

FISHERIES AND AQUATIC SCIENCES

FAS 5015 Aquaculture I 3 Credits

Grading Scheme: Letter Grade

Provides an overview of the field of aquaculture, including water quality, production systems, nutrition, spawning, and the common fish and invertebrate groups cultured in the United States.

FAS 5203 Biology of Fishes 3 Credits

Grading Scheme: Letter Grade

A survey of the diversity of fishes, including their anatomy, taxonomy, ecology, and conservation. Evolutionary trends are stressed, along with biogeography and biodiversity hotspots. The last section of the course is focused on fish ecology and conservation.

Prerequisite: Graduate standing

FAS 5203C Biology of Fishes 4 Credits

Grading Scheme: Letter Grade

Emphasizes trends in evolution, integrative and sensory biology, physiology, feeding ecology, reproduction, growth, and population dynamics as they relate to fisheries. Offered fall term in odd-numbered years.

Prerequisite: BSC 2011/2011L or consent of instructor.

FAS 5255 Diseases of Warmwater Fish 3 Credits

Grading Scheme: Letter Grade

Instruction in the methodology of diagnosis, treatment and management of parasitic, bacterial, viral, nutritional, and environmental diseases of warm water food and aquarium species. Fish biology and general husbandry, aquatic systems and water quality management, infectious agents, treatment plans, and biosecurity, quarantine and regulatory issues relevant to fish health.

Prerequisite: consent of instructor.

FAS 5276C Field Ecology of Aquatic Organisms 4 Credits

Grading Scheme: Letter Grade

Understanding principles of fish and shellfish ecology through field studies. Intensive study in lakes, rivers, and coastal marshes to gain understanding of how fish and shellfish interact with their environment. Requires extensive field trips. Offered summer term.

Prerequisite: FAS 4305C or consent of instructor.

FAS 5335C Applied Fisheries Statistics 4 Credits

Grading Scheme: Letter Grade

Population sampling and estimation, statistical assumptions and robustness, mark-recapture, growth, and empirical modeling of populations. Offered fall term in even-numbered years.

Prerequisite: FAS 5276C or consent of instructor.

FAS 5407 Biology of Fishery and Aquaculture Invertebrates 3 Credits

Grading Scheme: Letter Grade

Examines the biology of marine and freshwater invertebrates that are important as fisheries or in aquaculture. Topics will include taxonomy, morphology, distribution, habitat requirements, nutrition, major predators and parasites, significant ecological interactions, and life cycles. Non-food fisheries, such as commercial sponges and pearl oysters, will be included.

FAS 5901 Scientific Thinking in Ecology 2 Credits

Grading Scheme: Letter Grade

General philosophical foundations of science and specific critiques and perspectives found in ecology and aquatic sciences. Offered fall term.

FAS 6154 Marine Adaptations: Environmental Physiology 3 Credits

Grading Scheme: Letter Grade

Examines and compares the physiological adaptations of marine, estuarine, and freshwater organisms to environmental conditions at various organizational levels. Habitats discussed include freshwater, rocky intertidal, salt marsh, coral reef, and deep sea.

Prerequisite: undergraduate course in animal physiology.

FAS 6165 Fish and Crustacean Nutrition 3 Credits

Grading Scheme: Letter Grade

Aquaints students with basic principles of nutrition and formulation of diets for fish and crustaceans in aquaculture. Lectures will cover digestive physiology, nutrients, feed formulation, and specific nutritional requirements for numerous aquatic organisms.

FAS 6176 Algae Biology and Ecology 3 Credits

Grading Scheme: Letter Grade

Covers the biology and ecology of aquatic algae, including evolution, classification, structure, photosynthesis, growth, and reproduction. Emphasis on the ecological role of algae in different aquatic ecosystems (e.g. open ocean, estuaries, coral reefs, rocky intertidal), their impacts (e.g. harmful algae blooms, food webs), and their applications (e.g. food, biochemical).

FAS 6238 Environmental Physiology of Fishes 3 Credits

Grading Scheme: Letter Grade

Advanced topics on physiology of fishes, such as features and adaptations at different levels of biological organization, their implications, and applications. Students will gain an appreciation for, understanding of, and ability to formulate controlled scientific experiments to generate new knowledge about how fishes function.

FAS 6256 Fish and Aquatic Invertebrate Histology 3 Credits

Grading Scheme: Letter Grade

Covering interpretations of the fixed tissue microanatomy and physiology of fish, bivalves, and corals, and introduces common histopathologic (disease) findings.

Prerequisite: Previous coursework in animal biology, or permission of the instructor.

FAS 6272 Marine Ecological Processes 3 Credits

Grading Scheme: Letter Grade

The ecological, biological, and environmental processes that drive patterns in productivity, behavior, population dynamics, and community structure in marine and estuarine ecosystems.

Prerequisite: Graduate student status

FAS 6273 Trophic Ecology of Fishes 3 Credits

Grading Scheme: Letter Grade

Trophic ecology of fishes, including: food habit analyses, diet breadth, diet overlap, prey selectivity, prey digestion, gut evacuation, consumption, food-web linkages, foraging connections through stable isotope ratios, trophic cascades, feeding bioenergetics, and interactions among feeding, growth reproduction.

Prerequisite: STA 6166 & FAS 5203C or equivalent.

FAS 6275 Freshwater Ecology 3 Credits

Grading Scheme: Letter Grade

Provides students with an understanding of the concepts in freshwater ecology that are important for controlling the traits, distribution, and abundance of aquatic organisms. Material will focus on the major groups of organisms found in freshwater habitats, the physical and chemical properties that are important for structuring freshwater communities, and the ecological processes that affect freshwater communities and ecosystems.

FAS 6310C Fish & Limnology 3 Credits**Grading Scheme:** Letter Grade

A detailed examination of freshwater fish and habitats. Includes discussion of relevant fundamental concepts in ecology, chemistry, and geography. Practical skills in field sampling and data handling as well as skills (e.g. grant writing, science communication) and contemporary issues (e.g., ethical uses of AI tools) pertinent to fishery management and research will be applied.

Prerequisite: Graduate standing.**FAS 6337C Fish Population Dynamics 4 Credits****Grading Scheme:** Letter Grade

Analyzing fish populations for management purposes. Methods for estimating population parameters such as growth, recruitment, and mortality. Using population parameters and computer models to predict yield and catch composition, and bioenergetics approaches for fisheries management problems. Offered spring term in odd-numbered years.

Prerequisite: STA 6166 or STA 6093.**FAS 6339C Advanced Quantitative Fisheries Assessment 4 Credits****Grading Scheme:** Letter Grade

Covering topics related to fisheries stock assessment and management.

Focusing on modern assessment techniques and their associated challenges.

Prerequisite: FAS 6337C Fish Population Dynamics**FAS 6355C Fisheries Management 4 Credits****Grading Scheme:** Letter Grade

Managing fisheries sustainably and restoring degraded fisheries. Students will acquire a skillset of key interdisciplinary competencies including but not limited to dimensions such as ecological, social, legal and economic factors and resource assessment through hands-on participation and case study evaluation.

FAS 6356 Fisheries Enhancement 2 Credits**Grading Scheme:** Letter Grade

Provides participants with knowledge and skills required for assessing where and when enhancements can contribute to fisheries management goals, and for developing and managing such initiatives effectively. Emphasizes integrative systems approaches and the key elements of population dynamics, aquaculture production, release strategies, genetic management, governance, and social/economic costs and benefits.

FAS 6357 Marine Protected Areas 3 Credits**Grading Scheme:** Letter Grade

Presents the history and logic of marine protected areas (MPAs) and their advantages and disadvantages. The science of MPAs will be explained as well as an overview of traditional approaches of fisheries management. The importance of ecological principles when creating an MPA will be emphasized. An overview of sampling theory and the need for empirical data to document the success or failure of MPAs will be presented.

Prerequisite: Graduate standing.**FAS 6360 Invasion Ecology of Aquatic Animals 3 Credits****Grading Scheme:** Letter Grade

A comprehensive overview of invasion ecology, highlighting aspects related to aquatic animals, including ecological concepts and debates underlying this developing field; biology and life history of nonnative aquatic animals, including characteristics of successful invaders; risk analysis methodology; and the conservation and regulatory implications of nonnative aquatic species.

FAS 6408 Aquaculture II 3 Credits**Grading Scheme:** Letter Grade

Aquaculture engineering and system design; broodstock management; live feeds and algae production; economics and marketing; biosecurity. Application of principles and concepts will be emphasized. At the conclusion of this course students should have a firm grasp of critical concepts in aquaculture.

Prerequisite: FAS 5015 Introduction to Aquaculture (Aquaculture I).**FAS 6416 Spatial Ecology and Modeling of Fish Populations 2 Credits****Grading Scheme:** Letter Grade

Theoretical models, GIS-based methods, spatially explicit matrix population models, movement models, statistical approaches, and stock assessment models to trace the effects of habitat quality, environmental restoration and spatial behavior of fish populations.

Prerequisite: FAS or WEC.**FAS 6426 Applied Aquaculture Genetics 3 Credits****Grading Scheme:** Letter Grade

Provides students with the background knowledge and practical methodologies for the current technologies used for the genetic improvement of fish and shellfish aquaculture and fishery resource management. This course will be a combination of online lectures, group discussions, and video demonstrations to prepare students with the most updated advancements in the field.

FAS 6705 Fisheries and aquaculture: An economics perspective 3 Credits**Grading Scheme:** Letter Grade

Introduces students to important issues in fisheries and aquaculture management from an economic perspective, exploring the incentives of various stakeholders in utilizing and conserving fisheries resources, as well as the impacts and effects of differing management systems on industry and ecosystems.

FAS 6905 Individual Study 1-6 Credits, Max 10 Credits**Grading Scheme:** Letter Grade

Contemporary problem or topic.

FAS 6910 Supervised Research 1-5 Credits, Max 5 Credits**Grading Scheme:** S/U

Supervised Research

FAS 6932 Special Topics in Fisheries and Aquatic Sciences 1-4 Credits, Max 12 Credits**Grading Scheme:** Letter Grade

Fisheries biology, aquaculture, and associated aquatic sciences.

FAS 6933 Graduate Symposium 1 Credit, Max 3 Credits**Grading Scheme:** S/U

Graduate Symposium

FAS 6935 Contemporary Problems in Fisheries and Aquatic Sciences 2 Credits, Max 10 Credits**Grading Scheme:** Letter Grade

Library research, oral reports, and discussions of scientific problems or topics announced in advance. Offered fall and spring terms.

Prerequisite: graduate student standing.**FAS 6940 Supervised Teaching 1-5 Credits, Max 5 Credits****Grading Scheme:** S/U

Supervised Teaching

FAS 6971 Research for Master's Thesis 1-15 Credits**Grading Scheme:** S/U

Research for Master's Thesis

FAS 7979 Advanced Research 1-12 Credits**Grading Scheme:** S/U

Research for doctoral students before admission to candidacy. Designed for students with a master's degree in the field of study or for students who have been admitted to a doctoral program. Not appropriate for students who have been admitted to candidacy.

FAS 7980 Research for Doctoral Dissertation 1-15 Credits**Grading Scheme:** S/U

Research for Doctoral Dissertation