

OCEANOGRAPHY (OCN)

College of Fisheries and Ocean Sciences

Department of Oceanography (<https://uaf.edu/cfos/academics/departments/oceanography/>)
907-474-7210

OCN 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 FISH F102; MBI F102.

Lecture + Lab + Other: 1.5 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN 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 FISH F103; MBI F103.

Lecture + Lab + Other: 2 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F111L The Oceans Laboratory

0 Credit
Offered Fall, Spring and Summer

Provides laboratory experience emphasizing insights from biology, physics, chemistry and geology. Topics include the evolution of the ocean basins, seawater composition, generation of ocean currents and waves, and the combined processes that sustain life in the ocean. Societal topics related to climate change.

Co-requisites: MBI F111X or OCN F111X.

Cross-listed with MBI F111L.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

Grading System: Non-Graded

OCN F111X The Oceans (n)

4 Credits
Offered Fall, Spring and Summer

Broad study of our ocean through combining insights from biology, physics, chemistry and geology. Topics include evolution of the ocean basins, seawater composition, generation of ocean currents and waves, and the combined processes that sustain life in the ocean. Societal topics related to climate change, fisheries and pollution are discussed.

Prerequisites: Placement in WRTG F111X; placement in MATH F105.

Co-requisites: MBI F111L or OCN F111L.

Cross-listed with MBI F111X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F211 Introduction to Marine Science I

3 Credits
Offered Fall

This course introduces students to the geology, chemistry and physics of the ocean and the roles of the hydrosphere, cryosphere and atmosphere in the climate system.

Prerequisites: MATH F151X (may be taken concurrently).

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F303 Data Analysis and Writing for Aquatic Sciences

3 Credits
Offered Fall

In this course, students will develop skills in basic data analysis, scientific writing and interpretation of published research. This course will utilize public data sets and peer-reviewed scientific writing samples drawn from the fields of fisheries, marine sciences and limnology that address an important question in aquatic science.

Prerequisites: STAT F200X, OCN F211, MBI F212.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F315 Marine Geological Drama and Undersea Catastrophes

3 Credits
Offered Fall

Case studies of geological events that disrupt the ocean environment as an introduction to geological oceanography. Geological concepts are covered as part of the background and context for each one. The case studies include everyday geological drama, sudden catastrophes, and slow-motion catastrophes on a geologic time scale.

Prerequisites: OCN F111X or OCN F211.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F419 Concepts in Physical Oceanography

3 Credits
Offered Fall Even-numbered Years

This course establishes the physical concepts that drive ocean motion on our rotating earth including the roles of the Coriolis force, ocean stratification, wind driven and thermohaline circulation, tides and why the major ocean gyres exist.

Prerequisites: MATH F251X or PHYS F211X.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F425 Subarctic Oceanography Field Course

3 Credits
Offered Fall

This two-week intensive course provides students with skills and techniques for modern oceanographic investigation. Students develop, carry out and present their own field program conducted within fjords surrounding Seward, Alaska. An additional course fee covers ship time, lodging and meals in Seward. Fairbanks-to-Seward return travel costs are covered by students.

Prerequisites: OCN F211; MBI F212.

Stacked with OCN F625.

Lecture + Lab + Other: 11 + 20 + 17

Grading System: Letter Grades with option of Plus/Minus

OCN 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 FISH F443.

Stacked with OCN F643, FISH F643.

Lecture + Lab + Other: 4 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F450 Biological Oceanography

3 Credits

Offered Fall

Survey of biological processes emphasizing organic matter synthesis and transfer including topics essential to a basic understanding of contemporary biological oceanography.

Prerequisites: MBI F212 for undergraduate students; upper division standing in a science major.

Stacked with OCN F650.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F453 Zooplankton Ecology

3 Credits

Offered Fall Even-numbered Years

Survey of marine zooplankton and processes that influence their production and dynamics. Emphasis is placed upon zooplankton communities of northeast Pacific and Arctic oceans. Field and lab methodology reviewed include fixing, preserving, subsampling, identifying and quantifying zooplankton collections. Reviewed laboratory techniques cover culture of zooplankton, including physiological measurements of parameters.

Prerequisites: MBI F212; OCN F211; OCN F450.

Stacked with OCN F653.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F455 Phytoplankton and Marine Microbes

3 Credits

Offered Spring Even-numbered Years

An in-depth exploration of microbial life in the marine environment focusing on phytoplankton, microzooplankton, bacteria and archaea. Students will learn the importance of marine microbes, including their impacts on fisheries and biogeochemical cycles. Topics include harmful algal blooms and the impacts of climate change on marine microbial communities.

Prerequisites: MBI F212.

Stacked with OCN F655.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F459 Computer Programming for Scientific Applications

3 Credits

Offered Spring Odd-numbered Years

Introduction to scientific programming techniques and applications. This MATLAB-based course will cover programming fundamentals, input/output operations, and mapping and other data visualization techniques. Students will work with NetCDF and OpenDAP protocols and remote large-volume data repositories. No prior programming experience required.

Prerequisites: Senior or graduate level standing.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F460 Chemical Oceanography

3 Credits

Offered Spring

An integrated study of the chemical, biological, geological and physical processes that control the chemical composition of seawater. Boundary interactions with the atmosphere and lithosphere, biogeochemical cycles and tracers of these complex cycles are examined. The marine chemistry of inorganic carbon is considered in detail.

Prerequisites: BIOL F116X; CHEM F106X; upper-division standing.

Stacked with CHEM F660; OCN F660.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F463 Chemical Coastal Processes

3 Credits

Offered Spring Even-numbered Years

A study of chemical processes in the coastal ocean, including interactions at boundaries, and physical and biological controls on the chemistry of coastal environments. Key topics include riverine input, coastal acidification, photochemistry, coastal productivity and challenges in coastal management. Intended for students with general chemistry and marine science backgrounds.

Prerequisites: CHEM F105X; CHEM F106X; OCN F111X or (OCN F211; MBI F212); upper-division standing.

Stacked with OCN F663.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN F481 The Ocean and Global Change

3 Credits

Offered Fall

Explores how human activities are affecting Earth's oceans. Topics include climate change, sea-level rise, coastal erosion, declining sea ice, shifting ecosystems, ocean acidification, pollution and various mitigation proposals. The course will investigate the causes and effects of these changes and consider the challenges and opportunities that arise from them.

Prerequisites: Upper-division standing.

Stacked with OCN F681.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

OCN 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

OCN F498 Research

1-6 Credits

Lecture + Lab + Other: 1-6 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**Repeatable for Credit:** May be taken unlimited times for up to 99 credits**OCN F499 Senior Thesis**

3 Credits

Under the supervision and mentorship of a fisheries and ocean sciences faculty member, students will complete a self-designed project that is the capstone of a student's exemplary academic performance. The student will complete a senior thesis based on field and/or laboratory data collected during a field course or work that was completed with the faculty mentor within the context of the existing literature relevant to the study topic. Students are required to present their study results as an oral or poster presentation at a UAF seminar or symposium, or at a state or national scientific conference. In addition, students are encouraged to work with their mentor to submit their thesis for publication in a peer-reviewed scientific journal.

Prerequisites: Permission of a fisheries and ocean sciences faculty mentor.

Lecture + Lab + Other: 0 + 0 + 9**Grading System:** Letter Grades with option of Plus/Minus**Repeatable for Credit:** May be taken 2 times for up to 6 credits**OCN F620 Physical Oceanography**

4 Credits

Offered Fall

Physical description of the sea, physical properties of seawater, methods and measurements, boundary processes, currents, tides and waves, and regional oceanography.

Prerequisites: MATH F253X; PHYS F123X or PHYS F211X; science or engineering degree.

Lecture + Lab + Other: 3 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F625 Subarctic Oceanography Field Course**

3 Credits

Offered Fall

This two-week intensive course provides students with skills and techniques for modern oceanographic investigation. Students develop, carry out and present their own field program conducted within fjords surrounding Seward, Alaska. An additional course fee covers ship time, lodging and meals in Seward. Fairbanks-to-Seward return travel costs are covered by students.

Stacked with OCN F425.**Lecture + Lab + Other:** 11 + 20 + 17**Grading System:** Letter Grades with option of Plus/Minus**OCN 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 FISH F627; MBI F627.**Lecture + Lab + Other:** 1 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F630 Geological Oceanography**

3 Credits

Offered Spring

Topography and structure of the ocean floor. Theory of plate tectonics. Geology of ocean basins, continental slope, shelf and coastal environments. Major sediment types and distributions. Sediment transport and deposition. Interaction between seawater, rock, and sediment. Paleooceanography. Upper-division standing are invited to contact the instructor.

Prerequisites: Graduate standing.

Lecture + Lab + Other: 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN 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 FISH F631; MBI F631.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN 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 FISH F643.**Stacked with** OCN F443, FISH F443.**Lecture + Lab + Other:** 4 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F650 Biological Oceanography**

3 Credits

Offered Fall

Survey of biological processes emphasizing organic matter synthesis and transfer including topics essential to a basic understanding of contemporary biological oceanography.

Prerequisites: Upper-division standing in a science major.

Stacked with MBI F450.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus

OCN F653 Zooplankton Ecology

3 Credits

Offered Fall Even-numbered Years

Survey of marine zooplankton and processes that influence their production and dynamics. Emphasis is placed upon zooplankton communities of northeast Pacific and Arctic oceans. Field and lab methodology reviewed include fixing, preserving, subsampling, identifying and quantifying zooplankton collections. Reviewed laboratory techniques cover culture of zooplankton, including physiological measurements of parameters.

Stacked with OCN F453.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F655 Phytoplankton and Marine Microbes**

3 Credits

Offered Spring Even-numbered Years

An in-depth exploration of microbial life in the marine environment focusing on phytoplankton, microzooplankton, bacteria and archaea. Students will learn the importance of marine microbes, including their impacts on fisheries and biogeochemical cycles. Topics include harmful algal blooms and the impacts of climate change on marine microbial communities.

Stacked with OCN F455.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F660 Chemical Oceanography**

3 Credits

Offered Spring

An integrated study of the chemical, biological, geological and physical processes that control the chemical composition of seawater. Boundary interactions with the atmosphere and lithosphere, biogeochemical cycles and tracers of these complex cycles are examined. The marine chemistry of inorganic carbon is considered in detail.

Prerequisites: Graduate standing.**Cross-listed with** CHEM F660.**Stacked with** OCN F460.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F663 Chemical Coastal Processes**

3 Credits

Offered Spring Even-numbered Years

A study of chemical processes in the coastal ocean, including interactions at boundaries, and physical and biological controls on the chemistry of coastal environments. Key topics include riverine input, coastal acidification, photochemistry, coastal productivity and challenges in coastal management. Intended for students with general chemistry and marine science backgrounds.

Prerequisites: Graduate standing.**Stacked with** OCN F463.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F677 Scientific Writing Techniques**

3 Credits

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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** FISH F677.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Pass/Fail Grades**OCN F681 The Ocean and Global Change**

3 Credits

Offered Fall

Explores how human activities are affecting Earth's oceans. Topics include climate change, sea-level rise, coastal erosion, declining sea ice, shifting ecosystems, ocean acidification, pollution and various mitigation proposals. The course will investigate the causes and effects of these changes and consider the challenges and opportunities that arise from them.

Stacked with OCN F481.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**OCN F692 Seminar**

1-6 Credits

Lecture + Lab + Other: 1-6 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**Repeatable for Credit:** May be taken unlimited times for up to 99 credits**OCN F692P 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 99 credits**OCN 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**OCN 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