

BIOLOGY (BIOL)

College of Natural Science and Mathematics

Department of Biology and Wildlife

907-474-7671

BIOL F100X Human Biology (n)

4 Credits

Offered Fall and Spring

Survey of biological principles as applied to human anatomy, physiology, genetics and health.

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

Special Notes: Intended for non-science majors.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F101L Introductory Biology Lab

1 Credit

Offered Fall and Spring

Provides laboratory experience emphasizing contemporary biological topics for transfer students who are not science majors and who have completed a natural science course with no laboratory section at another institution. Content aligns with the laboratory section of BIOL F103X.

Students having completed BIOL F103X may not register for BIOL F101L.

Prerequisites: A university-level natural science course.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 3 + 0

BIOL F103X Biology and Society (n)

4 Credits

Offered Fall and Spring

Fundamental principles of biology; emphasis on their application to humans in the modern world. Lectures, laboratory demonstrations, experiments and discussions of contemporary biological topics. For non-science majors; cannot be used as a biology elective by biological science majors. Students who have completed BIOL F101L may not register for BIOL F103X.

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

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F104L BIOL F104X Laboratory (n)

0 Credit

Co-requisites: BIOL F104X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

BIOL F104X Natural History of Alaska (n)

4 Credits

Offered Fall

Survey of the physical and biological environment of Alaska, including terrestrial and aquatic systems. Topics include the past, present, and future climate of Alaska, life histories of common plants and animals, adaptations of organisms to the northern environment, human influences on ecosystems, and the management of wildlife and ecosystems.

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

Co-requisites: BIOL F104L.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F111L BIOL F111X Laboratory

0 Credit

Corequisite: BIOL F111X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

BIOL F111X Human Anatomy and Physiology I (n)

4 Credits

Offered Fall

Integrated view of human structure and function. Provides a foundation in relevant chemistry, cell biology, histology and unifying concepts. Covers integumentary, skeletal, muscular and nervous systems.

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

Co-requisites: BIOL F111L.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F112L BIOL F112X Laboratory

0 Credit

Co-requisites: BIOL F112X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

BIOL F112X Human Anatomy and Physiology II (n)

4 Credits

Offered Spring

Integrated view of human structure and function. Continuation of Human A&P I. Covers endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems.

Prerequisites: BIOL F111X.

Co-requisites: BIOL F112L.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F115L BIOL F115X Laboratory

0 Credit

Co-requisites: BIOL F115X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

BIOL F115X Fundamentals of Biology I (n)

4 Credits

Offered Fall and Spring

The first of a two-part course series for science majors, Fundamentals of Biology I covers the chemistry of life, cell structure and function, cellular energetics, cell division, genetics, and evolution.

Prerequisites: Placement in WRTG F111X; placement in MATH F151X; Recommended: High school biology, high school chemistry.

Co-requisites: BIOL F115L.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F116L BIOL F116X Laboratory

0 Credit

Co-requisites: BIOL F116X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

BIOL F116X Fundamentals of Biology II (n)

4 Credits

Offered Fall and Spring

The second of a two-course series for science majors, Fundamentals of Biology II covers speciation, organismal diversity, form and function of plants and animals, and ecology.

Prerequisites: Placement in WRTG F111X; placement in MATH F151X; BIOL F115X.

Co-requisites: BIOL F116L.

Recommended: high school biology, high school chemistry.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F120L BIOL F120X Laboratory

0 Credit

Co-requisites: BIOL F120X.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 0 + 0 + 0

BIOL F120X Introduction to Human Nutrition

4 Credits

Offered Spring

This course provides students with an understanding of basic nutritional science and how the principles of nutrition can be used to achieve and maintain optimum health and well-being. Students will consider their own food choices in light of the scientific concepts covered in class. May not be used as a biology elective credit for a major in biological sciences.

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

Co-requisites: BIOL F120L.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F140 Introduction to Behavioral Neuroscience Research

1 Credit

Offered Spring

Online asynchronous introductory biomedical research on compulsive-like mice, including data collection, data analysis, and interpretation of results. Learn about obsessive-compulsive disorder in humans and how animal research has the potential to contribute to improving the human condition.

Prerequisites: High school diploma, junior or senior standing in high school with a cumulative and science GPA of at least 3.0 with biology and chemistry course grades of at least 3.0.

Lecture + Lab + Other: 0.5 + 1.5 + 0

BIOL F190 Introduction to Alaska Flora

2 Credits

Offered Summer

This class is an introduction to several aspects of Alaska's unique flora. Class modules and hands-on exercises are designed to familiarize you with the identification, description and morphology of our local flora.

Lecture + Lab + Other: 1.5 + 1.5 + 0

BIOL F239 Introduction to Plant Biology (n)

4 Credits

Offered Fall

Plant biology including plant form and function (morphology, physiology and development), ecology (including interactions with herbivores, pollinators and microbes), conservation, evolution and economic botany. Emphasis on vascular plants (particularly angiosperms) but includes comparisons with nonvascular plants.

Prerequisites: BIOL F115X; BIOL F116X.

Lecture + Lab + Other: 3 + 3 + 0

BIOL F240X Beginnings in Microbiology

4 Credits

Offered Fall and Spring

Survey of the microbial world emphasizing the role microorganisms play in human health and life. Major topics include the role of microbes in human diseases and an introduction to the immune system and the human microbiome.

Prerequisites: One course in high school or college-level biology recommended.

Special Notes: Recommended one course in chemistry, taught asynchronous online, may not be used as biology elective credit for a major or minor in biological sciences.

Attributes: UAF GER Natural Science Req

Lecture + Lab + Other: 3 + 3 + 0

BIOL F260 Principles of Genetics

4 Credits

Offered Fall and Spring

Principles of inheritance; physiochemical properties of genetic systems.

Prerequisites: BIOL F115X; BIOL F116X; CHEM F105X; placement in MATH F151X; LS F101X (may be taken concurrently) or successful completion of library skills competency test.

Co-requisites: BIOL F260L.

Lecture + Lab + Other: 3 + 3 + 0

BIOL F260L BIOL F260 Laboratory

0 Credit

Co-requisites: BIOL F260.

Lecture + Lab + Other: 0 + 0 + 0

BIOL F310 Animal Physiology (n)

4 Credits

Offered Spring

Animal function, including respiration, digestion, circulation, nerve and muscle function, hormones and reproduction.

Prerequisites: BIOL F115X; BIOL F116X; CHEM F105X; CHEM F106X.

Co-requisites: BIOL F310L.

Lecture + Lab + Other: 3 + 3 + 0

BIOL F310L BIOL F310 Laboratory

0 Credit

Co-requisites: BIOL F310.

Lecture + Lab + Other: 0 + 0 + 0

BIOL F312 Medical Physiology

3 Credits

Offered Spring

This course focuses on pathology to teach advanced concepts in human anatomy and physiology. Case studies and diagnostic problem solving will be used to promote the application of knowledge.

Prerequisites: BIOL F115X and BIOL F116X; or BIOL F111X and BIOL F112X.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F320 Winter Botany

3 Credits

Offered Spring Odd-numbered Years

Identification of trees and shrubs by buds, twigs and bark in the winter.

Prerequisites: BIOL F115X, BIOL F116X, BIOL F239.

Special Notes: Asynchronous online.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F331 Systematic Botany (n)

3 Credits

Offered Spring Even-numbered Years

Classification of flowering plants with emphasis on Alaskan flora; familiarity with taxonomy (identification, nomenclature, classification), evolution (speciation, reproductive biology, adaptation, convergence, biogeography) and phylogenetics (morphology and molecules). Lab emphasizes learning representative families and genera of Alaskan flora using keys and manuals.

Prerequisites: BIOL F239.**Special Notes:** Recommended BIOL F260.**Lecture + Lab + Other:** 2 + 3 + 0**BIOL F335 Principles of Epidemiology**

3 Credits

Offered Spring

Introduction to the basic concepts of epidemiology, with examples from human to veterinary medicine, including chronic and infectious disease epidemiology, social epidemiology, outbreak investigation, properties of tests, and an introduction to study design and surveillance.

Prerequisites: STAT F200X.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F342 Microbiology (n)**

4 Credits

Offered Spring

Morphology and physiology of microorganisms. The role of these organisms in the environment and their relationship to humans. Concepts of immunology. Laboratory stresses aseptic techniques for handling microorganisms.

Prerequisites: BIOL F115X; BIOL F116X; CHEM F105X.**Co-requisites:** BIOL F342L.**Lecture + Lab + Other:** 3 + 3 + 0**BIOL F342L BIOL F342 Laboratory**

0 Credit

Co-requisites: BIOL F342.**Lecture + Lab + Other:** 0 + 0 + 0**BIOL F360 Cell and Molecular Biology (n)**

3 Credits

Offered Fall and Spring

An introduction to the structure and function of cells. Topics include: the structure and function of cellular components, including proteins, membranes and organelles; understanding how cells communicate; and how information is processed in the cell via DNA replication, transcription and translation.

Prerequisites: BIOL F260; CHEM F105X; CHEM F106X (may be taken concurrently).**Cross-listed with** CHEM F360.**Special Notes:** Taught asynchronously online in fall, face to face in spring.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F371 Principles of Ecology**

4 Credits

Offered Fall

Basic principles in physiological, ecosystem, population and community ecology. Environmental factors and their influence on plants and animals. Structure, growth and regulation of populations. The ecosystem concept, biogeochemical cycles, and the structure and function of major terrestrial biomes.

Prerequisites: BIOL F115X; BIOL F116X.**Co-requisites:** BIOL F371L.**Lecture + Lab + Other:** 3 + 3 + 0**BIOL F371L BIOL F371 Laboratory**

0 Credit

Co-requisites: BIOL F371.**Lecture + Lab + Other:** 0 + 0 + 0**BIOL F385 Global Change Biology (n)**

3 Credits

Offered Spring

Causes of climate change, the climate record, and the effects of past and forecast climate change on biophysical systems. Consideration of impacts on plants, animals, ice, and people with an emphasis on Alaska and the Arctic.

Prerequisites: BIOL F115X; BIOL F116X; Junior or Senior standing.**Cross-listed with** WLF F385.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F392 Seminar**

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 1-6**BIOL F392P Seminar**

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 1-6**BIOL F400 Research Capstone in Biological Sciences**

0 Credit

Offered Fall and Spring

Enrollment in BIOL F400 signals that a student has initiated a capstone research project, a required element of the Biological Sciences B.S. program. The research project may be completed within a designated course or by working individually with a faculty mentor.

Prerequisites: Junior or senior standing.**Lecture + Lab + Other:** 0 + 0 + 0**BIOL F402 Biomedical and Research Ethics (h)**

3 Credits

Offered Spring Odd-numbered Years

Issues in biomedical ethics. Topics will vary but include discussion of moral principles and problems of research ethics and medical ethics, such as: animal and human experimentation; data management; informed consent; therapeutic and non-therapeutic research; physician/patient relationship; autonomy; assisted reproductive technologies; euthanasia; organ transplantation; and allocation of scarce medical resources.

Prerequisites: WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; junior or senior standing; a course in philosophy, science, or nursing.**Cross-listed with** PHIL F402.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F406 Entomology (n)**

4 Credits

Offered Fall Odd-numbered Years

Biology of insects and related arthropods, with emphasis on evolution, ecology, behavior, biodiversity, morphology and systematics. Lab emphasizes identification and collection.

Prerequisites: BIOL F115X; BIOL F116X; BIOL F371.**Lecture + Lab + Other:** 3 + 3 + 0

BIOL F410 Integrative Capstone in Biological Sciences

3 Credits

Offered Spring

In this course, students learn concepts of interdisciplinary integration across the sciences, arts, humanities and social sciences. They then develop a capstone project integrating the biological sciences with another discipline, most commonly chosen as their minor. This course meets the capstone requirement for the B.A. in Biological Sciences.

Prerequisites: Students should hold junior or senior standing and be enrolled in the Biological Sciences BA program.

Lecture + Lab + Other: 1.5 + 0 + 4.5

BIOL F412 Exercise Physiology

3 Credits

Offered Fall

Physiology responses and adaptation to exercise in humans, emphasizing energy metabolism, adipose and lean tissue, central and peripheral components of oxidative metabolism and the environmental influences on these parameters.

Prerequisites: BIOL F111X and BIOL F112X; or BIOL F310.

Stacked with BIOL F612.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F415 Systematic and Comparative Biology

4 Credits

Offered Fall Even-numbered Years

Concepts of systematic biology basic to a rigorous and complete understanding of modern evolutionary theory. Systematics provides the historical framework critical to a variety of comparative analyses in biology. Recent innovations in phylogenetic analyses will be explored in lecture and lab

Prerequisites: BIOL F481.

Stacked with BIOL F615.

Lecture + Lab + Other: 3 + 3 + 0

BIOL F417 Neurobiology (n)

3 Credits

Offered Fall

Organization and function of the vertebrate nervous system from the subcellular to the organismal levels. Neural bases of sensations, homeostasis, specific behaviors, and psychopathology with the incorporation of current peer-reviewed mammalian behavioral neuroscience research.

Prerequisites: BIOL F111X; BIOL F112X, BIOL F310.

Special Notes: Taught asynchronously online.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F418 Biogeography

3 Credits

Offered Fall

This course explores the geography of life by examining linkages between climate, geomorphology, and ecological communities with emphasis on the biogeography of sub-Arctic, polar and alpine regions.

Prerequisites: NRM F277 or BIOL F371; junior/senior standing.

Stacked with BIOL F618.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F425 Mammalogy (n)

3 Credits

Offered Fall

Variety of mammals, their behavior, life histories, identification, phylogeny and systematics, morphology, distribution and zoogeography.

Prerequisites: BIOL F115X; BIOL F116X; junior standing or above.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F426 Ornithology (n)

3 Credits

Offered Spring

Evolution, anatomy, physiology, distribution, migration, breeding biology of birds, their classification and identification.

Prerequisites: BIOL F115X; BIOL F116X; COJO F131X or COJO F141X; WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F427 Ichthyology (n)

4 Credits

Offered Fall and 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 FISH F427.

Lecture + Lab + Other: 3 + 3 + 0

BIOL F430 Plant Physiology and Development

3 Credits

Offered Fall Odd-numbered Years

Physiology and development of vascular plants, stressing the interrelationships between development, growth, water relations, photosynthesis, transport and metabolism.

Prerequisites: BIOL F115X; BIOL F116X; MATH F151X or higher; STAT F200X.

Stacked with BIOL F630.

Special Notes: Available asynchronously online.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F431 Population Genetics

3 Credits

Offered Fall Odd-numbered Years

Processes affecting the distribution of genetic variation in populations of organisms and how it changed through time. Covered topics include characterization of DNA sequence variations, genetic drift, neutral theory, coalescent theory, population substructure, natural selection, inbreeding depression, mating systems and multilocus evolution.

Prerequisites: BIOL F260; STAT F200X or STAT F300.

Stacked with BIOL F631.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F435 Introduction to Biology of Cancer

3 Credits

Offered Fall Odd-numbered Years

Course covers current concepts and knowledge of cancer, including cancer research and cancer treatment.

Prerequisites: BIOL F360.

Stacked with BIOL F635.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F440 Behavioral Neuroscience Research Capstone

3 Credits

Offered Spring

Online asynchronous comprehensive biomedical research on compulsive-like mice, including data collection, data analysis, and interpretation of results. Learn about obsessive-compulsive disorder in humans and how animal research has the potential to contribute to improving the human condition. Complete the Biology Capstone requirements including writing a full length scientific manuscript.

Prerequisites: Junior or senior undergraduate standing.

Lecture + Lab + Other: 1 + 6 + 0

BIOL F441 Animal Behavior

4 Credits
Offered Fall

Evolutionary and ecological principles of individual and social behavior, genetic and physiological basis of behavior, techniques of behavioral observation, experimental manipulation and analysis. Design and implementation of independent research project on live animals. Student projects in this course may satisfy the capstone project requirement of the biological sciences degree.

Prerequisites: BIOL F481 (may be taken concurrently); BIOL F310; STAT F200X; COJO F131X or COJO F141X; WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X.

Lecture + Lab + Other: 2 + 3 + 3

BIOL 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 FISH F446.

Stacked with FISH F646, BIOL F646.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F455 Environmental Toxicology

3 Credits
Offered Fall

Environmental toxicology will focus on the general properties and principles of persistent and/or poisonous (toxic) chemicals commonly encountered in air, water, fish and wildlife. Numerous natural and synthetic chemicals in the environment will be discussed from a global perspective with some bias towards Arctic and sub-Arctic regions.

Prerequisites: WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; COJO F131X or COJO F141X; one semester each of organic chemistry and cell or molecular biology.

Cross-listed with CHEM F455.

Stacked with BIOL F656; CHEM F655.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F457 Environmental Microbiology

3 Credits
Offered Spring Even-numbered Years

This course focuses on the role of microorganisms in environmentally-relevant processes including bioremediation of pollutants, biogeochemical cycling, corrosion and wastewater treatment, including current methods for studying microbial diversity and function.

Prerequisites: BIOL F115X; BIOL F116X; BIOL F342; CHEM F105X; CHEM F106X.

Recommended: CHEM F449.

Stacked with BIOL F657.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F460 Principles of Virology

3 Credits
Offered Spring

This course will explore current concepts in the field of virology, with emphasis on the structure, genetic material, and replication strategies of various human and animal viruses. In addition, mechanisms of viral pathogenesis, viral diagnostics, prevention and treatment of viral infection will be presented.

Prerequisites: BIOL F342 (may be taken concurrently) or BIOL F360 (may be taken concurrently).

Stacked with BIOL F660.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F462 Infectious Diseases

3 Credits
Offered As Demand Warrants

Covers infectious disease biology using examples of different pathogens and exploring the concepts of their biology and the implication of these principles on pathology, epidemiology and sociology of infectious diseases.

Prerequisites: BIOL F360 or BIOL F342.

Stacked with BIOL F662.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F463 Immunology

3 Credits
Offered Fall

Adaptive immune response including its components and activation from cells to molecules, clonal selection, antigen recognition, and discrimination between foreign and self. Concepts applied on the level of intact organisms addressing allergies, autoimmunity, transplantation, tumors and disease.

Prerequisites: BIOL F115X, BIOL F116X; BIOL F310, BIOL F111X; BIOL F112X.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F466 Advanced Cell and Molecular Laboratory

3 Credits
Offered Spring

Modern molecular biological techniques including protein and nucleic acid gel electrophoresis, western blotting, cell fractionation, cellular respiration, enzymology and fluorescence microscopy. Lectures will be supplemented with reading from the primary literature. Student projects in this course may satisfy the capstone project requirements of the biological science degree.

Prerequisites: BIOL F360 or CHEM F360 may be taken concurrently.

Cross-listed with CHEM F466.

Lecture + Lab + Other: 2 + 4 + 0

BIOL F469 Landscape Ecology and Wildlife Habitat

3 Credits
Offered Spring Even-numbered Years

A problem-based learning and critical thinking approach to modern methods in landscape ecology, including geographic information systems, remote sensing, modeling, software and the Internet. Graduate students are expected to help undergraduates with problems and questions.

Prerequisites: BIOL F371; COJO F121X or COJO F131X or COJO F141X.

Cross-listed with WLF F469.

Stacked with BIOL F669; WLF F669.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F470 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** FISH F476; MSL F476.**Stacked with** BIOL F670; FISH F676; MSL F676.**Lecture + Lab + Other:** 2 + 3 + 0**BIOL F471 Population Ecology (n)**

3 Credits

Offered Spring

Biology of populations of plants and animals, including population structure, natality, mortality, population growth, regulation of population size, population interactions in competition, herbivory, predation and parasitism.

Prerequisites: A calculus course; BIOL F371.**Lecture + Lab + Other:** 2 + 3 + 0**BIOL F472 Community Ecology**

4 Credits

Offered Fall Even-numbered Years

Structure of plant and animal communities and their organization. Structuring forces of competition, predation, herbivory, and mutualisms; roles of foodwebs, indirect effects, and spatial and temporal dynamics. Application of community ecology concepts to conservation and restoration. Student projects may satisfy the capstone project requirement of the biological sciences degree.

Prerequisites: BIOL F371; WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X.**Lecture + Lab + Other:** 2 + 3 + 3**BIOL F473 Limnology**

4 Credits

Offered Fall Odd-numbered Years

The ecology of inland waters emphasizing lakes and rivers. Lecture provides graphically oriented view of concepts. Laboratory involves team-based original research from proposal to manuscript. Student projects in this course may satisfy the capstone project requirement of the biological sciences degree.

Prerequisites: BIOL F115X; BIOL F116X; CHEM F105X; CHEM F106X; WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X.**Lecture + Lab + Other:** 2 + 3 + 3**BIOL F476 Ecosystem Ecology**

4 Credits

Offered Spring

Ecosystem ecology is the scientific study of the interactions among organisms and the non-living environment. The course introduces the ecosystem concept and surveys environmental factors governing ecosystem processes, including major biogeochemical cycles. Includes application of these topics to ecosystem services, sustainability, and responses of ecosystems to global change.

Prerequisites: BIOL F371; STAT F200X.**Stacked with** BIOL F673.**Lecture + Lab + Other:** 3 + 0 + 3**BIOL F481 Principles of Evolution**

4 Credits

Offered Fall and Spring

Patterns and processes of evolutionary change. Covered topics include microevolutionary processes, population genetics, quantitative genetics, fitness and adaptation, phylogenetics, speciation and macroevolutionary pattern. The conceptual framework of evolutionary biology is used to understand basic and applied issues in the life sciences, biomedicine, and agriculture.

Prerequisites: BIOL F260; STAT F200X (may be taken concurrently) or STAT F300 (may be taken concurrently).**Co-requisites:** BIOL F481L.**Lecture + Lab + Other:** 3 + 3 + 0**BIOL F481L BIOL F481 Laboratory**

0 Credit

Co-requisites: BIOL F481.**Lecture + Lab + Other:** 0 + 0 + 0**BIOL F483 Stream Ecology**

3 Credits

Offered As Demand Warrants

The ecology of streams and rivers focusing on physical, chemical and biological processes.

Prerequisites: BIOL F115X; BIOL F116X; BIOL F371.**Recommended:** CHEM F105X; CHEM F106X.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F486 Vertebrate Paleontology (n)**

3 Credits

Offered Spring Odd-numbered Years

The study of vertebrate evolution through geologic time. Covers the temporal range, diversity and systematics of major vertebrate groups as documented in the fossil record, with an emphasis on current problems in vertebrate evolutionary pattern and process. Labs emphasize comparative morphology and identification of major vertebrate groups.

Prerequisites: BIOL F310 or GEOS F315.**Cross-listed with** GEOS F486.**Stacked with** GEOS F686; BIOL F686.**Lecture + Lab + Other:** 2 + 3 + 0**BIOL F487 Conceptual Issues in Evolutionary Biology**

3 Credits

Offered Spring Odd-numbered Years

Analysis of some of the main models which explain evolutionary change followed by consideration of the practical implications these models have on the study of biological phenomena in general.

Cross-listed with PHIL F487.**Stacked with** BIOL F687; PHIL F687.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F488 Arctic Vegetation Ecology: Geobotany**

3 Credits

Offered Fall Odd-numbered Years

Arctic plants in relationship to Earth, including Arctic plant identification, climate, geology and geography controls on Arctic plant communities, snow ecology, applications to wildlife studies and current Arctic issues. Consists of lecture, labs and field trips.

Prerequisites: BIOL F115X and BIOL F116X; BIOL F239 or BIOL F371.**Stacked with** BIOL F688.**Lecture + Lab + Other:** 2.5 + 0.5 + 0

BIOL F489 Vegetation Description and Analysis

3 Credits

Offered Fall Even-numbered Years

Methods of vegetation science including sampling, classification, gradient analysis, ordination, field description and mapping. Field trips to the plant communities of interior Alaska.

Prerequisites: BIOL F239, BIOL F371 or BIOL F331.**Stacked with** BIOL F689.**Lecture + Lab + Other:** 2 + 3 + 0**BIOL F490 Research Experience in Biology**

3 Credits

Offered Spring

Directed undergraduate research in the advanced life sciences. Students are required to publicly present their work and submit a final written report. Research areas range across ecology, evolution, physiology, cell biology and molecular biology.

Prerequisites: CHEM F105X; CHEM F106X; BIOL F115X; BIOL F116X.**Lecture + Lab + Other:** 1 + 0 + 6**BIOL F491 The Human Microbiome**

4 Credits

Offered Fall

Biology of host-associated microbiomes with an emphasis on the human microbiome. Investigate microbial impacts on the behavior, physiology and fitness of their host. Explore model and non-model systems. Student projects in this course may satisfy the capstone project requirements of the biological science degree.

Prerequisites: BIOL F260 and STAT F200X.**Stacked with** BIOL F691.**Lecture + Lab + Other:** 3 + 3 + 0**BIOL F492 Seminar**

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 0**BIOL F492P Seminar**

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 0**BIOL F498 Research**

1-6 Credits

Lecture + Lab + Other: 1-6 + 0 + 0**BIOL F602 Research Design**

3 Credits

Offered Fall

An introduction to the philosophy, performance and evaluation of hypothetical/deductive research in the biological sciences, with emphasis on hypothesis formulation and testing. Each student will develop a research proposal.

Prerequisite: Graduate standing.**Cross-listed with** WLF F602.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F604 Scientific Writing, Editing and Revising in the Biological Sciences**

3 Credits

Offered Spring

For students who are ready to produce a manuscript or thesis chapter. Topics include the publication process, selecting a journal, authorship, the components of the scientific paper, revising and editing manuscripts, and responding to reviews. Students will produce a complete manuscript.

Prerequisites: Graduate standing in Biology, Wildlife, or related discipline; permission of instructor.**Cross-listed with** WLF F604.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F605 Animal Stable Isotope Ecology**

3 Credits

Offered Every Third Spring

Recent primary literature in stable isotope ecology, which uses naturally occurring variation in stable isotopes of carbon, nitrogen, oxygen, hydrogen and sulphur as markers of organismal and ecological processes. The focus will be on animal studies, including diet reconstruction, mixing models, food web, metabolism, nutrient allocation and migration.

Prerequisite: Graduate standing.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F612 Exercise Physiology**

3 Credits

Offered Fall

Physiology responses and adaptation to exercise in humans, emphasizing energy metabolism, adipose and lean tissue, central and peripheral components of oxidative metabolism and the environmental influences on these parameters.

Prerequisites: Graduate standing.**Stacked with** BIOL F412.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F613 Resilience Internship**

2 Credits

Offered As Demand Warrants

Students of the Resilience and Adaptation Program participate in internships to broaden their interdisciplinary training, develop new research tools and build expertise outside their home disciplines.

Internships are for eight to ten weeks of full time commitment and take place during the student's first summer in the program. In autumn students meet to discuss their internship experiences and make public presentations.

Prerequisites: ANTH F667, BIOL F667, ECON F667 or NRM F667; ANTH F668, BIOL F668, ECON F668 or NRM F668.**Cross-listed with** ANTH F617; ECON F613; NRM F613.**Lecture + Lab + Other:** 2 + 0 + 0**BIOL F615 Systematic and Comparative Biology**

4 Credits

Offered Fall Even-numbered Years

Concepts of systematic biology basic to a rigorous and complete understanding of modern evolutionary theory. Systematics provides the historical framework critical to a variety of comparative analyses in biology. Recent innovations in phylogenetic analyses will be explored in lecture and lab

Prerequisites: Graduate standing.**Stacked with** BIOL F415.**Lecture + Lab + Other:** 3 + 3 + 0

BIOL F616 Ecological Background for Resilience and Adaptation

1 Credit

Offered Fall

Provides the ecological background that is necessary for understanding the role of ecology in complex systems involving interactions among biological, economic, and social processes. Designed for incoming students of the Resilience and Adaptation Program (RAP), who have not received training in ecology.

Prerequisites: Graduate standing.**Cross-listed with** NRM F616.**Lecture + Lab + Other:** 1 + 0 + 0**BIOL F617 Neurobiology**

3 Credits

Offered Spring Even-numbered Years

Organization and function of the vertebrate nervous system from the subcellular to the organismal levels. Neural bases of sensations, specific behaviors and homeostasis. Applications of basic neurobiological research to pathological conditions. Examples taken mostly from the recent vertebrate literature.

Prerequisites: BIOL F310; graduate standing.**Stacked with** BIOL F417.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F618 Biogeography**

3 Credits

Offered Fall

This course explores the geography of life by examining linkages between climate, geomorphology, and ecological communities with emphasis on the biogeography of sub-Arctic, polar and alpine regions.

Prerequisites: Graduate standing.**Stacked with** BIOL F418.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F630 Plant Physiology and Development**

3 Credits

Offered Fall Odd-numbered Years

Physiology and development of vascular plants, stressing the interrelationships between development, growth, water relations, photosynthesis, transport and metabolism.

Stacked with BIOL F430.**Special Notes:** Available asynchronous online.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F631 Population Genetics**

3 Credits

Offered Fall Odd-numbered Years

Processes affecting the distribution of genetic variation in populations of organisms and how it changed through time. Covered topics include characterization of DNA sequence variations, genetic drift, neutral theory, coalescent theory, population substructure, natural selection, inbreeding depression, mating systems and multilocus evolution.

Prerequisites: BIOL F260; STAT F200X or STAT F300.**Stacked with** BIOL F431.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F632 Veterinary Bacteriology and Mycology**

2 Credits

Offered Spring

This course will discuss bacterial structure, differences between bacterial families, and fungi and their pathogenesis. The basic principles of bacterial and fungal pathogenesis will be presented. Host response to bacterial or fungal infection, immunity and the role of vaccines in disease prevention will be explained.

Prerequisites: Successful completion of first-semester veterinary courses.**Cross-listed with** DVM F637; MSL F637.**Lecture + Lab + Other:** 2 + 0 + 0**BIOL F635 Introduction to Biology of Cancer**

3 Credits

Offered Fall Odd-numbered Years

Course covers current concepts and knowledge of cancer, including cancer research and cancer treatment.

Prerequisites: BIOL F360.**Stacked with** BIOL F435.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F639 Veterinary Virology**

2 Credits

Offered Spring

This course will explore current concepts in the field of veterinary virology, with an emphasis on the viral structure, viral genetic material and viral replication strategies of various animal viruses. In addition, mechanisms of viral pathogenesis, prevention and treatment of viral infection will be presented.

Prerequisites: Successful completion of first-semester veterinary courses.**Cross-listed with** DVM F639; MSL F639.**Lecture + Lab + Other:** 2 + 0 + 0**BIOL F640 Veterinary Pathology/Biology of Disease I**

5 Credits

Offered Spring

This course will discuss basic principles of disease with special emphasis on processes likely to be encountered veterinary practice. We will discuss these topics organized by underlying disease mechanism. The discussions will move from general cell-mediated processes to more specific disease mechanisms.

Prerequisites: Successful completion of first-semester veterinary courses.**Cross-listed with** MSL F642; DVM F640.**Lecture + Lab + Other:** 4 + 3 + 0**BIOL F641 Animal Welfare**

2 Credits

Offered Fall

This course will provide knowledge, skill development and tools necessary for professionals to assess and promote animal welfare and to analyze its associated challenges. It will stress the need for perpetual reassessment of animal welfare knowledge and reinforce the professional's role in staying up-to-date and proactive.

Prerequisites: Completion of first year of veterinary school, or graduate student with approval of instructor.**Cross-listed with** DVM F735.**Lecture + Lab + Other:** 2 + 0 + 0

BIOL F644 Advanced Topics in Evolution

3 Credits

Offered Spring Odd-numbered Years

Modern theory and subdisciplinary directions in the expanding field of evolutionary biology. Topics include adaptation, speciation, reinforcement, comparative method, group selection, phylogeography, advanced systematics, geographic variation and the role of evolutionary biology in society. May be repeated for credit when content varies.

Prerequisites: Undergraduate course in evolution.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL 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** FISH F646.**Stacked with** FISH F446, BIOL F446.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F647 Sustainability in the Changing North**

3 Credits

Offered Spring

Explores the basic principles of sustainability environment. The course introduces the ecosystem of environmental and social systems.

Principles are applied across a range of scales from local communities to the globe, with an emphasis on examples in Alaska and the Arctic.

Specific attention to the theory and practice of boundary spanning and knowledge coproduction.

Prerequisites: Graduate standing.**Cross-listed with** ANTH F647; ECON F647; NRM F647.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F649 Integrated Assessment and Adaptive Management**

3 Credits

Offered As Demand Warrants

An interdisciplinary exploration of the theoretical and practical considerations of integrated assessment and adaptive management. Students survey concepts important in understanding societal and professional-level decision-making. Students work as individuals and as a team to undertake case studies with relevance to integrated assessment and adaptive management.

Prerequisites: Graduate student standing in a natural science, social science or interdisciplinary program at UAF or another university.**Recommended:** ANTH F647, BIOL F647, ECON F647, NRM F647; ANTH F667, BIOL F667, ECON F667, NRM F667.**Cross-listed with** ANTH F649; ECON F649; NRM F649.**Special Notes:** In case of enrollment limit, priority will be given to graduate students in the Resilience and Adaptation Program in order for them to be able to meet their core requirements.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F656 Environmental Toxicology**

3 Credits

Offered Fall

Environmental toxicology will focus on the general properties and principles of persistent and/or poisonous (toxic) chemicals commonly encountered in air, water, fish and wildlife. Numerous natural and synthetic chemicals in the environment will be discussed from a global perspective with some bias towards Arctic and sub-Arctic regions.

Prerequisites: CHEM F449; or one semester each of organic chemistry and cell or molecular biology.**Cross-listed with** CHEM F655.**Stacked with** BIOL F455; CHEM F455.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F657 Environmental Microbiology**

3 Credits

Offered Spring Even-numbered Years

This course focuses on the role of microorganisms in environmentally-relevant processes including bioremediation of pollutants, biogeochemical cycling, corrosion and wastewater treatment, including current methods for studying microbial diversity and function.

Prerequisites: BIOL F115X; BIOL F116X; BIOL F342; CHEM F105X; CHEM F106X.**Recommended:** CHEM F449.**Stacked with** BIOL F457.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F660 Principles of Virology**

3 Credits

Offered Spring

This course will explore current concepts in the field of virology, with emphasis on the structure, genetic material, and replication strategies of various human and animal viruses. In addition, mechanisms of viral pathogenesis, viral diagnostics, prevention and treatment of viral infection will be presented.

Prerequisites: Graduate standing.**Stacked with** BIOL F460.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F662 Infectious Diseases**

3 Credits

Offered As Demand Warrants

Covers infectious disease biology using examples of different pathogens and exploring the concepts of their biology and the implication of these principles on pathology, epidemiology and sociology of infectious diseases.

Prerequisites: Graduate standing; BIOL F360 or BIOL F342.**Stacked with** BIOL F462.**Lecture + Lab + Other:** 3 + 0 + 0**BIOL F667 Resilience Seminar I**

1 Credit

Offered As Demand Warrants

Provides a forum for new students of the Resilience and Adaptation graduate program to explore issues of interdisciplinary research that are relevant to sustainability. A considerable portion of the seminar is student-directed, with students assuming leadership in planning seminar activities with the instructor.

Prerequisites: Enrolled in Resilience and Adaptation Graduate Program.**Recommended:** ANTH F647, BIOL F647, ECON F647 or NRM F647 (taken concurrently).**Cross-listed with** ANTH F667; ECON F667; NRM F667.**Lecture + Lab + Other:** 2 + 0 + 0

BIOL F668 Interdisciplinary Research Methods-Resilience Seminar II

1 Credit

Offered As Demand Warrants

Provides a forum for new students of the Resilience and Adaptation graduate program to explore issues of interdisciplinary research relevant to sustainability. The seminar provides support to each student planning his/her summer internship and preparing and presenting a thesis research prospectus.

Prerequisites: ANTH F647, BIOL F647, ECON F647 or NRM F647; ANTH F667, BIOL F667, ECON F667 or NRM F667.

Cross-listed with ANTH F668; ECON F668; NRM F668.

Lecture + Lab + Other: 2 + 0 + 0

BIOL F669 Landscape Ecology and Wildlife Habitat

3 Credits

Offered Spring Even-numbered Years

A problem-based learning and critical thinking approach to modern methods in landscape ecology, including geographic information systems, remote sensing, modeling, software and the Internet. Graduate students are expected to help undergraduates with problems and questions.

Prerequisites: Graduate standing.

Cross-listed with WLF F669.

Stacked with BIOL F469; WLF F469.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F670 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 FISH F676; MSL F676.

Stacked with BIOL F470; FISH F476; MSL F476.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F673 Ecosystem Ecology

4 Credits

Offered Spring

Ecosystem ecology is the scientific study of the interactions among organisms and the non-living environment. The course introduces the ecosystem concept and surveys environmental factors governing ecosystem processes, including major biogeochemical cycles. Includes application of these topics to ecosystem services, sustainability, and responses of ecosystems to global change.

Prerequisites: graduate standing.

Stacked with BIOL F476.

Lecture + Lab + Other: 3 + 0 + 3

BIOL F679 Cellular and Molecular Neuroscience

3 Credits

Offered Fall Even-numbered Years

The cellular and molecular underpinnings of signaling in the nervous system. Topics include properties of excitable membranes, synaptic transmission, neurological integration, the cellular and molecular basis of learning and memory, and pharmacological treatment of neuronal pathologies.

Prerequisites: Two F300-level courses in BIOL or CHEM; MATH F251X or MATH F230X.

Cross-listed with CHEM F670.

Stacked with CHEM F470.

Special Notes: Recommended MATH F252X.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F680 Data Analysis in Biology

3 Credits

Offered Spring

Course covers major statistical concepts and techniques using the statistical software R, with emphasis on applications in biology. Reviews probability theory, hypothesis testing, ANOVA, regression, least squares fitting, parametric and nonparametric approaches, and then focuses on random and mixed-effects models, likelihood based fitting, GAMs, GLMs, ordination, and model selection.

Prerequisites: STAT F200X, STAT F401; graduate standing in a biologically oriented field.

Cross-listed with WLF F680.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F686 Vertebrate Paleontology

3 Credits

Offered Spring Odd-numbered Years

The study of vertebrate evolution through geologic time. Covers the temporal range, diversity and systematics of major vertebrate groups as documented in the fossil record, with an emphasis on current problems in vertebrate evolutionary pattern and process. Labs emphasize comparative morphology and identification of major vertebrate groups.

Prerequisites: Graduate standing.

Cross-listed with BIOL F486; GEOS F486.

Stacked with GEOS F686.

Lecture + Lab + Other: 2 + 3 + 0

BIOL F687 Conceptual Issues in Evolutionary Biology

3 Credits

Offered Spring Odd-numbered Years

Analysis of some of the main models which explain evolutionary change followed by consideration of the practical implications these models have on the study of biological phenomena in general.

Cross-listed with PHIL F687.

Stacked with BIOL F487; PHIL F487.

Lecture + Lab + Other: 3 + 0 + 0

BIOL F688 Arctic Vegetation Ecology: Geobotany

3 Credits

Offered Fall Odd-numbered Years

Arctic plants in relationship to Earth, including Arctic plant identification, climate, geology and geography controls on Arctic plant communities, snow ecology, applications to wildlife studies and current Arctic issues. Consists of lecture, labs and field trips.

Prerequisites: BIOL F115X and BIOL F116X; BIOL F239 or BIOL F371.

Stacked with BIOL F488.

Lecture + Lab + Other: 2.5 + 0.5 + 0

BIOL F689 Vegetation Description and Analysis

3 Credits

Offered Fall Even-numbered Years

Methods of vegetation science including sampling, classification, gradient analysis, ordination, field description and mapping. Field trips to the plant communities of interior Alaska.

Prerequisites: BIOL F239, BIOL F371 or BIOL F331.**Stacked with** BIOL F489.**Lecture + Lab + Other:** 2 + 3 + 0**BIOL F691 The Human Microbiome**

4 Credits

Offered Fall

Biology of host-associated microbiomes with an emphasis on the human microbiome. Investigate microbial impacts on the behavior, physiology and fitness of their host. Explore model and non-model systems. Student projects in this course may satisfy the capstone project requirements of the biological science degree.

Prerequisites: BIOL F260 or STAT F200X.**Stacked with** BIOL F491.**Lecture + Lab + Other:** 3 + 3 + 0**BIOL F692 Seminar**

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 0**BIOL F692P Seminar**

1-6 Credits

Lecture + Lab + Other: 0 + 0 + 0**BIOL F698 Non-thesis Research/Project**

1-12 Credits

Lecture + Lab + Other: 0 + 0 + 0**BIOL F699 Thesis**

1-12 Credits

Lecture + Lab + Other: 0 + 0 + 0