MARINE SCIENCES (MSCI)

MSCI 103. Marine Ecology. 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. 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. 3 Units

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 instru	uctor
permission; M	SCI 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.

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

4 Units

4 Units

4 Units

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

4 Units

4 Units

4 Units

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. 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. 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. 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. Term Typically Offered: Fall, Spring 1 Unit

MSCI 175B. Intro To Marine Science. Term Typically Offered: Fall, Spring	1 Unit
MSCI 180. Independent Study. Prerequisite(s): Instructor permission. Term Typically Offered: Fall, Spring	1 - 4 Units
Faculty-directed study of selected research problems; open to undergraduate students with adequate preparation. Three hours unit.	s work per
MSCI 201. Library Research Methods. Prerequisite(s): Graduate standing in the Marine Science M.S. p and instructor permission. Term Typically Offered: Fall, Spring	1 Unit program
Students will gain advanced understanding of the nature of scie information. Provides the framework for using and evaluating a of information sources in marine and ocean sciences. Strong er will be placed on developing critical skills to interweave knowled history of science into the context of bibliographic tools includi digital realm. Lecture: three hours.	entific variety mphasis dge of the ng the
MSCI 202. Oceanographic Instrumentation. Prerequisite(s): MSCI 141, MSCI 142 and instructor permission. Term Typically Offered: Fall, Spring	4 Units
Principles of instruments used in oceanographic research, intro to electronics, and applications of instrument measurements. E will vary from CTD profilers, current meters, radiometry and cher measurement. Lecture two hours; laboratory six hours.	duction mphasis mical
MSCI 204 Sampling and Experimental Design	4 Unite

 MSCI 204.
 Sampling and Experimental Design.
 4 Units

 Prerequisite(s):
 MSCI 103, MSCI 104.
 4

 Term Typically Offered:
 Fall, Spring
 4

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.

t 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 Typical	y 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. Term Typically Offered: Fall, Spring	4 Units
MSCI 212B. Ichthyoplankton. Term Typically Offered: Fall, Spring	4 Units
MSCI 212C. Marine Bird+Mammal Ecolgy. Term Typically Offered: Fall, Spring	4 Units
MSCI 212D. Sampling+Expermntl Design. Term Typically Offered: Fall, Spring	4 Units
MSCI 221. Advanced Topics in Marine Invertebrates. Prerequisite(s): MSCI 124 and instructor permission. Term Typically Offered: Fall, Spring	4 Units

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.

Term Typically Offered: Fall, Spring

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

MSCI 233C. Coastal Ecology-Gulf of California. Prerequisite(s): MSCI 103, MSCI 104, MLML SCUBA certified, status, instructor permission. Term Typically Offered: Fall, Spring	3 Units graduate	MSCI 262. Satellite Oceanography. Prerequisite(s): MSCI 142, MSCI 144, or instructor permission. MSCI strongly recommended. Term Typically Offered: Fall, Spring	I Units ⊨263
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.		Physical principles of remote sensing with application to the oceans including satellite image processing methods. Labs involve use of P Unix workstation. Lecture two hours; laboratory six hours.	; C and
		MSCI 263. Application of Computers in Oceanography. 4 Prerequisite(s): College math and instructor permission. 4	Units
MSCI 233D. Immune Respn Marine Orgns. Term Typically Offered: Fall, Spring	2 Units	Term Typically Offered: Fall, Spring	
MSCI 234. Advanced Biological Oceanography. Prerequisite(s): MSCI 144. Term Typically Offered: Fall, Spring	4 Units	computation and visualization with applications in marine sciences. of existing program libraries for data I/O and analysis. Semester pro required. Lecture two hours; laboratory six hours.	Use ject
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		MSCI 271. Population Biology. 3 Prerequisite(s): MSCI 103, MSCI 104; or instructor permission. 3 Term Typically Offered: Fall, Spring 3	3 Units
involving analytical tools will be required. Lecture two hours; I six hours.	laboratory	Principles of the interaction among marine organisms that result in alteration of population structures. Techniques for assessment and	the
MSCI 242. Plate Tectonics. Prerequisite(s): MSCI 141 or instructor permission.	3 Units	management of populations. Lecture two hours; laboratory three ho MSCI 272. Subtidal Ecology.	urs. 4 Units
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		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	
Nours. MSCI 248. Marine Benthic Habitat Techniques. Prerequisite(s): Graduate standing and instructor permission. Term Typically Offered: Fall, Spring	4 Units	with emphasis on kelp forests. Lectures and discussions of original literature. Field work with SCUBA including group projects on underv research techniques and community analysis, and individual researc on ecological questions chosen by the student. Lecture two hours; laboratory six hours	water ch
Collection and interpretation of geophysical data used to char marine benthic habitats. Basic geophysical principles will be Application of techniques to identify and characterize marine	racterize reviewed. benthic	MSCI 274A. Electron Micros+Microanl. 3 Term Typically Offered: Fall, Spring) Units
habitats, including echosounders, multibeam bathymetry and backscatter, sidescan sonar, seismic profiling, and GIS. Lecture tw hours; laboratory six hours.		MSCI 274B. Geol Central Ca Margin. 4 Term Typically Offered: Fall, Spring	l Units
MSCI 251. Marine Geochemistry. Prerequisite(s): MSCI 143, quantitative analysis, one year calo	4 Units culus or	MSCI 274C. Chem Of Marine Pollution. 4 Term Typically Offered: Fall, Spring	l Units
instructor permission. Term Typically Offered: Fall, Spring		MSCI 274D. Global Change. Strem Typically Offered: Fall, Spring	3 Units
Geochemical processes in the oceans: thermodynamics of lot temperature aqueous reactions, processes occurring at the se air-sea interface. Lecture two hours; laboratory six hours.	w ea floor and	MSCI 280. Scientific Writing. S Prerequisite(s): Graduate status and instructor permission. Term Typically Offered: Fall. Spring	3 Units
MSCI 261. Ocean Circulation and Mixing. Prerequisite(s): MSCI 142; college physics strongly recomme instructor permission. Term Typically Offered: Fall, Spring	4 Units nded or	Techniques and strategies of scientific writing used for proposals, jo submissions, and abstracts for meetings. Students will develop thei writing skills by preparing, editing, and rewriting manuscripts. Lecture three hours	ournal r re
Mathematical description of the distribution of properties (sa density, etc.) in the oceans relating to physical and biochemic	linity cal		

processes. Equations of motion, geotropic method, and theory of distribution of variables. Lecture two hours; laboratory six hours.

MSCI 281. Coastal Dynamics. Prerequisite(s): Graduate standing and MSCI 141 or MSCI 142. Term Typically Offered: Fall, Spring	4 Units
Addresses the oceanographic dynamics of coastal environments, an emphasis on eastern boundary current systems influenced by cupwelling. Focuses on how physical and geological oceanography interact with each other and how both affect coastal ecosystem dynamics.	within coastal
MSCI 285. Seminar in Marine Biology. Prerequisite(s): Instructor permission. Term Typically Offered: Fall, Spring	2 Units
Seminar will be held on topics changing each semester. Each stud be required to give at least one seminar. Lecture two hours. Note: May be repeated once for credit.	ent will
MSCI 285A. Social Biology. Term Typically Offered: Fall, Spring	2 Units
MSCI 285B. Repro+Dev Marine Organism. Term Typically Offered: Fall, Spring	2 Units
MSCI 285C. Recent Adv Deep-Sea Bio. Term Typically Offered: Fall, Spring	2 Units
MSCI 285D. Controversies Modern Biol. Term Typically Offered: Fall, Spring	2 Units
MSCI 285E. Paradigms In Commun Ecol. Term Typically Offered: Fall, Spring	2 Units
MSCI 285F. Appl Moleclr Tech Mar Bio. Term Typically Offered: Fall, Spring	2 Units
MSCI 285G. Aspects Of Deep-Sea Biol. Term Typically Offered: Fall, Spring	2 Units
MSCI 286. Seminar in Marine Geology. Term Typically Offered: Fall, Spring	2 Units
Seminar will be held on topics changing each semester. Each stud be required to give at least one seminar. Note: May be repeated once for credit.	ent will
MSCI 287. Seminar In Oceanography. Term Typically Offered: Fall, Spring	2 Units
Seminar will be held on topics changing each semester. Each stud be required to give at least one seminar. Note: May be repeated once for credit.	ent will
MSCI 298. Research in the Marine Sciences. 1 - Prerequisite(s): Graduate standing and instructor permission. 1 Term Typically Offered: Fall, Spring 1	4 Units
Independent investigations of an advanced character for the gradu student with adequate preparation. Note: CSUH students must file a petition with their home campus department before admission to this class. CSU Stanislaus studen must file Individual Study forms. CSUF students must file Research Approval forms.	iate ts h

MSCI 299.	Master's Thesis.
Term Typicall	y Offered: Fall, Spring

1 - 4 Units