FISHERIES (FISH)

FISH F100  Skeleton Articulation as an Introduction to Marine Conservation Biology
2 Credits
Offered Spring
Course designed for high school students.
Prerequisites: GPA of 2.5 or higher; offered to high school juniors and seniors with at least 1 biology and 1 math class completed.
Lecture + Lab + Other: 1 + 3 + 0

FISH F101  Introduction to Fisheries
3 Credits
Offered Fall
This course surveys principles and fields of study that fisheries resource professionals use as a guide in their careers, including basic concepts associated with fish biology and fisheries management and the application of these concepts to solve complex fisheries problems. The course explores contemporary fisheries resource issues within and beyond Alaska's borders, human values associated with fish management and conservation, and the importance of fish resources for the world's economies and cultures.
Lecture + Lab + Other: 3 + 0 + 0

FISH F102  Fact or Fishin': Case Studies in Fisheries
1 Credit
Offered Fall
This seminar will promote active learning, critical thinking, and problem solving through a series of case studies involving current issues in fisheries conservation and management. Students enrolled in this course will also receive instruction on fundamental skills required to successfully complete a four-year degree at UAF. Attendance is mandatory.
Lecture + Lab + Other: 1 + 0 + 0

FISH F103  The Harvest of the Sea
2 Credits
Offered Spring
This course will explore the scientific and popular literature related to the exploitation of global marine fisheries resources. Specific topics of the course will be based on three core themes: (1) early exploitation of marine resources, leading to the need for fisheries management; (2) overexploitation of fish and marine mammal stocks driven largely by technological advancements culminating from the Industrial Revolution; and (3) the current status and future sustainability of marine fisheries resources. This course is largely discussion based; as a result, weekly attendance and preparation is a critical component of the course.
Prerequisites: FISH F102; FISH F110; placement in WRTG F111X.
Lecture + Lab + Other: 2 + 0 + 0

FISH F110  Fish and Fisheries in a Changing World
3 Credits
Offered Fall
This course is an exploration of the patterns of fish diversity, and the resilience and sustainability that results. The topics that we will cover are intended to act as foundational principles that fisheries resource professionals will use throughout their careers. Together we will examine the complexity of what constitutes a "fishery" and better understand the factors that have led some fisheries to collapse and others to persist. In addition to lectures, students will read, discuss and write extensively and by doing so, can expect to gain better understanding of the "science of sustainability" with regards to 21st century fisheries in Alaska and beyond.
Lecture + Lab + Other: 3 + 0 + 0

FISH F192  Seminar
1-6 Credits
Lecture + Lab + Other: 0 + 0 + 0

FISH F261  Introduction to Fisheries Utilization
3 Credits
Offered Fall
Application of harvesting, processing, preservation and marketing of Alaska's rich fisheries resources. Core course requirement for all B.A. students completing a minor in fisheries and for B.S. fisheries students. Course is offered via videoconference.
Prerequisites: BIOL F103X or CHEM F100X.
Lecture + Lab + Other: 3 + 0 + 0

FISH F288  Fish and Fisheries of Alaska
3 Credits
Offered Spring
This course will provide mid-level undergraduate students with an introduction to the biology and fisheries of Alaskan fish, shellfish and marine mammals, with important finfishes as the main focus of the course. First, we will examine important recreational, subsistence and commercial shellfish and finfish species. Next we will briefly cover fisheries economics and then turn our attention to lesser known freshwater and marine mammal fisheries in Alaska. The amount of coverage of each topic will vary depending on what is known about each group of organisms. Before enrolling students should have a basic understanding of biological and ecological concepts. This course is required of all fisheries students but should appeal to anyone interested in Alaska's fish and fisheries.
Prerequisites: FISH F110.
Lecture + Lab + Other: 3 + 0 + 0

FISH F290  Fisheries Internship
1 Credit
Offered Spring
Students gain practical, professional experience through employment. Can be repeated up to four times, each for a different type of employment. The primary learning objectives for students are to gain professional experience in fisheries and refine career goals.
Prerequisites: Permission of the Fisheries Experiential Learning Coordinator/instructor; a student internship agreement form turned into the Experiential Learning Coordinator.
Recommended: STAT F200X.
Lecture + Lab + Other: 0 + 0 + 1-4

FISH F292  Seminar
1-6 Credits
Lecture + Lab + Other: 0 + 0 + 0
FISH F301  Biology of Fishes
4 Credits
Offered Fall
A broad overview of the biological diversity of fishes presented from the comparative and organismal perspectives. The course examines the relationship between phylogenetic structures and evolutionary relationships. Topics include the anatomy, physiology, reproduction, and behavior of fish species. Emphasis will be placed on the proper care and use of laboratory equipment and fish sampling gear. Developmental biology, classification, and evolutionary relationships will be covered. Prerequisites: BIOL F115X; junior or senior standing.

FISH F305  Invertebrate Zoology (n)
4 Credits
Offered Spring Even-numbered Years
Classification, structure, function, evolution and life histories of invertebrate animals. Prerequisites: BIOL F115X; BIOL F116X.

FISH F315  Freshwater Fisheries Techniques
3 Credits
Offered MAYmester Even-numbered Years
Introduction to laboratory and field sampling methods in aquaculture, limnology, and fisheries biology. Emphasis will be placed on the proper care and use of laboratory equipment and field sampling gear, as well as the development of sampling protocols for collecting representative, non-biased fisheries and aquatic sciences data. Prerequisites: FISH F110; FISH F288; STAT F200X.

FISH F336  Introduction to Aquaculture (a)
3 Credits
Offered Spring Odd-numbered Years
Contribution of Alaska’s aquaculture industries including salmon ocean ranching, shellfish and kelp mariculture, contribute to the world’s increasingly important aquaculture production. Survey of worldwide production, introduction to production systems, and familiarization with Alaska systems. Team taught by SFOS specialists and featuring invited lecturers, laboratory demonstrations and field trips. Note: This course is taught in Juneau. Prerequisites: BIOL F115X.

FISH F340  Seafood Business
3 Credits
Offered Fall
Development and management of a successful seafood business from inception to operation. Practical application of business planning, obtaining financing, accounting, permitting, feasibility analysis, marketing, human resource management, and operational aspects of seafood harvesting and processing using case studies and guest lecturers from seafood industry. Prerequisites: FISH F261.

FISH F411  Human Dimensions of Environmental Systems
3 Credits
Offered Fall
Study of human-environment relationships and applications to resource management. Draws on a range of social scientific approaches to the study of environmental systems, including: environmental anthropology, environmental history, historical ecology, political ecology, ethnecology, property theory, and environmental justice. Prerequisites: COJO F131X or COJO F141X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; F200-level course in cultural anthropology, human geography, sociology, or political science.

FISH F412  Human-environment Research Methods
3 Credits
Offered Fall Odd-numbered Years
Basic overview of qualitative and quantitative social science methods for studying human-environment relationships. Introduction to research ethics, research design, data collection, data analysis and data reporting. Methods and data analysis techniques include interviews, text analysis, surveys, scales, cognitive anthropology and ethnoecology, social networks, behavioral observation and visual methods. Provides hands-on training in data collection and data analysis software. Prerequisites: COJO F131X or COJO F141X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; upper level standing.

FISH F413  Marine and Freshwater Conservation Biology
4 Credits
Offered Fall Odd-numbered Years
Conservation biology is an applied science that draws from multiple disciplines to address biodiversity loss, maintenance and restoration of threatened populations and habitats. This course will examine the theory and practice of conservation biology in aquatic ecosystems across genetic, population, community and landscape scales. Using case studies, students will examine causes and consequences of biodiversity loss, extinction risk and endangered species management and the human dimensions of conservation in the U.S. and worldwide. Prerequisites: junior or senior standing; a F200-level course in biological sciences or fisheries.

FISH F414  Field Methods in Marine Ecology and Fisheries
3 Credits
Offered Alternate MAYmester
A hands-on introduction to the methods used to study ecological patterns and processes in the marine environment. Class will consist of a series of group field exercises conducted in local marine habitats. These exercises will emphasize a variety of sampling methods for documenting patterns of distribution and abundance, experimental designs for testing hypotheses and statistical interpretation of results. These skills are fundamental to most basic and applied research in marine ecology and fisheries. Thus this course provides an essential foundation for a professional career in these areas.

FISH F611  Introduction to Aquaculture
3 Credits
Offered Spring Even-numbered Years
Introduction to laboratory and field sampling methods in aquaculture, limnology, and fisheries biology. Emphasis will be placed on the proper care and use of laboratory equipment and field sampling gear, as well as the development of sampling protocols for collecting representative, non-biased fisheries and aquatic sciences data. Prerequisites: BIOL F115X; BIOL F116X.

FISH F613  Marine and Freshwater Conservation Biology
3 Credits
Offered Fall Odd-numbered Years
Conservation biology is an applied science that draws from multiple disciplines to address biodiversity loss, maintenance and restoration of threatened populations and habitats. This course will examine the theory and practice of conservation biology in aquatic ecosystems across genetic, population, community and landscape scales. Using case studies, students will examine causes and consequences of biodiversity loss, extinction risk and endangered species management and the human dimensions of conservation in the U.S. and worldwide. Prerequisites: junior or senior standing; a F200-level course in biological sciences or fisheries.

FISH F614  Field Methods in Marine Ecology and Fisheries
3 Credits
Offered Alternate MAYmester
A hands-on introduction to the methods used to study ecological patterns and processes in the marine environment. Class will consist of a series of group field exercises conducted in local marine habitats. These exercises will emphasize a variety of sampling methods for documenting patterns of distribution and abundance, experimental designs for testing hypotheses and statistical interpretation of results. These skills are fundamental to most basic and applied research in marine ecology and fisheries. Thus this course provides an essential foundation for a professional career in these areas.

Prerequisites: FISH F101; BIOL F371.
FISH F421  Fisheries Population Dynamics  
4 Credits  
Offered Fall Odd-numbered Years  
This course introduces basic ecological and fisheries stock assessment models. Through lectures, assignments and weekly computer lab, it provides a conceptual understanding of population dynamics relevant to fisheries and practice manipulating equations.  
Prerequisites: STAT F200X.  
Lecture + Lab + Other: 4 + 0 + 0

FISH F425  Fish Ecology  
3 Credits  
Offered Fall Odd-numbered Years  
This course provides advanced level elective coursework. Before enrolling, students should have a sound understanding of both ecological and biological concepts relating to fish.  
Prerequisites: FISH F110; BIOL F371.  
Stacked with FISH F650.  
Lecture + Lab + Other: 3 + 0 + 0

FISH F426  Behavioral Ecology of Fishes  
3 Credits  
Offered Spring Even-numbered Years  
This course will provide upper-level undergraduate and graduate students with an advanced understanding of behavioral responses and adaptations of fishes in both freshwater and marine systems to natural and anthropogenic environmental variables. It should provide students another option to fulfill upper-level undergraduate and graduate level elective course work. Before enrolling, students should have a sound understanding of both ecological and biological concepts relating to fishes.  
Prerequisites: BIOL F371 or FISH F301 or FISH F427.  
Recommended: FISH F425; FISH F427.  
Stacked with FISH F626.  
Lecture + Lab + Other: 3 + 0 + 0

FISH F427  Ichthyology (n)  
4 Credits  
Offered Spring  
Major groups of fishes, emphasizing fishes of northwestern North America. Classification structure, evolution, general biology and importance to man.  
Prerequisites: BIOL F116X.  
Cross-listed with BIOL F427.  
Lecture + Lab + Other: 3 + 3 + 0

FISH F428  Physiological Ecology of Fishes  
3 Credits  
Offered Spring Odd-numbered Years  
This course will provide upper-level undergraduate and graduate students with an advanced understanding of physiological responses and adaptations of fishes in both freshwater and marine systems to natural and anthropogenic environmental variables. It should provide students with another option to fulfill upper-level undergraduate and graduate level elective coursework. Before enrolling, students should have a sound understanding of both ecological and biological concepts relating to fish.  
Prerequisites: FISH F301, BIOL F310, FISH F427 or BIOL F427.  
Stacked with FISH F628.  
Lecture + Lab + Other: 3 + 0 + 0

FISH F433  Pacific Salmon Life Histories  
3 Credits  
Offered Spring Even-numbered Years  
This course provides an introduction to the life histories of Pacific salmon. We will explore variation in life history traits within and among species, as well as within and among populations, at each stage of the salmon life cycle. Life histories will be understood in evolutionary and ecological contexts. We will also discuss management and conservation of Pacific salmonid species throughout their range, but with focus on Alaska. This course is taught in Juneau.  
Prerequisites: BIOL F115X, BIOL F116X.  
Stacked with FISH F633.  
Lecture + Lab + Other: 3 + 0 + 0

FISH F440  Oceanography for Fishes  
3 Credits  
Offered Fall Odd-numbered Years  
Students examine how understanding the oceanographic processes that determine the distribution, recruitment, and abundance of marine vertebrates and invertebrates from global to local scales and from evolutionary time scales to daily scales supports the sustainable management of marine fisheries resources.  
Prerequisites: CHEM F105X, PHYS F103X, FISH F288, STAT F200X.  
Recommended: FISH F425.  
Cross-listed with MSL F440.  
Lecture + Lab + Other: 3 + 0 + 0

FISH F450  Practicum in Fisheries: Fisheries Observer Program (a)  
3 Credits  
Offered As Demand Warrants  
Practical experience as a fisheries biologist onboard an Alaska commercial fishing vessel doing independent work at sea as an agent for the National Marine Fisheries Service or the Alaska Department of Fish and Game. Simultaneous to credit, the student/observer will be under contract and receive reimbursement for deployment. May be repeated for additional credit during different deployments as observer.  
Prerequisites: STAT F200X.  
Lecture + Lab + Other: 0 + 1-12 + 0

FISH F487  Fisheries Management (O, W, n)  
3 Credits  
Offered Spring  
Theory and practice of fisheries management, with an emphasis on strategies utilized for the management of freshwater and marine fisheries. Application of quantitative methodologies for the assessment and manipulation of aquatic habitats, sport and commercial fish populations, and stock assessment are considered, as is the setting of appropriate goals and objectives for effective, science-based management.  
Prerequisites: COJO F131X or COJO F141X; FISH F288; STAT F200X.  
Stacked with FISH F687.  
Lecture + Lab + Other: 3 + 0 + 0
**FISH F490  Experiential Learning: Fisheries Internship**  
1 Credit  
Under the supervision of a faculty member and a fisheries professional, upper-division students gain professional experience through employment. Requirements are decided prior to enrollment based on a 3-way agreement between the employer, student, and faculty member, which contains learning objectives that reflect upper-division credit. Can be repeated up to 4 times, each for a different type of employment.  
**Prerequisites:** Junior or senior standing plus permission of Faculty Sponsor and the Fisheries Experiential Learning Coordinator/instructor (the Coordinator can be a sponsor as well); signing of a student internship agreement form that contains learning objectives for the internship that reflects upper-division internship credit.  
**Recommended:** FISH F315; STAT F200X; STAT F401.  
Lecture + Lab + Other: 0 + 0 + 1-4

**FISH F492  Seminar**  
1-6 Credits  
Lecture + Lab + Other: 0 + 0 + 0

**FISH F492P  Seminar**  
1-6 Credits  
Lecture + Lab + Other: 1-6 + 0 + 0

**FISH F498  Senior Thesis Proposal**  
1-3 Credits  
Students will complete the first part of a year-long, self-designed scholarly project that is the capstone of a student’s exemplary academic performance. For this component of senior thesis, the student will develop a proposal that will reflect a thorough understanding of the existing literature, study objectives and testable hypotheses, the methodology by which data will be collected through field and/or laboratory research, including data analyses, and a timeline by which the senior thesis will be completed. The student should also complete the collection of field and/or laboratory data and begin data analysis.  
**Prerequisites:** Fisheries major with senior standing; a GPA of 3.2 or higher and permission of a Fisheries Division faculty mentor and the SFOS Internship Coordinator (the coordinator may also be a mentor); STAT F200X and ENGL F414.  
**Recommended:** FISH F315; STAT F401 or STAT F402.  
Lecture + Lab + Other: 0 + 0 + 0

**FISH F499  Fisheries Senior Thesis**  
2-4 Credits  
Students will complete the second part of a year-long, self-designed scholarly project that is the capstone of a student’s exemplary academic performance. For this component of senior thesis, the student will complete analysis of field and/or laboratory data collected during FISH F498 and develop a research paper/manuscript that will interpret the study results and cast them within the context of the existing literature relevant to the study topic. Students will be expected to work with their senior thesis mentor to submit the manuscript for peer review to a scientific journal and will be required to present their study results as an oral or poster presentation.  
**Prerequisites:** Fisheries major with senior standing; with a GPA of 3.2 or higher; and permission of a Fisheries Division faculty mentor and the SFOS Internship Coordinator (the coordinator may also be a mentor); FISH F498.  
**Recommended:** FISH F315; STAT F401; STAT F402.  
Lecture + Lab + Other: 0 + 0 + 2-4

**FISH F601  Quantitative Fishery Science**  
3 Credits  
Offered Spring Even-numbered Years  
Lecture + Lab + Other: 2 + 3 + 0

**FISH F604  Modern Applied Statistics for Fisheries**  
4 Credits  
Offered Odd-numbered Years  
Covers general statistical approaches to quantitative problems in marine science and fisheries with guidance on how to collect and organize data, how to select appropriate statistical methods and how to communicate results. A variety of advanced statistical methods for analyzing environmental data sets will be illustrated in theory and practice.  
**Prerequisites:** STAT F200X; STAT F401; proficiency in computing with R.  
Cross-listed with MSL F604.  
Lecture + Lab + Other: 3 + 3 + 0

**FISH F605  Communicating Science to the Public**  
2 Credits  
Offered Spring Odd-numbered Years  
In this course, students will gain practical skills in communicating their research to peers and public audiences. Short lectures, readings and discussion will focus on communication issues in environmental science and management and best practices for good oral and written communication. Throughout the semester, students will engage with professionals in science journalism, education and resource management. Students will gain direct experience in communicating science to public audiences through a group outreach event they will co-organize at the culmination of the course.  
**Prerequisites:** Graduate standing in the sciences.  
Lecture + Lab + Other: 2 + 0 + 0

**FISH F611  Human Dimensions of Environmental Systems**  
3 Credits  
Offered Fall  
Study of human-environment relationships and applications to resource management. Draws on a range of social scientific approaches to the study of environmental systems, including: environmental anthropology, environmental history, historical ecology, political ecology, ethnecology, property theory, and environmental justice.  
**Prerequisites:** Graduate standing.  
Stacked with FISH F411.  
Lecture + Lab + Other: 3 + 0 + 0

**FISH F612  Marine and Freshwater Conservation Biology**  
4 Credits  
Offered Fall Odd-numbered Years  
Basic overview of qualitative and quantitative social science methods for studying human-environment relationships. Introduction to research ethics, research design, data collection, data analysis and data reporting. Methods and data analysis techniques include interviews, text analysis, surveys, scales, cognitive anthropology and ethnecology, social networks, behavioral observation, and visual methods. Provides hands-on training in data collection and data analysis software.  
**Prerequisites:** graduate standing.  
Stacked with FISH F413.  
Lecture + Lab + Other: 4 + 0 + 0
FISH F613  Human-Environment Research Methods  
3 Credits  
Offered Fall Odd-numbered Years  
Basic overview of qualitative and quantitative social science methods for studying human-environment relationships. Introduction to research ethics, research design, data collection, data analysis and data reporting. Methods and data analysis techniques include interviews, text analysis, surveys, scales, cognitive anthropology and ethnology, social networks, behavioral observation, and visual methods. Provides hands-on training in data collection and data analysis software. Stack with FISH F412. 
Prerequisites: Graduate standing or permission of instructor. 
Lecture + Lab + Other: 3 + 0 + 0

FISH F621  Estimation of Fish Abundance  
3 Credits  
Offered Fall Even-numbered Years  
Estimation of abundance of fish and other aquatic populations, using mark-recapture, line-transect, catch-effort and change-in-ratio techniques. Computer lab work and homework from actual and simulated populations. 
Prerequisites: MATH F252X; STAT F401; familiarity with PCs including word processing and spreadsheets. 
Recommended: FISH F421; MATH F302; MATH F314. 
Lecture + Lab + Other: 2 + 2.5 + 0

FISH F622  Quantitative Fish Population Dynamics  
3 Credits  
Offered Spring Odd-numbered Years  
This course is taught in Juneau. Modeling fish population mortality, recruitment individual growth and fecundity. Models and assessment techniques for age- and length-structured populations. Biological reference points and management strategies derived from population and harvesting parameters. Computer lab work and homework with data from actual and simulated populations. 
Prerequisites: MATH F252X; STAT F401; Familiarity with PCs including word processing and spreadsheets. 
Recommended: FISH F421; MATH F302; MATH F314. 
Lecture + Lab + Other: 2 + 2.5 + 0

FISH F625  Population Dynamics of Vertebrates  
3 Credits  
Offered Spring Odd-numbered Years  
This course is taught in Juneau. Sampling vertebrate populations, modeling their population dynamics and the implications for management. Focus will be on study design, model assumptions, estimation of population parameters and inference. State-of-the-art computer applications will be employed in laboratory exercises of actual and simulated data. 
Prerequisites: BIOL F371; STAT F401. 
Cross-listed with WLF F625. 
Lecture + Lab + Other: 2 + 3 + 0

FISH F626  Behavioral Ecology of Fishes  
3 Credits  
Offered Spring Even-numbered Years  
This course will provide upper-level undergraduate and graduate students with an advanced understanding of behavioral responses and adaptations of fishes in both freshwater and marine systems to natural and anthropogenic environmental variables. It should provide students another option to fulfill upper-level undergraduate and graduate level elective course work. Before enrolling, students should have a sound understanding of both ecological and biological concepts relating to fishes. 
Prerequisites: BIOL F371 or FISH F301 or FISH F427. 
Recommended: FISH F425 or FISH F427. 
Stacked with FISH F426. 
Lecture + Lab + Other: 3 + 0 + 0

FISH F627  Statistical Computing with R  
2 Credits  
Offered Fall, As Demand Warrants  
Using the free, open-source software R to teach computing, programming, and modeling concepts for the statistical computing of fisheries and biological data. Prepares students for other graduate-level, quantitative fisheries courses and covers exploratory statistical and graphical analyses, as well as computer-intensive methods such as bootstrapping and randomization tests. 
Prerequisites: STAT F200X, STAT F401, and proficiency with Excel. 
Cross-listed with MSL F627. 
Lecture + Lab + Other: 1 + 3 + 0

FISH F628  Physiological Ecology of Fishes  
3 Credits  
Offered Spring Odd-numbered Years  
This course will provide upper-level undergraduate and graduate students with an advanced understanding of physiological responses and adaptations of fishes in both freshwater and marine systems to natural and anthropogenic environmental variables. It should provide students with another option to fulfill upper-level undergraduate and graduate level elective course work. Before enrolling, students should have a sound understanding of both ecological and biological concepts relating to fish. 
Prerequisites: FISH F301 or BIOL F310, FISH F427 or BIOL F427; graduate standing. 
Lecture + Lab + Other: 3 + 0 + 0

FISH F630  Natural Resource Modeling  
2 Credits  
Offered Spring Odd-numbered Years  
This course is taught in Juneau. A hands-on introduction to the techniques and issues involved in modeling natural resources. Students will complete an individual modeling project related to each student’s graduate research. 
Prerequisites: FISH F421 and STAT F401. 
Lecture + Lab + Other: 1 + 3 + 0

FISH F631  Data Analysis in Community Ecology  
3 Credits  
Offered Spring Odd-numbered Years  
This course will provide an overview of statistical methods that have been specifically developed to aid our understanding and interpretation of the structure, abundance, and distribution of species and communities in relation to resources and the environment. 
Prerequisites: STAT F200X; STAT F401; FISH F627 (Statistical Computing with R) or familiarity with R, general ecology, graduate standing in fisheries. 
Cross-listed with MSL F631. 
Lecture + Lab + Other: 3 + 0 + 0
**FISH F633  Pacific Salmon Life Histories**  
3 Credits  
Offered Spring Even-numbered Years  
This course provides an introduction to the life histories of Pacific salmon. We will explore variation in life history traits within and among species, as well as within and among populations, at each stage of the salmon life cycle. Life histories will be understood in evolutionary and ecological contexts. We will also discuss management and conservation of Pacific salmonid species throughout their range, but with focus on Alaska. This course is taught in Juneau.  
**Prerequisites:** BIOL F115X; BIOL F116X.  
**Stacked with** FISH F433.  
**Lecture + Lab + Other:** 3 + 0 + 0

**FISH F640  Management of Renewable Marine Resources**  
3 Credits  
Offered Spring Even-numbered Years  
Principles of fisheries management, along with case studies of successes and failures. Topics include management objectives, relationships of fished species to their environment, fishing methods, human dimensions, fishery data acquisition, harvest strategies, ecosystem effects of fishing, aquaculture and alternative management strategies, including ecosystem-based fishery management.  
**Prerequisites:** FISH F427.  
**Recommended:** FISH F487.  
**Lecture + Lab + Other:** 3 + 0 + 0

**FISH F641  Ecosystem-based Fisheries Management**  
2 Credits  
Offered Spring Odd-numbered Years  
This course examines the theory and practice of ecosystem-based fisheries management (EBFM). Topics include legal frameworks, principles, governance, approaches, scientific basis, management implementation and outcomes of EBFM. Emphasis is placed on Alaska with other illustrative examples from around the world.  
**Prerequisites:** FISH F487; or FISH F640; or graduate standing.  
**Lecture + Lab + Other:** 2 + 0 + 0

**FISH F642  Bayesian Decision Theory for Resource Management**  
4 Credits  
Offered Spring Even-numbered Years  
Application of decision theory to problems in natural resources management. Students will learn to perform Bayesian calculations and uncomplicated decision analysis themselves.  
**Prerequisites:** FISH F621 or FISH F630.  
**Cross-listed with** STAT F642.  
**Lecture + Lab + Other:** 2 + 2 + 0

**FISH F645  Bioeconomic Modeling and Fisheries Management**  
3 Credits  
Offered Spring Even-numbered Years  
An introduction to analytic and computational models of discrete-time representations of bioeconomic systems, including comparative static and optimal control approaches to optimizing unitary and multiple criteria subject to deterministic and stochastic dynamic processes. Particular attention is given to bioeconomic models of optimal management of exploited populations of fish and shellfish.  
**Prerequisites:** STAT F401; MATH F230X or MATH F251X; graduate standing.  
**Lecture + Lab + Other:** 3 + 0 + 0

**FISH F650  Fish Ecology**  
3 Credits  
Offered Fall Odd-numbered Years  
This course in an exploration of how fish interact with, and adapt to, their physical and biological environment, taught through the viewpoint that habitat diversity acts as a template for biological diversity within and among species. We will examine the ecology of major freshwater and marine habitats (with an emphasis on the former), as well as the potential threats to these habitats from human activity.  
**Prerequisites:** Graduate standing.  
**Stacked with** FISH F425.  
**Lecture + Lab + Other:** 3 + 0 + 0

**FISH F653  Zooplankton Ecology**  
3 Credits  
Offered Fall As Demand Warrants  
Survey of marine zooplankton including processes and variables which influence their production and dynamics. Emphasis on the northeast Pacific and Arctic Ocean zooplankton communities. Field and lab methods for sampling include fixing, preserving, subsampling, identifying and quantifying zooplankton collections. Laboratory techniques for culture of zooplankton include physiological measurements of bioenergetic parameters. Course is offered outside Fairbanks by video conference.  
**Prerequisites:** MSL F650.  
**Cross-listed with** MSL F653.  
**Lecture + Lab + Other:** 4 + 0 + 0

**FISH F654  Benthic Ecology**  
3 Credits  
Offered Alternate Spring  
NOTE: This course is taught in Juneau and Fairbanks.  
Ecology of marine benthos, from subtidal to hadal zone. Methods of collecting, sorting, narcotizing, preserving and analyzing benthic assemblages, including video analytical techniques from submersibles and ROVs. Hydrothermal vent and cold seep assemblages. Physiology/energetics of benthic organisms, including animal-sediment relationships, feeding, reproduction and growth. Depth, spatial and latitudinal distribution patterns.  
**Prerequisites:** Invertebrate zoology course; marine biology course.  
**Cross-listed with** MSL F654.  
**Lecture + Lab + Other:** 3 + 0 + 0

**FISH F654J  Benthic Ecology**  
3 Credits  
Offered Spring Odd-numbered Years  
Ecology of marine benthos, from subtidal to hadal zones. Methods of collecting, sorting, narcotizing, preserving and analyzing benthic assemblages, including video analytical techniques from submersibles and ROVs. Hydrothermal vent and cold seep assemblages. Physiology/energetics of benthic organisms, including animal-sediment relationships, feeding, reproduction and growth. Depth, spatial and latitudinal distribution patterns.  
**Prerequisites:** Invertebrate zoology course; marine biology course.  
**Cross-listed with** MSL F654.  
**Lecture + Lab + Other:** 3 + 0 + 0
FISH F661  Seafood Processing and Preservation
3 Credits
Offered Spring
Positive and negative aspects of processing and preservation of seafoods are discussed. Practical aspects of preservation are stressed and topics include thermal processing (canning and pasteurization), fish smoking, salting, drying, pickling, freezing, fermentation, natural preservatives and packaging. Aspects of selected processing and preservation techniques are demonstrated in the FITC pilot plant.
Prerequisites: BIOL F342; CHEM F351.
Recommended: MATH F230X or MATH F253X.
Lecture + Lab + Other: 3 + 0 + 0

FISH F662  Seafood Composition and Analysis
3 Credits
Offered Fall
Major components of foods, their properties, analysis and interactions during processing and preservation, the effect of processing on functional and nutritive value, postmortem microbial and biochemical changes especially proteins, lipids and carbohydrates. Role of minor constituents such as flavors, vitamins, toxins and carcinogens. This course is offered via videoconference.
Prerequisites: BIOL F342; CHEM F351.
Lecture + Lab + Other: 3 + 0 + 0

FISH F665  Aquatic Entomology
2 Credits
Offered Fall Odd-numbered Years
Aquatic invertebrate taxonomy, mostly to the family level, and ecology. Includes field trips to learn collecting techniques and habitats.
Prerequisites: Graduate standing. Students must be able to safely wade in streams and wetlands.
Cross-listed with BIOL F665.
Lecture + Lab + Other: 1 + 3 + 0

FISH F670  Quantitative Analysis for Marine Policy Decisions
3 Credits
Offered Spring Even-numbered Years
An introduction to the practical application of mathematical programming, operations research, simulation, cost-benefit analysis, cost effectiveness analysis, regional impact assessment, economic valuation, risk analysis, adaptive management and other decision theoretic tools in preparation of regulatory documents required for the management of living marine resources and for assessment of environmental damages.
Prerequisites: STAT F401; MATH F230X or MATH F251X; graduate standing.
Lecture + Lab + Other: 3 + 0 + 0

FISH F672  Law and Fisheries
2 Credits
Offered Fall Even-numbered Years
This course introduces students to the key Federal, State and International laws that govern fisheries in Alaska state waters and in the US Exclusive Economic Zone off Alaska. In addition, the course introduces students to seminal court rulings that have helped shape those laws.
Prerequisites: graduate standing.
Lecture + Lab + Other: 2 + 0 + 0

FISH F674  Economic Development for Fish-dependent Communities
3 Credits
Offered Fall Even-numbered Years
This course provides an introduction to the economic organization of fishery-dependent communities in Alaska, tools for characterizing community-scale economies, principles of economic development, methods of measuring regional economic impacts of changes in access to fisheries, and a review of policies intended to support the continuity and development of Alaskan communities dependent on commercial fisheries.
Prerequisites: STAT F401 or ECON F227.
Lecture + Lab + Other: 3 + 0 + 0

FISH F675  Political Ecology
3 Credits
Offered Fall Even-numbered Years
Introduction to the field of political ecology. Topics include the sociology of scientific knowledge, traditional and local ecological knowledge, politics of resource management, processes of enclosure and privatization, environmental values, conservation, environmental justice, and colonialism and economic development.
Prerequisites: Graduate standing.
Cross-listed with ANTH F675.
Lecture + Lab + Other: 3 + 0 + 0

FISH F676  Aquatic Food Web Ecology
3 Credits
Offered Fall Even-numbered Years
This course will examine theoretical and applied aspects of aquatic food web ecology, from the ecological processes that give rise to patterns in aquatic communities to the incorporation of trophic interactions into ecosystem-based management. Lectures and discussion will focus on ecological theory and case studies. Lab exercises will introduce empirical and modeling approaches for studying food web interactions. Proficiency with Excel and basic statistics is preferred.
Prerequisites: FISH F425.
Cross-listed with MSL F676.
Lecture + Lab + Other: 2 + 3 + 0

FISH F680  Marine Sustainability Internship
2 Credits
Offered Fall
Internship program in marine ecosystem sustainability to broaden students' interdisciplinary training, develop new research tools, build expertise outside their home discipline, gain exposure to careers, and gain a unique perspective on research problems. Internships are for a minimum of 8 weeks and take place during the summer. In the autumn students report on and meet to discuss their internship experiences.
Prerequisites: MSL F652.
Cross-listed with ANTH F680 and MSL F680.
Lecture + Lab + Other: 0 + 0 + 5-16

FISH F681  The North Pacific Fishery Management Council: A Case Study
2 Credits
Offered Summer
This two-week intensive course provides immersion into the scientific and policy basis for fisheries management in Alaska. Students receive two days of classroom instruction, review current management issues and witness the decision-making process by attending a North Pacific Fishery Management Council Meeting. Learning is enhanced by discussions with diverse stakeholders and field trips.
Prerequisites: Permission of instructor.
Lecture + Lab + Other: 1 + 0 + 1
FISH F682  Field Course in Salmon Management
4 Credits
Offered Summer Odd-numbered Years
A hands-on study of salmon management, with participation of harvesters, processors, managers and scientists. Students will track the return of salmon to Bristol Bay and estimate the total return as the runs develop. Consists of a combination of lectures, computer laboratories and field experience in data collection.
Prerequisites: Permission of instructor.
Lecture + Lab + Other: 3 + 3 + 0

FISH F687  Fisheries Management  (O, W, n)
3 Credits
Offered Spring
Theory and practice of fisheries management, with an emphasis on strategies utilized for the management of freshwater and marine fisheries. Application of quantitative methodologies for the assessment and manipulation of aquatic habitats, sport and commercial fish populations, and stock assessment are considered, as is the setting of appropriate goals and objectives for effective, science-based management.
Prerequisites: graduate standing.
Stacked with FISH F487.
Lecture + Lab + Other: 3 + 0 + 0

FISH F692  Seminar
0.5-6 Credits
Lecture + Lab + Other: 0 + 0 + 0

FISH F692A  Seminar
1-6 Credits
Lecture + Lab + Other: 0 + 0 + 0

FISH F692P  Seminar
1-6 Credits
Lecture + Lab + Other: 1-6 + 0 + 0

FISH F698  Non-thesis Research/Project
1-9 Credits
Lecture + Lab + Other: 0 + 0 + 0

FISH F699  Thesis
1-12 Credits
Lecture + Lab + Other: 0 + 0 + 0