

MARINE BIOLOGY (MBI)

College of Fisheries and Ocean Sciences

Department of Marine Biology (<https://uaf.edu/cfos/academics/departments/marine-biology/>)
907-474-7210

MBI 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; OCN F102.

Lecture + Lab + Other: 1.5 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

MBI 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; OCN F103.

Lecture + Lab + Other: 2 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

MBI 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 OCN F111L.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

Grading System: Non-Graded

MBI 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 OCN F111X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

Grading System: Letter Grades with option of Plus/Minus

MBI F212 Introduction to Marine Science II

3 Credits
Offered Spring

This course explores the diversity of marine life, from microbes to mammals, and the interactions of marine organisms with each other and with their environment. Topics include primary productivity, marine food webs, physiological adaptations, and ecology of marine habitats from coastal to deep-sea systems.

Prerequisites: OCN F211.

Lecture + Lab + Other: 3 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

MBI F219 Marine Mammals of the World

2 Credits
Offered Spring

We will go on a tour of the 129 currently recognized extant marine mammal species in the world. We will explore taxonomy, species description and identifying characteristics, distribution, ecology, including feeding strategies, reproduction etc., status, threats and conservation.

Prerequisites: OCN F111X, FISH F102, FISH F103, BIOL F115X or BIOL F116X.

Lecture + Lab + Other: 2 + 0 + 0

Grading System: Letter Grades with option of Plus/Minus

MBI F220 Scientific Diving

2 Credits
Offered Spring

Introduction to cold water diving and SCUBA techniques used in the research community. Includes familiarization with Alaska subtidal flora and fauna. Opportunity to work underwater and assist with diving projects conducted by MBI F423 students at the Kasitsna Bay Marine Lab during spring break. Through this course, students also can be certified with a Research Diver Specialty (PADI) and a Dry Suit Specialty (PADI). CPR, First Aid (Red Cross), and Emergency Oxygen Administration (DAN) are available through this course. Special Conditions: Must have current SCUBA physical approved.

Prerequisites: Basic biology/ecology courses, SCUBA (open water) certification.

Special Notes: Completion of this course will allow students to be eligible to join the UAF (AAUS) dive program and to dive on the UAF-sanctioned diving projects and have reciprocity to dive with other universities and other government agencies.

Lecture + Lab + Other: 1 + 1 + 8

Grading System: Pass/Fail Grades

Repeatable for Credit: May be taken 15 times for up to 30 credits

MBI F306 Aquatic Invertebrate Zoology

4 Credits
Offered Fall Even-numbered Years

We will explore the phylogenetics, life history, reproduction, physiology, morphology and sexual systems of aquatic invertebrates. Hands-on approaches, including a survey and comparison of taxonomic groups using microscopy and visual observations, recorded in a lab notebook, are central to the laboratory component of this course.

Prerequisites: (OCN F211 and MBI F212) or (BIOL F115X and BIOL F116X).

Lecture + Lab + Other: 3 + 3 + 0

Grading System: Letter Grades with option of Plus/Minus

MBI F317 Introduction to Marine Mammal Biology

3 Credits

Offered Spring

The course will introduce students to the biology and diversity of cetaceans, pinnipeds, sirenians, and other marine mammals. Topics will include evolution, ecology, reproduction, and behavior of marine mammals, their special adaptations, such as diving, osmo- and thermoregulation, and will explore some current conservation and management issues.

Prerequisites: BIOL F116X or MBI F212.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F320 Aquatic Ecology**

3 Credits

Offered Fall

An introduction to the relationship between aquatic species and their environment, with an emphasis on biological interactions and environmental factors that structure these communities.

Prerequisites: (OCN F211 and MBI F212) or (BIOL F115X and BIOL F116X).**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F410 Marine Bird Ecology and Conservation**

3 Credits

Offered Fall Even-numbered Years

This course will introduce students to the biology, ecology and conservation of marine birds, with emphasis on seabirds, sea ducks and shorebirds, especially species found in Alaska and the Northern Hemisphere. Through ecological and evolutionary perspectives, topics will include biodiversity, adaptations, life histories, population ecology, demography, community ecology and conservation.

Prerequisites: BIOL F371 or MBI F320.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F412 Early Life Histories of Marine Invertebrates**

3 Credits

Offered Fall Odd-numbered Years

This course will explore the diversity of reproductive strategies and larval forms in marine invertebrates, and consider selective pressures governing the evolution of these forms. Topics include larval ecology and evolution, environmental constraints on early life histories, reproductive biology, population dynamics, sources of larval mortality, dispersal, and recruitment.

Prerequisites: MBI F212 and upper-division standing.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F415 Physiology of Marine Organisms**

3 Credits

Offered Fall

We will study the problems and challenges vertebrates and invertebrates are facing in the marine environment, and their responses and solutions. Characteristic issues for marine animals include oxygen supply, salinity, temperature and pressure, and adaptations can vary widely or be remarkably similar.

Prerequisites: BIOL F310, MBI F212 or (BIOL F111X & BIOL F112X).**Stacked with** MBI F615.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F421 Polar Marine Science**

3 Credits

Offered Fall Odd-numbered Years

Physical, biological, chemical and geological oceanography of the polar oceans with emphasis on comparing and contrasting the Arctic and Antarctic.

Prerequisites: OCN F211; MBI F212.**Stacked with** MBI F621.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F423 Nearshore Ecology Field Course**

2 Credits

Offered Spring

Students will propose a hypothesis that they will develop in the first two months of the semester and then experimentally test during a spring break field trip to the Kasitsna Bay Marine Lab. Projects may be subtidal (if the student is a current AAUS diver) or intertidal.

Prerequisites: MBI F220, successful completion of a 200-level marine biology, ecology, or equivalent courses; If the student wants to dive as part of their project, they must be AAUS divers with current CPR, First Aid, O2 Administration certifications, and have a current AAUS medical physical.

Stacked with MBI F623.**Lecture + Lab + Other:** 1 + 1 + 8**Grading System:** Letter Grades with option of Plus/Minus**Repeatable for Credit:** May be taken 15 times for up to 30 credits**MBI F450 Marine Biology and Ecology Field Course**

4 Credits

Offered Summer Odd-numbered Years

Advanced understanding of marine organisms in an ecological and evolutionary context through field and laboratory work at the Kasitsna Bay Marine Lab (Kachemak Bay, Alaska). Includes the study of marine macroalgae, invertebrates and plankton and relating their anatomical organization to habitat, lifestyle and ecology.

Prerequisites: One year of biology.**Recommended:** Basic courses in ecology and invertebrate zoology.**Stacked with** MBI F650.**Lecture + Lab + Other:** 3 + 6 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F456 Kelp Forest Ecology**

2 Credits

Offered Summer Even-numbered Years

Introduction to knowledge, hypotheses and disputes regarding kelp forest ecology, including the environmental and ecological interactions that influence their distribution, structure and function. Course includes lectures, discussions, labs and scuba diving field trips. We take a global perspective but focus on local Alaska subtidal flora and fauna.

Prerequisites: UAF Science Diver certification.**Stacked with** MBI F656.**Lecture + Lab + Other:** 5 + 35 + 0**Grading System:** Letter Grades with option of Plus/Minus

MBI F457 Field Techniques in Ocean Acidification Research

3 Credits

Offered Summer Even-numbered Years

An introduction to the design and fabrication of experimental ocean acidification systems and oceanographic pH sensors for the study of ocean acidification. This course will require extra fees to cover laboratory activities, room and board. Students are responsible for the travel to and from Kasitsna Bay Laboratory, near Seldovia, Alaska.

Prerequisites: OCN F211 and MBI F212.**Lecture + Lab + Other:** 2 + 4 + 3**Grading System:** Letter Grades with option of Plus/Minus**MBI F467 Ecology and Physiology of Marine Macroalgae (n)**

3 Credits

Offered Spring Odd-numbered Years

This course will provide an overview of marine seaweed related to their diversity, structure, physiology, ecology, and basic grouping approaches, and marine seaweed's relation to human affairs. This course will allow students to increase their awareness of the ecological and economic relevance of marine seaweeds.

Prerequisites: BIOL F115X; MBI F212.**Stacked with** MBI F667.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI 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; FISH F476.**Stacked with** BIOL F670; FISH F676; MBI F676;.**Lecture + Lab + Other:** 2 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F482 Human Impacts to the Marine Biosphere**

3 Credits

Offered Spring

A review of the biological mechanisms that marine species utilize to respond to ocean change focusing on the links between physical, chemical and biological systems and human activities.

Prerequisites: (OCN F211 and MBI F212) or (BIOL F115X and BIOL F116X).**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI 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**MBI 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**MBI 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**MBI F601 Professional Development**

1 Credit

Offered Spring Odd-numbered Years

Improve ability to make oral and poster presentations and to write resumes and cover letters. Includes lectures, discussions, and four individual projects. Students are encouraged to use their thesis/dissertation material for the posters and oral presentations. Feedback on all projects will be given by both instructor and students. Special Notes:

Recommended: Graduate status.**Lecture + Lab + Other:** 1 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F602 Proposal Writing**

1 Credit

Offered Fall

Familiarize students with the proposal writing process. Writing proposals is a common requirement during graduate school and will be continuing during the career as a scientist and researcher. This class aims to cover some common rules about good proposal writing.

Prerequisites: Recommended: Graduate status.**Lecture + Lab + Other:** 1 + 0 + 0**Grading System:** Pass/Fail Grades**Repeatable for Credit:** May be taken 3 times for up to 3 credits**MBI 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** FISH F604.**Lecture + Lab + Other:** 3 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus

MBI F605 Controversies in Marine Science

1 Credit

Offered Fall

Introduction to the idea that science is fluid and controversies and disagreements do occur. These disagreements are often published in the primary literature. This course will be a discussion/debate of various controversial topics in marine science.

Recommended: Graduate status.**Lecture + Lab + Other:** 1 + 0 + 0**Grading System:** Pass/Fail Grades**MBI F610 Marine Biology**

3 Credits

Offered Spring

This class covers all major marine ecosystems across the globe in a comparative manner. Each system is introduced by its physical setting, then covers important primary producer sources or foundation species, ultimately leading to how ecological concepts structure the communities and food webs in these ecosystems.

Prerequisites: Degree in biology.**Recommended:** Courses in invertebrate zoology, ichthyology, and vertebrate zoology.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F612 Early Life Histories of Marine Invertebrates**

3 Credits

Offered Fall Odd-numbered Years

This course will explore the diversity of reproductive strategies and larval forms in marine invertebrates, and consider selective pressures governing the evolution of these forms. Topics include: larval ecology and evolution, environmental constraints on early life histories, reproductive biology, population dynamics, sources of larval mortality, dispersal and recruitment.

Prerequisites: Graduate standing.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F615 Physiology of Marine Organisms**

3 Credits

Offered Fall

We will study the problems and challenges vertebrates and invertebrates are facing in the marine environment, and their responses and solutions. Characteristic issues for marine animals include oxygen supply, salinity, temperature and pressure, and adaptations can vary widely or be remarkably similar.

Prerequisites: Graduate standing.**Stacked with** MBI F415.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F619 Biology of Marine Mammals**

3 Credits

Offered As Demand Warrants

Introduction to a broad range of research and conservation topics associated with marine mammals. Topics include physiological adaptations, phylogeny and evolution, behavior, ecology, population dynamics and conservation.

Prerequisites: Graduate standing; or upper-division ecology and biology courses.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F621 Polar Marine Science**

3 Credits

Offered Fall Odd-numbered Years

Physical, biological, chemical and geological oceanography of the polar oceans with emphasis on comparing and contrasting the Arctic and Antarctic.

Prerequisites: graduate standing.**Stacked with** MBI F421.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F623 Nearshore Ecology Field Course**

2 Credits

Offered Spring

Students will propose a hypothesis that they will develop in the first two months of the semester and then experimentally test during a spring break field trip to the Kasitsna Bay Marine Lab. Projects may be subtidal (if the student is a current AAUS diver) or intertidal.

Prerequisites: Graduate standing; MBI F220, successful completion of a 200-level marine biology, ecology, or equivalent courses; If the student wants to dive as part of their project, they must be AAUS divers with current CPR, First Aid, O2 Administration certifications, and have a current AAUS medical physical.

Stacked with MBI F423.**Lecture + Lab + Other:** 1 + 1 + 8**Grading System:** Letter Grades with option of Plus/Minus**Repeatable for Credit:** May be taken 15 times for up to 30 credits**MBI 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; OCN F627.**Lecture + Lab + Other:** 1 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI 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; OCN F631.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus

MBI F650 Marine Biology and Ecology Field Course

4 Credits

Offered Summer Odd-numbered Years

Advanced understanding of marine organisms in an ecological and evolutionary context through field and laboratory work at the Kasitsna Bay Marine Lab (Kachemak Bay, Alaska). Includes the study of marine macroalgae, invertebrates and plankton and relating their anatomical organization to habitat, lifestyle and ecology.

Prerequisites: One year of biology; graduate standing.**Recommended:** Basic courses in ecology and invertebrate zoology.**Stacked with** MBI F450.**Lecture + Lab + Other:** 3 + 6 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F652 Marine Ecosystems**

3 Credits

Offered Fall Even-numbered Years

Understanding ecosystems of the sea in the context of evaluating the impact of human activities. Focus on current concepts, trends and perspectives.

Prerequisites: BIOL F472; OCN F620; OCN F650.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI 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** FISH F654.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F656 Kelp Forest Ecology**

2 Credits

Offered Summer Even-numbered Years

Introduction to knowledge, hypotheses and disputes regarding kelp forest ecology, including the environmental and ecological interactions that influence their distribution, structure and function. Course includes lectures, discussions, labs and scuba diving field trips. We take a global perspective but focus on local Alaska subtidal flora and fauna.

Prerequisites: UAF Science Diver certification.**Stacked with** MBI F456.**Lecture + Lab + Other:** 5 + 35 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F661 Stable Isotope Techniques in Environmental Research**

3 Credits

Offered Spring

An examination of the use of added or naturally occurring isotope tracers in ecological studies. Demonstration of equipment and modern techniques.

Prerequisites: Graduate standing.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI F667 Ecology and Physiology of Marine Macroalgae**

3 Credits

Offered Spring Odd-numbered Years

This course will provide an overview of marine seaweed related to their diversity, structure, physiology, ecology, and basic grouping approaches, and marine seaweed's relation to human affairs. This course will allow students to increase their awareness of the ecological and economic relevance of marine seaweeds.

Prerequisites: Upper-division standing in a natural science for undergraduates or graduate standing.**Stacked with** MBI F467.**Lecture + Lab + Other:** 3 + 0 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI 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; FISH F676.**Stacked with** BIOL F470; FISH F476; MBI F476.**Lecture + Lab + Other:** 2 + 3 + 0**Grading System:** Letter Grades with option of Plus/Minus**MBI 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**MBI 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**MBI 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**MBI 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