

their biotic and abiotic surroundings. (2 lecture, 6 lab or field hours)

122. Marine

Invertebrate Embryology (4)

Prerequisite: M SCI 124, cell biology or biochemistry strongly recommended or permission of instructor. Survey of principles of developmental biology, concentrating on experimental evidence obtained using invertebrate material. Laboratory observations cover the embryology of lower invertebrates, molluscs, crustacea, enchinoderms, and protochordates. (2 lecture, 6 lab or field hours)

124. Marine Invertebrate Zoology I (4)

Prerequisite: college zoology or permission of instructor; M SCI 103 recommended. A field-oriented introduction to the structure, systematics, evolution, and life histories of the major phyla. (2 lecture, 6 lab or field hours)

125. Marine Invertebrate Zoology II (3)

Prerequisite: college zoology or permission of instructor; M SCI 103 and M SCI 124 recommended. A field-oriented introduction to the structure, systematics, evolution, and life histories of the minor phyla. (1 lecture, 6 lab or field hours)

131. Marine Botany (4)

Prerequisite: M SCI 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. (2 lecture, 6 lab or field hours)

135. Physiology of Marine Algae (4)

Prerequisites: M SCI 103, 131, 144. Develops physiological basis for understanding the adaptation of marine algae (seaweeds and microalgae) to their environment. Students will learn modern methods in physiological research, covering areas such as photosynthesis, respiration, enzyme activity, and biochemical composition. (2 lecture, 6 lab hours)

141. Geological Oceanography (4)

Prerequisite: M SCI 142 or 143 or concurrently. Structures, physiography, and sediments of the sea bottom and shoreline. (2 lecture, 6 lab or field hours)

142. Physical Oceanography (4)

Prerequisite: college algebra; college physics recommended. An introduction to the nature and causes of various oceanic motions including currents, waves, tides and mixing, and the physical properties of sea-

water including transmission of sound and light; does not require calculus. (3 lecture, 3 lab or field hours)

143. Chemical Oceanography (4)

Prerequisite: one year of college chemistry. 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. (2 lecture, 6 lab and field hours)

144. Biological Oceanography (4)

Prerequisites: general biology and general chemistry. The ocean as an ecological system. Emphasis is on the complexity of organismal-environmental interaction of the plankton, the transfer of organic matter between trophic levels and nutrient cycles. Laboratory includes methods in sampling, shipboard techniques, identification of plankton, and current analytical techniques. (2 lecture, 6 lab or field hours)

161. Marine Fisheries (4)

Prerequisite: college mathematics, M SCI 104, or permission of instructor; M SCI 103 recommended. An introduction to fishery biology, including the concepts of stock, recruitment, and yield; emphasizing the parameters abundance, age, growth, and mortality; discussion of hydrography and fishery ecology, management problems, world fisheries and mariculture; and collection and analysis of fishery data. (2 lecture, 6 lab or field hours)

173T. Topics in Marine Biology (1-4)

Prerequisite: permission of instructor. The study of a selected area in marine biology (morphology, physiology, ecology, etc.). Subjects will vary depending on student demand and availability of instructors. (Lecture and/or laboratory)

174T. Topics in Oceanography (1-4)

Prerequisite: permission of instructor. The study of selected areas in oceanography; subject varies depending on student demand and availability of instructors. (Lecture and/or laboratory)

175T. Topics in Marine Science (1-4)

The study of a selected area in the marine sciences. The subjects vary depending on student demand and availability of instructors. (Lecture and/or laboratory)

177. Microscopic Techniques (3)

Prerequisites: one semester college physics and permission of instructor. Principles and techniques of light and electron mi-

croscopy; consideration of brightfield, darkfield, phase contrast, and interference contrast light microscopy; episcopic and diascopic illumination systems; photomicrography; preparation of materials for and operation of the scanning electron microscope. (2 lecture, 3 lab hours)

180. Independent Study

(1-4; max total 6)

Prerequisite: permission of instructor. Faculty directed study of selected problems; open to undergraduate students with adequate preparation. Approved for *SP* grading.

GRADUATE COURSES

(See *Course Numbering System*.)

Marine Science (M SCI)

202. Marine Instrumental Analysis (4)

Prerequisites: M SCI 142, 143. Theory and use of advanced instrumentation; advanced field and laboratory techniques for the interpretation of data collected in marine science research. (2 lecture, 6 lab or field hours)

204. Sampling and Experimental Design (4)

Prerequisites: M SCI 103, 104. Basic design of experiments and field sampling, including random sampling, systemic sampling, subsampling, survey techniques, and design of single and multifactor experiments using randomized and block experimental designs.

211. Ecology of Marine Birds and Mammals (4)

Prerequisites: M SCI 103, 104, 112. Community approach to the ecology of marine birds and mammals using experimental and sampling methodology. Examines the distribution, abundance, trophic ecology, and behavior of birds and mammals in Elkhorn Slough and Monterey Bay. (2 lecture, 6 lab hours)

212T. Advanced Topics in Marine Vertebrates (1-4)

Prerequisites: M SCI 112 or 113 and permission of instructor. Advanced considerations of the ecology, physiology, and phylogeny of fishes, birds, or mammals; emphasizing current literature and research. (Lecture and/or laboratory)

221T. Advanced Topics in Marine Invertebrates (1-4)

Prerequisites: M SCI 124 and permission of instructor. Advanced considerations of the ecology, physiology, and phylogeny of