




Fisheries Biology

LOWER DIVISION

 **FISH 220. Water Resources & Conservation** (3). Abundance, status, and conservation of global water resources. Aquatic habitats available for fish and water quality requirements. Laws and agencies charged with protecting water resources. Water allocation conflicts and resolutions.

 **FISH 260. Fish Conservation & Management** (3). Introduction to fisheries science. Overview of relationships between fish and people, including law and regulatory agencies, management programs, and conservation.

UPPER DIVISION

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

FISH 310. Ichthyology (4). Biology of fishes and fishlike vertebrates. Anatomy/concepts of systematics of fishes; classifying fishes, particularly commercial, game, and forage species. [Prereq: ZOO 110. Weekly: 3 hrs lect, 3 hrs lab.]

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


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


FISH 320. Limnology (3). Lake formation and aging. Physical, chemical, and behavioral relationships between organisms and their environments. [Prereq: CHEM 107 or CHEM 109 or equivalent, and STAT 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). 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 358. Fisheries Data Analysis (4). Introduction to quantitative fisheries methods including statistical methods, basic sampling and experimental design, and models for fish growth, recruitment, mortality, and population dynamics. Focus on applications and interpretation. [Prereq: MATH 101 or MATH 101i or MATH 102 or equivalent, and STAT 108 or STAT 108i or STAT 109. Weekly: 3 hrs lect, 2 hrs lab. Rep.]


 **FISH 370. Aquaculture** (4). 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. Weekly: 3 hrs lect, 3 hrs lab.]


 **FISH 375. Mariculture** (3). 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). Overview of fishery research methods: sampling theory, collection gear; stock identification methods, age and growth, tagging, and estimation of population size. [Prereq: FISH 310 (C) and STAT 109 (C), or IA. Weekly: 2 hrs lect, 3 hrs lab.]


FISH 410. Topics in Advanced Ichthyology (3). Advanced topics in ichthyology such as phylogeny, zoogeography, fish families of the world, early life history of fish, or biology of particular groups of fish (e.g. sharks and rays). Repeatable with different content. [Prereq: FISH 310. Weekly: 2 hrs lect, 3 hrs lab. Rep 4 times.]


 **FISH 434. Ecology of Freshwater Fish** (4). Distribution, diversity, and abundance of freshwater and anadromous fish. Covers evolution, life history strategies, behavior, physiology, and interactions between species, including relevance for conservation and management. Focus on local species, particularly Pacific salmon and trout. [Prereq: STAT 109, FISH 310 or IA. Weekly: 3 hrs lect, 3 hrs lab.]

 **FISH 435. Ecology of Marine Fish** (4). Environmental influences on life history, behavior, growth, and survival of marine and anadromous fishes. [Prereq: FISH 310 and (OCN 109 (if taken prior to fall 2015) or OCN 109 and OCN 109L), or IA. Weekly: 3 hrs lect, 3 hrs lab. Some weekend and after-hours field trips.]

 **FISH 443. Problems in Water Pollution Biology** (3). 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/FISH 320L or 8 units of upper division biology; one year of chemistry. Weekly: 2 hrs lect, 3 hrs lab.]


 **FISH 458. Fish Population Dynamics** (4). 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, STAT 109, and IA. Weekly: 3 hrs lect, 2 hrs computer lab.]


 **FISH 460. Advanced Fish Conservation & Management** (3). Overview of theoretical and practical constraints of fish conservation and management with focus on use of quantitative tools. Examination of how laws and values shape the objectives of management. [Prereq: FISH 434 (C) or FISH 435 (C).]


 **FISH 470. River Fish Restoration Ecology** (3). Principals of ecological restoration applied to river fishes, emphasis on biological, physical and watershed processes. [Prereq: FISH 310. Weekly: 2 hrs lect, 3 hrs lab.]

FISH 471. Fish Diseases (3). 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 472. Advanced Aquaculture (3). Principles of hatchery management, including the biology of fish reproduction, spawning techniques, egg incubation, and larval rearing. [Prereq: FISH 370 or FISH 375. Weekly 2 hrs lect 3 hrs lab.]

 **FISH 474. Conservation Genetics of Fish and Wildlife** (4). Application of molecular methods to conservation, management, ecology, and evolution of fish and wildlife. [Prereq: BIOL 105 or equivalent. Weekly: 3 hrs lect, 3 hrs lab.]

 **FISH 476. 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 alternation. [Prereq: BIOL 330 or IA. Weekly: 2 hrs lect, 3 hrs lab.]

 **FISH 478. Fisheries Oceanography** (3). Introduction to how climate and oceanographic processes affect the dynamics of marine populations, ecosystems, and fisheries, and how oceanography informs management of marine ecosystems. [Weekly: 2 hrs lect, 2 hrs lab. IA.]

FISH 480. Selected Topics in Fisheries (1-4). [CR/NC. Rep with different topics.]


FISH 480L. Selected Topics in Fisheries Lab (1-2). [CR/NC. Rep with different topics.]


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

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


GRADUATE


FISH 510. Topics in Advanced Ichthyology (3). Advanced topics in ichthyology such as phylogeny, zoogeography, fish families of the world, early life history of fish, or biology of particular groups of fish (e.g. sharks and rays). Repeatable with different content. [Prereq: FISH 310 or equivalent. Weekly: 2 hrs lect, 3 hrs lab. Rep 4 times.]

 **FISH 558. Fish Population Dynamics** (4). Theory and analysis of exploited fish populations. Meets jointly with FISH 458. Students in FISH 558 are expected to develop a fish populations dynamics case study and report findings to class. [Prereq: STAT 109 and MATH 105 (C). Weekly: 3 hrs lect, 2 hrs computer lab.]

 **FISH 570. River Fish Restoration Ecology** (3). Principals of ecological restoration applied to river fishes, emphasis on biological, physical and watershed processes. [Prereq: FISH 310 or IA. Weekly: 2 hrs lect, 3 hrs lab.]

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, 3 hrs lab.]

 **FISH 576. 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. Weekly: 2 hrs lect, 3 hrs lab.]

 **FISH 578. Fisheries Oceanography** (3). Introduction to and directed study of how climate and oceanographic processes affect the dynamics of marine populations, ecosystems, and fisheries, and how oceanography informs management of marine ecosystems. [Weekly: 2 hrs lect, 2 hrs lab. IA.]

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 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.]