MOSS LANDING MARINE LABORATORIES
M.S. IN MARINE SCIENCE PROGRAM

COURSE CATALOG

Undergraduate Courses

MS 103: Marine Ecology 4 Units
Field-oriented introduction to the interrelationship between marine and estuarine organisms and their environment; emphasis on quantitative data collection and analysis.

- **Prerequisites:** Ecology, statistics (or concurrent registration), consent of instructor.

MS 105: Marine Science Diving 3 Units
Skin and SCUBA diving course, pool-training culminates in ten ocean dives. Topics covered include diving physics, physiology, diving environments, night diving and research diving. Successful completion gives AAUS and MLML scientific diver certification. Not for major credit.

- **Prerequisites:** CERTIFIED SCUBA DIVER (OR EQUIVALENCY AS DETERMINED BY INSTRUCTOR), upper division science major status, thorough physical examination, ability to pass swimming test, instructor's consent.

MS 112: Marine Birds and Mammals 4 Units
Systematics, morphology, ecology and biology of marine turtles, birds, and mammals.

- **Prerequisites:** Upper division college vertebrate zoology or instructor's consent; MS 103 recommended.

MS 113: Marine Ichthyology 4 Units
A 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.

- **Prerequisites:** College zoology or equivalent or consent of instructor; MS 103 recommended.

MS 124: Marine Invertebrate Zoology I 4 Units
A field-oriented introduction to the structure, systematics, evolution, and life histories of the major and minor marine phyla.

- **Prerequisites:** College zoology or consent of instructor; MS 103 recommended.

MS 125: Marine Invertebrate Zoology II 3 Units
A field-oriented survey of the common marine invertebrates of the major intertidal habitats in and around Monterey Bay. Focus will be on identification and natural history. Students will maintain and expand a course website that includes updated guides to common invertebrates and a geo-referenced database of species based upon class

observations.

- **Prerequisites:** College zoology or instructor's consent; MS 103 and MS 124 recommended, or instructor's consent

MS 131: Marine Botany 4 Units
Introduction to the plants of the sea, with emphasis on the morphology, taxonomy and natural history of seaweeds and seagrasses.

- **Prerequisites:** Instructor's consent; MS 103 recommended.

MS 135: Physiology of Marine Algae 4 Units
Understanding the adaptations of marine algae to their environment. Physiological topics will incude respiration, enzyme activity, and biochemical composition. Hands-on experience in basic electronic instrumentation, chemical separations, optical measurements, culturing methods and radioisotope techniques. Designed for students interested in the biology of seaweeds and phytoplankton.

- **Prerequisites:** MS 103, 131, 144 or consent of instructor.

MS 141: Geological Oceanography 4 Units
A study of the structures, physiography, and sediments of the sea bottom and shoreline.

- **Prerequisites:** Instructor's consent; undergraduate course in general geology recommended

MS 142: Physical Oceanography 4 Units
An introduction to the nature and causes of various oceanic motions including currents, waves, tides and mixing, and the physical properties of seawater.

- **Prerequisites:** Instructor's consent; college algebra, college physics and calculus recommended.

MS 143: Chemical Oceanography 4 Units
An 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.

- **Prerequisites:** One year of college chemistry.

MS 144: Biological Oceanography 4 Units
The ocean as an ecological system. Emphasis will be on the complexity of environmental influences on 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.

- **Prerequisites:** Instructor's consent; general biology, general chemistry.

MS 175: Topics in Marine Sciences 1 Units

The study of a selected area in the marine sciences. The subjects will vary depending on student demand and availability of instructors. Can be repeated for credit when topics change.

- **Prerequisites:** Instructor's consent

MS 180: Independent Study 1-4 Units
Faculty-directed study of selected problems; open to undergraduate students with adequate preparation. NOTE: SFSU and CSUH students must file a petition with their home campus department before admission to class. Offered every semester.

- **Prerequisites:** Instructor's consent

Graduate Courses

MS 201: Library Research Methods in Marine Science 1 Units
Students will gain an advanced understanding of the nature of scientific information. Lectures, discussions and assignments will provide 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.

- **Prerequisites:** Graduate standing and instructor's consent.

MS 202: Oceanographic Instrumentation 4 Units
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.

- **Prerequisites:** Graduate standing, instructor's consent, MS 141, 142.

MS 204: Sampling and Experimental Design 4 Units
Basic design of experiments and field sampling, including random and systemic sampling, subsampling, survey techniques, single and multifactor experiments using randomized, nested, and blocked experimental designs, and data analyses.

- **Prerequisites:** Graduate standing, instructor's consent, MS 103, 104.

MS 206: Molecular Biological Techniques 4 Units
A laboratory-based overview of concepts and techniques for the isolation, characterization, and analysis of DNA and RNA. This course presents an overview of standard methods (amplification, cloning, and sequencing), as well as selected specialized techniques (analysis of gene expression). Lectures focus on marine science applications.

- **Prerequisites:** Graduate standing; college level genetics, molecular biology, or instructor's consent.

MS 208: Scientific Methods 4 Units

Course is designed to help students develop an understanding of strengths and limitations of various types of scientific reasoning, methodology, and analysis as they relate to scientific progress. Course centers on: round-table discussions of papers and techniques; interactive computer, laboratory, and field learning experiences; and development of critical thinking and writing skills.

- **Prerequisites:** Graduate standing, instructor's consent, and approved MLML thesis project.

MS 211: Ecology of Marine Turtles, Birds and Mammals 4 Units
Community approach to the ecology of marine turtles, birds, and mammals using experimental and sampling methodology. The class will read and discuss recent literature regarding ecological concepts, and field studies will examine the distribution, abundance, trophic ecology, and behavior of birds and mammals in Elkhorn Slough and Monterey Bay.

- **Prerequisites:** Graduate standing, instructor's consent, MS 103, 104, 112.

MS 212: Advanced Topics in Marine Vertebrates 4 Units
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. May be repeated once for credit. Spring 2015 textbook: Animal Physiology - Third Edition, Hill, Wyse, and Anderson, Sinauer Associates, Inc. Publishers. ISBN for the book is 978-0878935598.

- **Prerequisites:** Graduate standing, instructor's consent, MS 112 or 113.

MS 221: Advanced Topics in Marine Invertebrates 4 Units
Advanced considerations of the ecology, physiology and phylogeny of the various invertebrate phyla emphasizing current literature and research. Topics and emphasis will vary from term to term. May be repeated once for credit.

- **Prerequisites:** Graduate standing, instructor's consent, MS 124.

MS 231: Biology of Seaweeds 4 Units
Discussions of marine macroalgal biology with extensive reading of original literature. Ecologically oriented individual research projects involving laboratory culture and field experimentation.

- **Prerequisites:** Graduate standing, instructor's consent, MS 131.

MS 233: Advanced Topics in Marine Ecology 4 Units
Selected topics and current issues in marine ecology. The subjects will vary depending on student demand and availability of instructors. Can be repeated for credit when topics change.

- **Prerequisites:** Instructor's consent; MS 103.

MS 234: Advanced Biological Oceanography 4 Units

Experimental techniques in biological oceanography with emphasis on problems important in plankton ecology. The course includes lectures and labs, and discussions of current research problems. An individual research project involving the use of one or more modern analytical tools will be required.

- **Prerequisites:** Graduate standing; MS 144 or instructor's consent.

MS 242: Plate Tectonics 3 Units
Historical background, modern theory and geophysical evidence of continental drift sea floor spreading and plate tectonics. Examinations of the impact of the recent revolution in historical geology. Offered alternate fall semesters.

- **Prerequisites:** Graduate standing and MS 141 or instructor's consent

MS 246: Geology of the Monterey Bay Region 4 Units
Geology, tectonics and active naturally occurring processes in the Monterey Bay region and in the Monterey Bay National Marine Sanctuary. The geologic and tectonic history of central California, plate tectonic processes, representative stratigraphy and geomorphology of the Monterey Bay region. Offered alternate fall semesters.

- **Prerequisites:** Graduate standing and MS 141 or instructor's consent

MS 248: Marine Benthic Habitat Mapping Techniques 4 Units
The collection and interpretation of geophysical data that can be used to characterize marine benthic habitats. Basic geophysical principals will be reviewed. Application of techniques will be used to identify and characterize marine benthic habitats, including echosounders, multibeam bathymetry and backscatter, sidescan sonar, seismic profiling, and GIS.

- **Prerequisites:** Graduate standing; MS 141 or instructor's consent.

MS 251: Marine Geochemistry 4 Units
Geochemical processes in the oceans: thermodynamics of low temperature aqueous reactions, weathering, oxidation-reduction and biologically mediated reactions, processes occurring at the sea floor and air-sea interface. Offered as needed.

- **Prerequisites:** Graduate standing, MS 143, statistics and/or 1 year calculus, instructor's consent

MS 261: Mixing, Estuarine and Sediment Transport 4 Units
Dynamical processes in estuarine and coastal systems, with an emphasis on flow, friction, sediment transport, mixing and diffusion of mass and biogeochemical constituents (nutrients and oxygen, others). Discussion of recent literature.

- **Prerequisites:** Graduate standing; MS 142 or instructor's consent

MS 263: Data Analysis Techniques in Marine Science 4 Units
Introduction to using observational oceanographic data, with hands-on practice in scientific programming for data analysis. Lecture, discussion, and practical experience

including the use of existing programs and subroutine libraries. Semester project required.

- **Prerequisites:** Graduate standing, statistics, college math and instructor's consent.

MS 271: Population Biology 3 Units
Principles of the interaction among marine organisms that result in the alteration of population structures. Techniques for assessment and management of populations.

- **Prerequisites:** Graduate standing; MS 103 and 104 or instructor's consent

MS 272: Subtidal Ecology 4 Units
The ecology of nearshore rocky subtidal populations and communities with emphasis on kelp forests. Lectures and discussions of original literature. Fieldwork with SCUBA including group projects on underwater research techniques and community analysis, and individual research on ecological questions chosen by the student. Offered alternate spring semesters.

- **Prerequisites:** Graduate standing, MLML diver certification and MS 103 or equivalent (knowledge of marine algae, invertebrates, and statistics recommended).

MS 273: Marine Environmental Studies of the Gulf of California 4 Units
A comparative analysis of Gulf of California marine environments. Lectures, readings, intensive field work, and composing a scientific paper based on original research. Topics will vary depending on instructors. Taught in conjunction with Mexican faculty and students from La Paz, Mexico, Universidad Autonoma de Baja California Sur.

- **Prerequisites:** Graduate standing; Instructor's consent, students must be able to participate in 2 weeks of fieldwork and a valid passport is required.

MS 274: Advanced Topics in Oceanography 4 Units
The study of a selected area of oceanography. The subjects will vary depending on student demand and availability of instructors. Can be repeated for credit when topics change.

- **Prerequisites:** Graduate standing, instructor's consent

MS 280: Scientific Writing 3 Units
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. There is a maximum of 12 students allowed to register for this course.

- **Prerequisites:** Graduate standing, instructor's consent.

MS 281: Coastal Dynamics 4 Units
Oceanographic dynamics of coastal environments, with an emphasis on eastern

boundary current systems influenced by coastal upwelling. Interactions of physical and geological oceanography and how both affect coastal ecosystem dynamics.

- **Prerequisites:** Graduate standing and MS 142 or MS 141.

MS 285: Graduate Seminar in Marine Science 2 Units
Seminar will be held on topics changing each semester. Each student will be required to give at least one seminar. May be repeated for credit. Offered spring and fall semesters.

- **Prerequisites:** Graduate standing, consent of instructor.

MS 298: Research in Marine Science 2 Units
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. Offered spring and fall semesters.

- **Prerequisites:** Graduate standing and consent of instructor

MS 299: Thesis 4 Units
Offered spring and fall semesters. Available only to MLML graduate students in good standing with the approval of their major advisor. Note: Fresno, San Francisco, and Hayward students must file a petition with their home campus departments before admission to this class. San Francisco students must also file a Graduate Approved Program.

- **Prerequisites:** Classified graduate standing, advancement to candidacy