

FISHERIES (FISH)

College of Fisheries and Ocean Sciences

Department of Fisheries (<https://www.uaf.edu/cfos/academics/departments/fisheries/>)
907-474-7289

FISH F100 Skeleton Articulation as an Introduction to Marine Conservation Biology

2 Credits

Offered As Demand Warrants

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

Grading System: Pass/Fail Grades

FISH F102 Fact or Fishin': Case Studies in Fisheries and Marine Sciences

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 and marine sciences 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.

Cross-listed with MBI F102; OCN F102.

Lecture + Lab + Other: 1.5 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

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 resources. Specific topics of the course will be based on three core themes: (1) early exploitation of marine resources; (2) overexploitation of marine stocks; and (3) the status and sustainability of marine resources.

Prerequisites: FISH F102; FISH F110; placement in WRTG F111X.

Cross-listed with MBI F103; OCN F103.

Lecture + Lab + Other: 2 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

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

Grading System: Letter Grades with option of Plus/Minus

FISH F192 Seminar

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

Repeatable for Credit: May be taken 98 times for up to unlimited credits

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

Grading System: Letter Grades with option of Plus/Minus

FISH F288 Fish and Fisheries of Alaska

3 Credits

Offered Spring

An introduction to finfish, shellfish and marine mammals of Alaska, including their biology, ecology, fisheries, uses, management, economics and conservation issues.

Prerequisites: FISH F110.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F292 Seminar

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

Repeatable for Credit: May be taken 98 times for up to unlimited credits

FISH F315 Freshwater Fisheries Techniques

3 Credits

Offered Summer 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 gears, 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.

Lecture + Lab + Other: 2 + 3 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F320 Salmon, People and Place

3 Credits

Offered Spring

An examination of the deep ties between salmon and Indigenous peoples' food security, subsistence traditions and ways of life; contemporary Western society connections to salmon, including governance structures, recreational and commercial fishing, and global economies; case studies of pressing challenges facing salmon-dependent communities.

Prerequisites: ANTH F100X, FISH F110, WRTG F111X, or FISH F288.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F336 Introduction to Aquaculture

3 Credits

Offered Spring Odd-numbered Years

Introduction to the species, methodology, economics and environmental impacts of world aquaculture, with a focus on the contribution of Alaska's aquaculture industries including salmon ocean ranching, shellfish and kelp mariculture. Survey of worldwide production, including an introduction to production systems and familiarization with Alaska systems.

Prerequisites: BIOL F115X.**Special Notes:** This course is taught in Juneau.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**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.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**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, ethnoecology, property theory and environmental justice.

Prerequisites: COM F131X or COM F141X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; F200-level course in cultural anthropology, human geography, sociology or political science.**Stacked with** FISH F611.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F412 Human-environment Research Methods**

3 Credits

Offered Fall Even-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.

Prerequisites: COM F131X or COM F141X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; upper level standing.**Cross-listed with** ANTH F412.**Stacked with** FISH F613.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F414 Field Methods in Marine Ecology and Fisheries**

3 Credits

Offered Summer Odd-numbered Years

Hands-on introduction to ecological methods in fisheries and the marine environment. Class will consist of a series of group field exercises and sampling methods conducted in local marine habitats as well as instruction on experimental designs for testing hypotheses and statistical interpretation of results.

Prerequisites: BIOL F371, MBI F320.**Lecture + Lab + Other:** 13.5 + 20 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F425 Fish Ecology**

3 Credits

Offered Fall Odd-numbered Years

An exploration of how fishes interact with and adapt to their physical and biological environments. Examples focus on individual and population level of biological organization. Human impacts to the ecology of major freshwater and marine habitats are examined.

Prerequisites: FISH F110; BIOL F371.**Stacked with** FISH F650.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**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 provides students an option to fulfill upper-level undergraduate and graduate required and 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 F427.**Recommended:** FISH F425.**Stacked with** FISH F626.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**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**Grading System:** Letter Grades with option of Plus/Minus**FISH F428 Physiological Ecology of Fishes**

3 Credits

Offered Spring Odd-numbered Years

An advanced exploration of the physiological responses and adaptations of fishes in both freshwater and marine systems to natural and human-induced environmental changes.

Prerequisites: BIOL F310, FISH F427 or BIOL F427.**Stacked with** FISH F628.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus

FISH F433 Pacific Salmon Life Histories

3 Credits

Offered Spring Even-numbered Years

Introduction to the life histories of Pacific salmon. Exploring variation in life history traits within and among species, within and among populations, at each stage of the salmon life cycle. Understanding evolutionary and ecological contexts life histories. Discussing management and conservation of Pacific salmonid species throughout their range- Alaskan focused.

Prerequisites: BIOL F115X; BIOL F116X.**Stacked with** FISH F633.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F435 Data Visualization in Fisheries**

2 Credits

Offered Spring

Fundamental methods for presenting fisheries data visually, including figures, tables and visual abstracts. Focus will be on effective design and the preparation of publication-ready figures and tables. Student activities will include critiquing figures and tables published in fisheries literature as well as creating their own from existing datasets.

Prerequisites: STAT F200X.**Stacked with** FISH F635.**Lecture + Lab + Other:** 2 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F443 Fisheries Oceanography**

4 Credits

Offered Fall Odd-numbered Years

Oceanography of marine processes affecting vertebrates and invertebrates. Interactions between fisheries resources and physical and biological oceanography, and climatological and meteorological conditions that support sustainable management. Topics include recruitment, transport, mortality, feeding, distribution, abundance, El Nino/La Nina, regime shifts, and climate change. Global to local scales. Worldwide ecosystems and examples.

Prerequisites: FISH F110 or FISH F288; STAT F200X, OCN F111X, or CHEM F105X; PHYS F123X.**Cross-listed with** OCN F443.**Stacked with** OCN F643, FISH F643.**Lecture + Lab + Other:** 4 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F446 Freshwater Habitat Dynamics**

3 Credits

Offered Fall Even-numbered Years

Theoretical background of habitat dynamics in freshwaters with a focus on the response of biota and practical application of current sampling methods.

Prerequisites: FISH F110, BIOL F371.**Cross-listed with** BIOL F446.**Stacked with** FISH F646, BIOL F646.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F451 Aquatic Conservation and Management Genetics**

3 Credits

Offered Fall Even-numbered Years

Genetics is one of the most rapidly growing fields of science and is fundamental for ecology, conservation and natural resource management. This course will cover population genetics, molecular ecology, evolutionary theory and quantitative methods, with an emphasis on genomic applications to marine and freshwater resource management.

Prerequisites: BIOL F260; STAT F401 (STAT course may be taken concurrently).**Stacked with** FISH F651.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F476 Aquatic Food Web Ecology**

3 Credits

Offered Fall Even-numbered Years

Examines 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. Includes a lecture component focused on peer reviewed studies and a lab component focused on applying concepts with data.

Prerequisites: Upper-level undergraduate standing.**Cross-listed with** BIOL F470; MBI F476.**Stacked with** BIOL F670; FISH F676; MBI F676.**Lecture + Lab + Other:** 2 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F487 Fisheries Management (n)**

3 Credits

Offered Spring

Theory and practice of fisheries management, including strategies utilized for the management of freshwater and marine fisheries. Application of quantitative methodologies for the assessment and manipulation of aquatic habitats, fish populations and human resource users are considered, as is the setting of appropriate goals and objectives for science-based management.

Prerequisites: COM F131X or COM F141X; FISH F288; STAT F200X.**Stacked with** FISH F687.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus

FISH F490 Experiential Learning: Fisheries and Marine Sciences Internship

1 Credit

Offered Fall, Spring and Summer

Under the supervision of a faculty member and a fisheries or marine sciences 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.

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.

Special Notes: Can be repeated up to 4 times, each for a different type of employment.

Lecture + Lab + Other: 0 + 0 + 1-4

Grading System: Pass/Fail Grades

Repeatable for Credit: May be taken 4 times for up to 4 credits

FISH F492 Seminar

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

Repeatable for Credit: May be taken unlimited times for up to 99 credits

FISH F492P Seminar

1-6 Credits

Lecture + Lab + Other: 1-6 + 0 + 0

Grading System: Pass/Fail Grades

Repeatable for Credit: May be taken unlimited times for up to 6 credits

FISH F498 Senior Thesis Proposal

1-3 Credits

Students will initiate their year-long senior thesis project, crafting a proposal demonstrating their grasp of existing literature, study goals, methods for data collection, analyses and a project timeline. They will also start gathering data and commencing data analysis as part of their exemplary academic journey.

Prerequisites: Fisheries major with senior standing; a GPA of 3.2 or higher and permission of a Fisheries Division faculty mentor and the CFOS 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

Grading System: Letter Grades with option of Plus/Minus

FISH F499 Fisheries Senior Thesis

2-4 Credits

Students will analyze data from FISH F498, creating a research paper that contextualizes findings within the relevant literature. They will collaborate with a mentor to submit the paper for scientific journal peer review and present their results via oral or poster presentations.

Prerequisites: Fisheries major with senior standing; with a GPA of 3.2 or higher; and permission of a Fisheries Division faculty mentor and the CFOS 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

Grading System: Letter Grades with option of Plus/Minus

FISH F604 Modern Applied Statistics for Fisheries

4 Credits

Offered As Demand Warrants

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** MBI F604.

Lecture + Lab + Other: 3 + 3 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F605 Communicating Science to the Public

2 Credits

Offered Spring Odd-numbered Years

A focus on practical skills in communicating 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.

Prerequisites: Graduate standing in the sciences.

Lecture + Lab + Other: 2 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

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, ethnoecology, property theory and environmental justice.

Prerequisites: Graduate standing.

Stacked with FISH F411.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F613 Human-environment Research Methods

3 Credits

Offered Fall Even-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.

Prerequisites: Graduate standing.

Stacked with FISH F412 and ANTH F412.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F616 Indigenous Fisheries of Alaska

3 Credits

Offered Fall Odd-numbered Years

Introduces students to the breadth and depth of Indigenous knowledge, practice and governance of fisheries and environmental systems across Alaska. Explores and compares European ontological and epistemological positions that form the base of Western science. This course pairs weekly class meetings with an intensive in-person retreat.

Prerequisites: Permission by Department.

Lecture + Lab + Other: 2.64 + 0 + 1.64

Grading System: Letter Grades with option of Plus/Minus

FISH F621 Estimation of Fish Abundance

3 Credits

Offered Spring 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.**Recommended:** MATH F302; MATH F314.**Lecture + Lab + Other:** 2 + 2.5 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F622 Quantitative Fish Population Dynamics**

3 Credits

Offered Spring Odd-numbered Years

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.**Recommended:** MATH F302; MATH F314.**Lecture + Lab + Other:** 2 + 2.5 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F625 Population Dynamics of Vertebrates**

3 Credits

Offered Spring Even-numbered Years

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**Grading System:** Letter Grades with option of Plus/Minus**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 provides students an option to fulfill upper-level undergraduate and graduate required and 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 F427.**Recommended:** FISH F425.**Stacked with** FISH F426.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F627 Statistical Computing with R**

2 Credits

Offered Fall

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; proficiency with Excel.**Cross-listed with** MBI F627; OCN F627.**Lecture + Lab + Other:** 1 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F628 Physiological Ecology of Fishes**

3 Credits

Offered Spring Odd-numbered Years

An advanced exploration of the physiological responses and adaptations of fishes in both freshwater and marine systems to natural and human-induced environmental changes.

Prerequisites: BIOL F310, FISH F427 or BIOL F427; graduate standing.**Stacked with** FISH F428.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**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** MBI F631; OCN F631.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F633 Pacific Salmon Life Histories**

3 Credits

Offered Spring Even-numbered Years

Introduction to the life histories of Pacific salmon. Exploring variation in life history traits within and among species, within and among populations, at each stage of the salmon life cycle. Understanding evolutionary and ecological contexts life histories. Discussing management and conservation of Pacific salmonid species throughout their range- Alaskan focused.

Prerequisites: BIOL F115X; BIOL F116X.**Stacked with** FISH F433.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus

FISH F635 Data Visualization in Fisheries

2 Credits

Offered Spring

Fundamental methods for presenting fisheries data visually, including figures, tables and visual abstracts. Focus will be on effective design and the preparation of publication-ready figures and tables. Student activities will include critiquing figures and tables published in fisheries literature as well as creating their own from existing datasets.

Prerequisites: STAT F401.**Stacked with** FISH F435.**Lecture + Lab + Other:** 2 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**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 graduate standing.**Lecture + Lab + Other:** 2 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F643 Fisheries Oceanography**

4 Credits

Offered Fall Odd-numbered Years

Oceanography of marine processes affecting vertebrates and invertebrates. Interactions between fisheries resources and physical and biological oceanography, and climatological and meteorological conditions that support sustainable management. Topics include recruitment, transport, mortality, feeding, distribution, abundance, El Nino/La Nina, regime shifts, and climate change. Global to local scales. Worldwide ecosystems and examples.

Prerequisites: Graduate standing.**Cross-listed with** OCN F643.**Stacked with** OCN F443, FISH F443.**Lecture + Lab + Other:** 4 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F645 Bioeconomic Modeling and Fisheries Management**

3 Credits

Offered Spring Odd-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**Grading System:** Letter Grades with option of Plus/Minus**FISH F646 Freshwater Habitat Dynamics**

3 Credits

Offered Fall Even-numbered Years

Theoretical background of habitat dynamics in freshwaters with a focus on the response of biota and practical application of current sampling methods.

Prerequisites: Graduate standing.**Cross-listed with** BIOL F646.**Stacked with** FISH F446, BIOL F446.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F650 Fish Ecology**

3 Credits

Offered Fall Odd-numbered Years

An exploration of how fishes interact with and adapt to their physical and biological environments. Examples focus on individual and population level of biological organization. Human impacts to the ecology of major freshwater and marine habitats are examined.

Prerequisites: Graduate standing.**Stacked with** FISH F425.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F651 Aquatic Conservation and Management Genetics**

3 Credits

Offered Fall Even-numbered Years

Genetics is one of the most rapidly growing fields of science and is fundamental for ecology, conservation and natural resource management. This course will cover population genetics, molecular ecology, evolutionary theory and quantitative methods, with an emphasis on genomic applications to marine and freshwater resource management.

Stacked with FISH F451.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F654 Benthic Ecology**

3 Credits

Offered Fall Even-numbered Years

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** MBI F654.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus

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

Grading System: Letter Grades with option of Plus/Minus

FISH F671 Foundations of Marine Policy and Ocean Governance

3 Credits

Offered Fall

This course provides a foundation in developing, analyzing, and enforcing laws and policies that govern the marine environment and living marine resources. Subjects addressed include transportation, environmental protection, energy development, seabed mining, fisheries, mariculture, coastal zone development and hazard mitigation.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F672 Law and Fisheries

3 Credits

Offered Fall Even-numbered Years

This course introduces students to the key federal and state laws that govern fisheries in Alaska state waters, U.S. territorial seas, and the U.S. exclusive economic zone off Alaska. In addition, the course introduces students to seminal court rulings that have shaped the application of those laws.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F673 International Maritime Law and IUU Fishing

3 Credits

Offered Fall Odd-numbered Years

This course introduces students to international maritime law governing territorial seas, exclusive economic zones and the high seas. Particular attention is given to laws and institutions that address illegal, unreported and unregulated (IUU) fishing.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F674 Economic Development for Fish-dependent Communities

3 Credits

Offered Spring Even-numbered Years

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 these communities.

Prerequisites: STAT F401 or ECON F227.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F675 Political Ecology

3 Credits

Offered As Demand Warrants

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

Grading System: Letter Grades with option of Plus/Minus

FISH F676 Aquatic Food Web Ecology

3 Credits

Offered Fall Even-numbered Years

Examines 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. Includes a lecture component focused on peer reviewed studies and a lab component focused on applying concepts with data.

Cross-listed with BIOL F670; MBI F676.

Stacked with BIOL F470; FISH F476; MBI F476.

Lecture + Lab + Other: 2 + 3 + 0

Grading System: Letter Grades with option of Plus/Minus

FISH F677 Scientific Writing Techniques

3 Credits

Offered As Demand Warrants

Students learn to write scientifically with skill and clarity by practicing using easy-to-follow writing techniques to write and rewrite a draft manuscript. Topics include writing approaches, storytelling, outlines, style, grammar, punctuation, and editorial review. Most beneficial for graduate students writing theses, but provides excellent writing experience for new students.

Prerequisites: Graduate Standing.

Cross-listed with OCN F677.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Pass/Fail Grades

FISH F681 The North Pacific Fishery Management Council

2 Credits

Offered Summer

This course immerses students into the scientific and policy basis for federal fisheries management in Alaska. Lectures introduce the laws that underlie federal fisheries management of Alaska and issues scheduled for the upcoming NPFMC meeting. Experiential learning will occur through participation in the meeting and discussions with fishery stakeholders.

Lecture + Lab + Other: 12 + 0 + 26

Grading System: Pass/Fail Grades

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

Grading System: Letter Grades with option of Plus/Minus

FISH F683 The Alaska Board of Fisheries

2 Credits

Offered Spring

An experiential immersion into Alaska's state fisheries management. Classroom sessions explore state and federal laws and fishery management strategies that underpin the management of sport, commercial and subsistence fisheries in Alaska and preview current fishery management issues. Students will experience the decision-making process by observing a BOF meeting.

Prerequisites: Graduate standing.**Special Notes:** Students are responsible for their own travel costs.**Lecture + Lab + Other:** 1.5 + 0 + 2**Grading System:** Pass/Fail Grades**FISH F687 Fisheries Management (n)**

3 Credits

Offered Spring

Theory and practice of fisheries management, including strategies utilized for the management of freshwater and marine fisheries. Application of quantitative methodologies for the assessment and manipulation of aquatic habitats, fish populations and human resource users are considered, as is the setting of appropriate goals and objectives for science-based management.

Prerequisites: graduate standing.**Stacked with** FISH F487.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**FISH F690 Marine Policy Internship**

2-6 Credits

Offered Fall, Spring and Summer

Students of the MMP program participate in internships to broaden their interdisciplinary training, develop new research tools and build expertise outside their home disciplines. Internships require 42 hours of directed professional activity per course credit hour.

Special Notes: Internships must be pre-approved by the MMP program coordinator and require a student internship agreement form signed by the student, the instructor, the MMP program coordinator, and the internship host.

Lecture + Lab + Other: 0 + 0 + 84-252**Grading System:** Pass/Fail Grades**FISH F691 Marine Policy Capstone**

3 Credits

Offered Fall, Spring and Summer

A directed project or literature review demonstrating a capacity to gather, interpret, synthesize and apply MMP program coursework and internship experience to a contemporary or historic marine policy issue. In addition, this course explores perspectives on research ethics and the responsible conduct of research.

Prerequisites: FISH F671; graduate standing.**Special Notes:** FISH F691 is an advanced course taken after completion of at least 9 credits of required or elective MMP program courses.**Lecture + Lab + Other:** 1 + 0 + 10**Grading System:** Pass/Fail Grades**FISH F692 Seminar**

0.5-6 Credits

Lecture + Lab + Other: 0 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**Repeatable for Credit:** May be taken unlimited times for up to 99 credits**FISH F692P Seminar**

1-6 Credits

Lecture + Lab + Other: 1-6 + 0 + 0**Grading System:** Pass/Fail Grades**Repeatable for Credit:** May be taken 15 times for up to unlimited credits**FISH F698 Non-thesis Research/Project**

1-9 Credits

Lecture + Lab + Other: 0 + 0 + 0**Grading System:** Pass/Fail Grades**Repeatable for Credit:** May be taken unlimited times for up to 99 credits**FISH F699 Thesis**

1-12 Credits

Lecture + Lab + Other: 0 + 0 + 0**Grading System:** Pass/Fail Grades**Repeatable for Credit:** May be taken unlimited times for up to 99 credits