

MARINE SCIENCE (MSCI)

MSCI 200 Adventures in Marine Science (Units: 3)

Prerequisite: GE Area A2*.

Introduction to environmental issues, research topics, and career trajectories related to Marine Science. To enhance writing skills, students will develop a semester-long writing project and digital portfolio based on multiple, scaffolded assignments incorporating research, literature citations, reflections, and persuasive essays. Students will develop a picture of themselves as a professional marine scientist and a projected CV of where they see themselves at graduation to add to the portfolio. Students will participate in 15 hours of community service related to ocean/coastal well-being. (Plus-minus letter grade)

Course Attributes:

- E: Lifelong Learning Develop

MSCI 303 Marine Ecology (Units: 4)

Prerequisites: Ecology, statistics (or concurrent registration in MSCI 304), or permission of the instructor.

Interrelationships between marine and estuarine organisms and their environment. Quantitative data collection and analysis. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 304 Quantitative Marine Science (Units: 4)

Prerequisite: College mathematics.

Mathematical methods for the analysis of biological, chemical, and physical data from the marine environment including experimental design, and parametric and non-parametric statistics. Lecture, 3 units; laboratory, 1 unit. (Plus-minus letter grade only)

MSCI 305 Marine Science Diving (Units: 3)

Prerequisite: Certified SCUBA diver or equivalency as determined by the instructor.

Skin and scuba diving including five ocean dives and an exploration of underwater sampling and survey techniques. Successful completion gives National Association of Underwater Instructors (NAUI) and Moss Landing Marine Laboratories (MLML) certification. Does not satisfy any major requirements. Lecture, 1 unit; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 306 Marine Science Diving and Boating (Units: 2)

Prerequisites: Upper-division science majors; basic open water SCUBA diving certification; physician's authorization to dive; ability to pass a swim test; and permission of the instructor.

Hands-on learning and application of advanced skills to conduct marine science research. Topics include diving physics, physiology, and marine ecological survey skills using diving and boating. Learn to accomplish research on and under the water in a variety of conditions. Lead dives to demonstrate the ability to gather data to test hypotheses in marine ecology, conservation, and restoration and generate plots to visualize the collected data. Lecture, 1 unit; Activity, 1 unit. Extra fee required.

MSCI 312 Marine Birds and Mammals (Units: 4)

Prerequisites: Upper-division standing; MSCI 303 or BIOL 585 recommended.

Systematics, morphology, ecology, and biology of marine birds and mammals. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 313 Marine Ichthyology (Units: 4)

Prerequisites: A college-level zoology course or equivalent; MSCI 303 or BIOL 585 recommended. Not open to students who have completed BIOL 571.

The taxonomy, morphology, function, and ecology of marine fishes. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 324 Marine Invertebrate Zoology I (Units: 4)

Prerequisites: A College-level zoology course or permission of the instructor; MSCI 303 recommended.

Structure, systematics, evolution, and life histories of the major and minor marine phyla. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 331 Marine Botany (Units: 4)

Prerequisite: MSCI 303 recommended.

Plants of the sea, marshes, and dunes. Morphology, taxonomy, and the natural history of seaweeds and vascular plants. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 335 Physiological Ecology of Marine Algae (Units: 4)

Prerequisites: MSCI 303, MSCI 331, and MSCI 344, or permission of the instructor.

The physiological basis for understanding the adaptation of marine algae to their environment. Lecture, 2 units; laboratory, 2 units.

MSCI 341 Geological Oceanography (Units: 4)

Prerequisite: MSCI 342 or MSCI 343 (may be taken concurrently).

The structure, physiography, and composition of the sea bottom and shoreline. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 342 Physical Oceanography (Units: 4)

Prerequisites: A college-level algebra course; college-level physics course recommended.

The nature and causes of various oceanic motions including currents, waves, tides, and mixing, and the physical properties of seawater. Includes a limited use of calculus. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 343 Chemical Oceanography (Units: 4)

Prerequisite: One year of college-level chemistry.

Chemistry of the oceans including major salts, dissolved gases, nutrient ions, carbonate system, transient tracers, and shipboard sampling techniques. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 344 Biological Oceanography (Units: 4)

Prerequisites: One college-level general biology and one college-level general chemistry course.

The complexity of organismal-environmental interaction of plankton and the transfer of organic matter between trophic levels and nutrient cycles. Sampling, shipboard techniques, identification of the plankton, and analytical techniques. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 699 Independent Study (Units: 1-3)

Prerequisite: Permission of the instructor. Open to undergraduate students who have adequate subject matter preparation for the selected problem.

Faculty-directed study of selected research problems in the marine sciences. May be repeated for credit.

MSCI 701 Library Research Methods in Marine Science (Unit: 1)

Prerequisite: Graduate standing and permission of the instructor.

The nature of scientific information. Framework for evaluating and interweaving the history of science with a variety of information sources and bibliographic tools. (Plus-minus letter grade only)

MSCI 706 Molecular Biological Techniques (Units: 4)

Prerequisites: Graduate standing; college-level genetics or molecular biology course; or permission of the instructor.

A laboratory-based overview of concepts and techniques for the isolation, characterization, and analysis of DNA and RNA. Covers standard methods (amplification, cloning, and sequencing), as well as selected specialized techniques (analysis of gene expression), emphasizing application in marine sciences. Seminar, 1 unit; laboratory, 3 units. (Plus-minus letter grade only)

MSCI 708 Scientific Methods (Units: 2)

Prerequisites: Graduate standing and permission of the instructor.

Information and skills for graduate students beginning their research careers including the philosophy of science, scientific writing, the design of experiments and sampling programs, and using the library and other resources. Seminar, 3 units; laboratory, 1 unit. (Plus-minus letter grade only)

MSCI 709 Foundations in Interdisciplinary Marine & Estuarine Science (Units: 4)

Prerequisite: Graduate Interdisciplinary Marine & Estuarine students or permission of the instructor.

Developing interdisciplinary working knowledge at the intersection of global change (climate change, ocean acidification, invasive species, disease, land use), coastal oceanography (physical, biological, chemical, geological), marine/estuarine biology (biodiversity, population, ecosystem, physiology), and societal issues (general public, managers, policymakers). (Plus-minus letter grade only)

MSCI 711 Ecology of Marine Birds and Mammals (Units: 4)

Prerequisites: MSCI 303, MSCI 304, and MSCI 312.

Ecology of marine birds and mammals using experimental and sampling methodology. Distribution, abundance, trophic ecology, and behaviors of birds and mammals in Elkhorn Slough. Aerial and boat surveys to determine distribution and abundance. Seminar, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 715 Writing for Interdisciplinary Marine and Estuarine Scientists (Units: 3)

Prerequisite: Restricted to Interdisciplinary Research Intensive Pedagogical Training of Interdisciplinary Estuarine Scientists (RIPTIDES) students.

Advance academic writing skills through targeted exercises and activities. Topics will include academic vocabulary, essay structure, paragraph structure, and citation skills. Activities will be conducted to teach how to report and present the methods, results, and conclusions of scientific inquiry. (Plus-minus letter grade only)

MSCI 717 Professional Skills Workshop I: Data Analysis and Visualization (Units: 2)

Prerequisite: Interdisciplinary Research Intensive Pedagogical Training of Interdisciplinary Estuarine Scientists (RIPTIDES) students or permission of the instructor.

Weekly discussion of statistical analysis in R and data visualization for inclusion in a thesis project. (Plus-minus letter grade only)

MSCI 718 Writing and Professional Skills Workshop II (Units: 2)

Prerequisite: Interdisciplinary Marine and Estuarine Science students or permission of the instructor.

Weekly assignments in academic writing, editing and reviewing with peers, practice, and increased skills in interview techniques, resume writing, and journal article submission. (Plus-minus letter grade only)

MSCI 721 Advanced Topics in Marine Invertebrates: Marine Invertebrates (Units: 4)

Prerequisites: MSCI 324 and permission of the instructor.

Advanced considerations of the ecology, physiology, and phylogeny of the various invertebrate phyla emphasizing current literature and research. Seminar, 2 units; laboratory, 2 units. May be repeated for a total of 8 units.

MSCI 731 Biology of Seaweeds (Units: 4)

Prerequisite: MSCI 331 or permission of the instructor.

Lectures and discussions about marine macroalgal biology with extensive reading of original literature. Ecologically oriented individual research projects involving laboratory culture and field experimentation. Seminar, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 733 Advanced Topics in Marine Ecology: Marine Ecology (Units: 4)

Prerequisite: Graduate standing.

Study of various topics in marine ecology. Seminar, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 734 Advanced Biological Oceanography (Units: 4)

Prerequisite: MSCI 344 or permission of the instructor.

Experimental techniques in biological oceanography: problems in plankton ecology. Individual research project required. Seminar, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 748 Marine Benthic Habitat Mapping Techniques (Units: 4)

Prerequisite: Graduate standing or permission of the instructor.

The collection and interpretation of geophysical data used to characterize marine benthic habitats. Basic geophysical principals are reviewed. Application of techniques to identify and characterize marine benthic habitats, including echosounders, multibeam bathymetry and backscatter, side scan sonar, seismic profiling, and GIS. Seminar, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 761 Ocean Circulation and Mixing (Units: 2)

Prerequisites: MSCI 342; college-level physics course strongly recommended.

Mathematical description of the distribution of various properties in the oceans relating to physical and biochemical processes. Distribution of variables, geostrophic method. Seminar, 3 units; laboratory, 1 unit. (Plus-minus letter grade only)

MSCI 763 Applications of Computers in Oceanography (Units: 4)

Prerequisites: College-level mathematics course and permission of the instructor.

Discussion and technical programming with MATLAB for computation and visualization with applications in marine science. Use of existing program libraries for data I/O and analysis. Seminar, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 772 Subtidal Ecology (Units: 4)

Prerequisites: Moss Landing Marine Laboratories diver certification and marine ecology course; knowledge of marine algae, invertebrates, and statistics recommended.

The ecology of nearshore, rocky, subtidal populations and communities with emphasis on kelp forests. Fieldwork with SCUBA including group projects on underwater research techniques and community analysis. Seminar, 2 units; Laboratory, 2 units. (Plus-minus letter grade only)

MSCI 773 Marine Environmental Studies of the Gulf of California (Units: 4)

Prerequisite: Graduate standing or consent of the instructor.

An analysis of the Gulf of California marine environments. Lectures, readings, intensive fieldwork, and writing a scientific paper based on original research. Topics vary. Taught with Mexican faculty and students from La Paz, Mexico. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 774 Advanced Topics in Oceanography: Oceanography (Units: 4)

Prerequisite: Graduate standing or permission of the instructor.

Selected topics in oceanography. Topics and emphases vary with term and instructor. Lecture, 2 units; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 788 Professional Internship in Marine and Estuarine Sciences (Units: 3)

Prerequisite: Interdisciplinary Research Intensive Pedagogical Training of Interdisciplinary Estuarine Scientists (RIPTIDES) students.

Professional internship with a partner organization one day per week. Partners are from a wide range of organizations where scientific information is used, not generated. Students will relate what they learn to classmates during weekly group meetings and group discussions with internship mentors to address student career planning questions. Lecture, 1 unit; laboratory, 2 units. (Plus-minus letter grade only)

MSCI 885 Seminar in Interdisciplinary Marine and Estuarine Science (Units: 2)

Prerequisite: Graduate standing or permission of the instructor.

Topic to be specified in Class Schedule. May be repeated for a total of 4 units. (Plus-minus letter grade only)

Topics:

1. Graduate Seminar in Marine Science
2. Graduate Seminar in Marine Geology
3. Graduate Seminar in Oceanography

MSCI 895 Field Study or Applied Research Project (Units: 3)

Prerequisites: Graduate standing in Interdisciplinary Marine and Estuarine Science; permission of the instructor and chair of student's committee; and approval of Advancement to Candidacy (ATC) and Culminating Experience (CE) forms by Graduate Studies. ATC and Proposal for Culminating Experience Requirement forms must be approved by the Graduate Division before registration.

Supervised independent and original laboratory or field investigation. Guidelines are available upon advisement through the Interdisciplinary Marine and Estuarine Science graduate coordinator. (CR/NC/RP grading only)

MSCI 897 Research (Units: 1-4)

Prerequisites: Permission of the adviser, instructor, and department chair.

Independent investigations for the student with adequate preparation. May be repeated for a total of 8 units. (Plus-minus letter grade, CR/NC, RP)

MSCI 898 Master's Thesis (Units: 4)

Prerequisite: Permission of instructor and approval of Advancement to Candidacy (ATC) and Culminating Experience (CE) forms by Graduate Studies.

(CR/NC, RP grading only)