

Fisheries Biology

LOWER DIVISION

FISH 110. Introduction to Fisheries (1) **FS**. Fishery biology field: its breadth, career opportunities, and scientific principles on which it is founded. [CR/NC.]

FISH 165. Small Aquarium Management (2). Construction, operation, maintenance, and management of small aquaria for home, commercial, or public display of marine and freshwater fishes. [CR/NC]

UPPER DIVISION

FISH 300. Introduction to Fishery Biology (3) **FS**. Identification, life histories, and ecology of important freshwater and marine fishes. Principles of fisheries management and its relationships with management of other resources. [GE.]

FISH 310. Ichthyology (5) **FS**. Biology of fishes and fishlike vertebrates. Anatomy/concepts of systematics of fishes; classifying fishes, particularly commercial, game, and forage species. [Prereq: ZOO 110 or ZOO 210. Weekly: 3 hrs lect, 3 hrs lab.]

FISH 311. Fish Physiology (3) **F**. Physiology of lower vertebrate organ systems. Efficient management and culture of the animal as a renewable resource. [Prereq: FISH 310, BIOM 109. Weekly: 2 hrs lect, 3 hrs lab.]

FISH 314. Fishery Science Communication (3) **F**. Technical literature; library usage; reporting. Organize/communicate written and oral scientific information. [Prereq: BIOM 109 and FISH 310. FISH 310 may be taken concurrently. Weekly: 2 hrs lect, 2 hrs disc.]

FISH 320. Limnology (3) **F**. Lake formation and aging. Physical, chemical, and behavioral relationships between organisms and their environments. [Prereq: CHEM 107 or 109 or equivalent, and BIOM 109.]

FISH 320L. Limnology Practicum (1). Survey lakes and streams. Survey equipment; analytical instruments; field and lab methods. [Coreq: FISH 320. Weekend field trips.]

FISH 335. U.S. & World Fisheries (3) **F**. Location of, and species taken in, commercial fisheries. Their importance to world food supply. Methods of harvest and products marketed. Economic problems of common property resources. [Prereq: IA. Weekly: 2 hrs lect, 3 hrs lab. Some weekend and after-hours field trips required.]

FISH 370. Aquaculture (3) **S**. Culture and breeding of freshwater and marine fishes, sport and commercial. Operating fresh and saltwater hatcheries. Care and use of fishes as experimental animals. [Prereq: FISH 310 or IA.]

FISH 370L. Aquaculture Practicum (1). Culture methods and materials: egg-taking and fish rearing; operating hatchery facilities; hatchery and

pond management. Requires hip boots or waders and rain gear. [Prereq: FISH 370 (C).]

FISH 375. Mariculture (3) **S**. Controlled spawning, cultivation, harvesting, processing, and marketing of marine and estuarine algae, invertebrates, and fishes. How laws and regulations, engineering, and economics affect culture on a worldwide basis. Culture of food items used in rearing marine and estuarine species. [Prereq: FISH 310 or ZOO 314. Lab requires after-hours time at marine lab.]

FISH 380. Techniques in Fishery Biology (3) **F**. Overview of fishery research methods: sampling theory, collection gear, stock identification methods, age and growth, tagging, and estimation of population size. [Prereq: FISH 310 or IA. Weekly: 2 hrs lect, 3 hrs lab.]

FISH 430. Ecology of Freshwater Fishes (3) **S**. Environmental influences on life history, behavior, growth, and survival of freshwater and anadromous fishes. [Prereq: FISH 310 and BIOM 109, or IA.]

FISH 430L. Ecology of Freshwater Fishes Lab (1). Prereq: FISH 310 and BIOM 109. [Weekly: 3 hrs lab. Some weekend and after-hours field trips required.]

FISH 435. Ecology of Marine Fishes (4) **F**. Environmental influences on life history, behavior, growth, and survival of marine and anadromous fishes. [Prereq: FISH 310, OCN 109. Weekly: 3 hrs lect, 3 hrs lab. Some weekend and after-hours field trips.]

FISH 440 / FISH 540. Early Life History of Fishes (4). Identification and ecology of the early life history stages of fishes. [Prereq: FISH 310 or IA.]

FISH 443. Problems in Water Pollution Biology (3) **S**. Nature, scope, magnitude, and significance of water pollution; common pollutant materials; their nature, sources, and effects in natural waters; detection, surveillance, and abatement. [Prereq: FISH 320/320L or 8 units of upper division biology; one year of chemistry. Weekly: 2 hrs lect, 3 hrs lab.]

FISH 450. Introductory Fish Population Dynamics (4) **F**. Classical theory and analysis of exploited fish populations. Mortality, growth, recruitment, and yield models are derived, evaluated, and applied to fishery data. Estimates of survival and population size. [Prereq: MATH 105, BIOM 109, and IA. Weekly: 3 hrs lect, 2 hrs computer lab.]

FISH 460. Principles of Fishery Management (3) **S**. An overview of the theoretical and practical constraints of fishery management. An historical perspective on maximum sustained yield, net economic yield, and optimum yield, with a focus on how laws and policy dictate and change the methods and objectives of management. [Prereq or Coreq: FISH 430 or 435 or IA.]

FISH 471. Fish Health Management (3) **F**. Prevent, diagnose, manage, and treat infectious and

noninfectious fish diseases. [Prereq: FISH 310 or equivalent or IA. Weekly: 2 hrs lect, 3 hrs lab.]

FISH 473. Wastewater Aquaculture (3) **S**. Use wastewater to enhance productivity of aquaculture systems. Functional similarity between wastewater treatment lagoons, fertilized fish ponds, and wastewater aquaculture systems. Polyculture in wastewater aquaculture; case studies. [Prereq: upper division standing and IA. Weekly: 2 hrs lect, 2 hrs activ.]

FISH 474. Genetic Applications in Fish Management (4) **S**. Introductory genetic principles using fish examples. Cytogenetic and quantitative genetic methods in fish culture. Population genetic methods in fishery management. [Prereq: BIOL 105 or equivalent. Weekly: 3 hrs lect, 3 hrs lab.]

FISH 480. Selected Topics in Fisheries (1-4). [CR/NC. Lect/lab as appropriate. Rep with different topic.]

FISH 485. Ecology of Running Waters (3). Characterization of the physical and chemical environment, adaptations, distribution, and interactions of riverine biota, ecosystem structure and dynamics, and response to human alteration. [Prereq: BIOL 105 or IA.]

FISH 490. Honors Thesis Research (1-4). [Prereq: FISH 314 or BIOL 369 or equivalent; GPA of 3.2 or better. Prior to enrollment, file a formal application, including a research proposal. Rep.]

FISH 495. Senior Fisheries Seminar (1) **FS**. Selected topics. [CR/NC. Rep.]

FISH 499. Directed Study (1-4). Independent study culminating in tangible evidence of academic accomplishment. [Prereq: upper division standing. Rep.]

GRADUATE

FISH 510. Advanced Ichthyology (3). Phylogenetic history of major groups of fishes. Survey world's extinct/living fishes. Geographic distribution; historical zoogeography. [Prereq: FISH 310 or equivalent. Weekly: 2 hrs lect, 3 hrs lab.]

FISH 525. Wastewater Ecosystems Analysis/Reuse (3). Principles of aquatic ecology applied to wastewater treatment. Reuse of treated effluents with natural resource benefits. Microbiology; wetland ecology; nutrient cycling and removal; soil chemistry. [Prereq: senior or grad status in CNRS and IA. Field trips to wastewater treatment facilities occasionally require one or more days' absence during the week.]

FISH 540 / FISH 440. Early Life History of Fishes (4). Reproduction, embryology, and identification of fish eggs and larvae. Biotic and abiotic factors affecting early life survival. [Prereq: FISH 310 or IA. Weekly: 3 hrs lect, 3 hrs lab. Weekend field trips occasionally require one or more days' absence during the week.]

FISH 571. Advanced Fish Disease & Pathology (3). Epidemiology, pathology, diagnosis, and

treatment of infectious and noninfectious fish diseases. [Prereq: FISH 471 and IA. Weekly: 2 hrs lect, 6 hrs lab.]

FISH 575. Fish Bioenergetics (3). Energy requirements of fish; physiology of fish relative to energetic processes and constraints imposed by environmental conditions. [Prereq: BIOM 109, FISH 310. Prior course in physiology recommended. Weekly: 2 hrs lect, 2 hrs lab.]

FISH 580. Advanced Study in Fishery Biology & Management (1-4). Theories, principles, techniques. [Prereq: IA. CR/NC. Lect/lab (FISH 580L concurrently) as appropriate to instructor and topic. Rep with different topic and instructor.]

FISH 585. Ecology of Running Waters (3). Characterization of the physical and chemical environment, adaptations, distribution, and interactions of riverine biota, ecosystem structure and dynamics, and response to human alteration. [Prereq: BIOL 330 or any upper division ecology class.]

FISH 597. Mentoring & Teaching Associate Training (1-4). Train in course preparation and delivery. [CR/NC. Advanced majors or grad students take prior to, or concurrent with, assignments as teaching assistants/associates.]

FISH 685. Graduate Fisheries Seminar (1). Discuss and review advanced topics. [Prereq: grad standing. CR/NC. Rep.]

FISH 690. Thesis (1-4). [Prereq: grad standing. Rep.]

FISH 695. Research Problems in Fisheries (1-4). Individual research on advanced lab or field problems. [Prereq: grad standing. Rep.]

FISH 699. Directed Study (1-4). Advanced independent studies terminating in tangible evidence of academic accomplishment. [Prereq: grad standing. Rep.]