

# MARINE SCIENCES (MSCI)

- MSCI 103. Marine Ecology. 4 Units**  
**Prerequisite(s):** Ecology, statistics; or concurrent registration in MSCI 104.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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.  
 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**
- MSCI 175B. Intro To Marine Science. 1 Unit**
- MSCI 180. Independent Study. 1 - 4 Units**  
**Prerequisite(s):** Instructor permission.  
 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.  
 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.  
 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.

<b>MSCI 204. Sampling and Experimental Design.</b>	<b>4 Units</b>	<b>MSCI 233C. Coastal Ecology-Gulf of California.</b>	<b>3 Units</b>
<b>Prerequisite(s):</b> MSCI 103, MSCI 104.		<b>Prerequisite(s):</b> MSCI 103, MSCI 104, MLML SCUBA certified, graduate status, instructor permission.	
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.		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.	
<b>MSCI 208. Molecular Ecology: Concepts and Methods.</b>	<b>4 Units</b>	<b>MSCI 233D. Immune Respn Marine Orgns.</b>	<b>2 Units</b>
<b>Prerequisite(s):</b> Basic cellular/molecular biology course; consent of instructor.		<b>MSCI 234. Advanced Biological Oceanography.</b>	<b>4 Units</b>
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.		<b>Prerequisite(s):</b> MSCI 144.	
<b>MSCI 211. Ecology of Marine Birds and Mammals.</b>	<b>4 Units</b>	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.	
<b>Prerequisite(s):</b> MSCI 103, MSCI 104, MSCI 112.		<b>MSCI 242. Plate Tectonics.</b>	<b>3 Units</b>
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.		<b>Prerequisite(s):</b> MSCI 141 or instructor permission.	
<b>MSCI 212. Advanced Topics in Marine Vertebrates.</b>	<b>4 Units</b>	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.	
<b>Prerequisite(s):</b> MSCI 112 or MSCI 113 and instructor permission.		<b>MSCI 248. Marine Benthic Habitat Techniques.</b>	<b>4 Units</b>
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.		<b>Prerequisite(s):</b> Graduate standing and instructor permission.	
<b>Note:</b> May be repeated once for credit.		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.	
<b>MSCI 212A. Adv Ichthyology.</b>	<b>4 Units</b>	<b>MSCI 251. Marine Geochemistry.</b>	<b>4 Units</b>
<b>MSCI 212B. Ichthyoplankton.</b>	<b>4 Units</b>	<b>Prerequisite(s):</b> MSCI 143, quantitative analysis, one year calculus or instructor permission.	
<b>MSCI 212C. Marine Bird+Mammal Ecolgy.</b>	<b>4 Units</b>	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.	
<b>MSCI 212D. Sampling+Expermntl Design.</b>	<b>4 Units</b>	<b>MSCI 261. Ocean Circulation and Mixing.</b>	<b>4 Units</b>
<b>MSCI 221. Advanced Topics in Marine Invertebrates.</b>	<b>4 Units</b>	<b>Prerequisite(s):</b> MSCI 142; college physics strongly recommended or instructor permission.	
<b>Prerequisite(s):</b> MSCI 124 and instructor permission.		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.	
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.		<b>MSCI 262. Satellite Oceanography.</b>	<b>4 Units</b>
<b>Note:</b> May be repeated for credit when topics change.		<b>Prerequisite(s):</b> MSCI 142, MSCI 144, or instructor permission. MSCI 263 strongly recommended.	
<b>MSCI 221A. Marine Symbioses.</b>	<b>4 Units</b>	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.	
<b>MSCI 231. Biology Of Seaweeds.</b>	<b>4 Units</b>	<b>MSCI 263. Application of Computers in Oceanography.</b>	<b>4 Units</b>
<b>Prerequisite(s):</b> MSCI 131 or instructor permission.		<b>Prerequisite(s):</b> College math and instructor permission.	
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.		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.	
<b>MSCI 233A. Adv Marine Ecology.</b>	<b>4 Units</b>		
<b>MSCI 233B. Sampling+Expermntl Design.</b>	<b>4 Units</b>		

- MSCI 271. Population Biology. 3 Units**  
**Prerequisite(s):** MSCI 103, MSCI 104; or instructor permission.  
 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).  
 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+Microanal. 3 Units**
- MSCI 274B. Geol Central Ca Margin. 4 Units**
- MSCI 274C. Chem Of Marine Pollution. 4 Units**
- MSCI 274D. Global Change. 3 Units**
- MSCI 280. Scientific Writing. 3 Units**  
**Prerequisite(s):** Graduate status and instructor permission.  
 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.  
 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.  
 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**
- MSCI 285B. Repro+Dev Marine Organism. 2 Units**
- MSCI 285C. Recent Adv Deep-Sea Bio. 2 Units**
- MSCI 285D. Controversies Modern Biol. 2 Units**
- MSCI 285E. Paradigms In Commun Ecol. 2 Units**
- MSCI 285F. Appl Moleclr Tech Mar Bio. 2 Units**
- MSCI 285G. Aspects Of Deep-Sea Biol. 2 Units**
- MSCI 286. Seminar in Marine Geology. 2 Units**  
 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**  
 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.  
 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**