered: Fall, Spring

MSCI 274B. Geol Central Ca Margin. 4 Units
Term Typically Offered: Fall, Spring

MSCI 274C. Chem Of Marine Pollution. 4 Units
Term Typically Offered: Fall, Spring

MSCI 274D. Global Change. 3 Units
Term Typically Offered: Fall, Spring

MSCI 280. Scientific Writing. 3 Units
Prerequisite(s): Graduate status and instructor permission.
Term Typically Offered: Fall, Spring

Techniques and strategies of scientific writing used for proposals, journal submissions, and abstracts for meetings. Students will develop their writing skills by preparing, editing, and rewriting manuscripts. Lecture three hours.

MSCI 281. Coastal Dynamics. 4 Units
Prerequisite(s): Graduate standing and MSCI 141 or MSCI 142.
Term Typically Offered: Fall, Spring

Addresses the oceanographic dynamics of coastal environments, within an emphasis on eastern boundary current systems influenced by coastal upwelling. Focuses on how physical and geological oceanography interact with each other and how both affect coastal ecosystem dynamics.

MSCI 285. Seminar in Marine Biology. 2 Units
Prerequisite(s): Instructor permission.
Term Typically Offered: Fall, Spring

Seminar will be held on topics changing each semester. Each student will be required to give at least one seminar. Lecture two hours.
Note: May be repeated once for credit.

MSCI 285A. Social Biology. 2 Units
Term Typically Offered: Fall, Spring

MSCI 285B. Repro+Dev Marine Organism. 2 Units
Term Typically Offered: Fall, Spring

MSCI 285C. Recent Adv Deep-Sea Bio. 2 Units
Term Typically Offered: Fall, Spring

MSCI 285D. Controversies Modern Biol. 2 Units
Term Typically Offered: Fall, Spring

MSCI 285E. Paradigms In Commun Ecol. 2 Units
Term Typically Offered: Fall, Spring

MSCI 285F. Appl Moleclr Tech Mar Bio. 2 Units
Term Typically Offered: Fall, Spring

MSCI 285G. Aspects Of Deep-Sea Biol. 2 Units
Term Typically Offered: Fall, Spring

MSCI 286. Seminar in Marine Geology. 2 Units
Term Typically Offered: Fall, Spring

Seminar will be held on topics changing each semester. Each student will be required to give at least one seminar.
Note: May be repeated once for credit.

MSCI 287. Seminar In Oceanography. 2 Units
Term Typically Offered: Fall, Spring

Seminar will be held on topics changing each semester. Each student will be required to give at least one seminar.
Note: May be repeated once for credit.

MSCI 298. Research in the Marine Sciences. 1 - 4 Units
Prerequisite(s): Graduate standing and instructor permission.
Term Typically Offered: Fall, Spring

Independent investigations of an advanced character for the graduate student with adequate preparation.
Note: CSUH students must file a petition with their home campus department before admission to this class. CSU Stanislaus students must file Individual Study forms. CSUF students must file Research Approval forms.

MSCI 299. Master's Thesis. 1 - 4 Units
Term Typically Offered: Fall, Spring