Biology (BIOL)

Courses

BIOL A074 Field Natural History **1-3 Credits**
A short course on field natural history. Classes may focus on fungi, invertebrates, fish, mammals, birds, mosses and lichens, tracking, ecosystems and/or climate.
Special Note: May be repeated for credit. May include extensive hiking and camping. Community service course.

BIOL A100 Human Biology **3 Credits**
Survey of biological principles as applied to human anatomy, physiology and genetics.
Special Note: Intended for non-science majors. Does not satisfy major requirements for Bachelor of Arts or Bachelor of Science in Biological Sciences.
Registration Restrictions: Placement into Quantitative Skills GER or Written Communication Skills GER
Attributes: UAA Natural Sciences GER.

BIOL A102 Introductory Biology **3 Credits**
Explores biological concepts and competencies that will provide the non-biologist a working knowledge of life sciences that can be applied when making decisions on health and the environment.
Special Note: Primarily for non-science majors.
Attributes: UAA Natural Sciences GER.

BIOL A103 Introductory Biology Laboratory **1 Credit**
Presents introductory biological concepts including characteristics of life, evolution, genetics, energetics, ecology, biotechnology and the scientific method. Provides the non-biologist with knowledge of biology enabling them to make informed decisions in areas such as health and the environment.
Special Note: Primarily for non-science majors.
Prerequisites: BIOL A102 with a minimum grade of D or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

BIOL A104 Natural History of Alaska **3 Credits**
Examines the animals and plants of Alaska, how they fit together into communities, the environmental and historical factors influencing their distributions, and changes occurring to these distributions.

BIOL A108 Principles and Methods in Biology **6 Credits**
Introduces the biological sciences through an exploration of core themes and fundamental skills. Exposes students to biological theory and laboratory practice through integrated lecture and experiential learning modules.
Prerequisites: CHEM A105 with a minimum grade of C or concurrent enrollment.
Corequisites: BIOL A108L.
Attributes: UAA Natural Science w/ Lab GER.

BIOL A110 Survey of Brewing and Fermentation Science **2 Credits**
Introduces styles, terminology, flavors, faults, and proper service of beer and other fermented beverages. Discusses brewing processes and brewing science. Demonstrates commercial brewing, careers in brewing, and other fermented beverage industries.
Special Note: Must be age 21 or older by the first day of class.

BIOL A111 Human Anatomy and Physiology I **3 Credits**
Integrates human structure and function. Provides a foundation in relevant chemistry, cell biology, histology and unifying concepts. Covers integumentary, skeletal, muscular and nervous systems.
Special Note: Does not apply for biology major credit.
Attributes: UAA Natural Sciences GER.

BIOL A111L Human Anatomy and Physiology I Lab **1 Credit**
Provides an integrated experiential learning of human structure and function with a hands-on foundation in relevant chemistry, cell biology, histology and unifying concepts. Covers integumentary, skeletal, muscular and nervous systems. Labs only, no lectures.
Special Note: Does not apply for biology major credit.
Prerequisites: BIOL A111 with a minimum grade of C or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

BIOL A112 Human Anatomy and Physiology II **3 Credits**
Provides an integrated view of human structure and function with continuation of Human Anatomy and Physiology I. Covers endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems.
Special Note: Does not apply for biology major credit.
Prerequisites: BIOL A111 with a minimum grade of C.
Attributes: UAA Natural Sciences GER.

BIOL A112L Human Anatomy and Physiology II Lab **1 Credit**
Provides an integrated experiential learning of human structure and function with a hands-on foundation in endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems. Labs only, no lectures.
Special Note: Does not apply for biology major credit.
Prerequisites: BIOL A111 with a minimum grade of C and BIOL A111L with a minimum grade of C and BIOL A112 with a minimum grade of C or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

BIOL A125 Marine Skeletal Articulation **2 Credits**
Introduces the preparation of marine skeletons for museum-quality display. Introduces basic anatomy, form and function, as well as materials and general techniques for excavating, cleaning, collecting data from and articulating marine vertebrates.
Special Note: May be repeated twice for credit.

BIOL A127 Biota of Alaska: Introduction to Mariculture **3 Credits**
Introduces the principles, concepts, and methods used in the production of shellfish, seaweeds, and other mariculture species with an emphasis on techniques used by Alaskan producers. Covers aspects of aquatic farming, including site selection, permitting, daily operations, best management practices, business planning and processing, and safety and challenges that the Alaskan industry is facing.

BIOL A128 Biota of Alaska: Introduction to Field Ecology **3 Credits**
Introduces methods in field ecology and species identification. Explores characteristics of animals, plants, fungi, and protists of Alaska. Includes life history, habitat, ecology, and behavior.

BIOL A139 Introduction to Forestry **3 Credits**
Introduces forest management, utilization, and conservation. Covers cultural, ecological, and technical conditions which influence forest use and management.

BIOL A150 Introduction to Marine Biology **3 Credits**
Investigates marine natural history with emphasis on planktonic, benthic, and pelagic organisms in intertidal, subtidal, deep-sea, and pelagic ecosystems.
Special Note: May include field trips and extensive hiking.

BIOL A178 Introduction to Oceanography **3 Credits**
Study of the oceans combining insights from geological, chemical, physical and biological oceanography. Topics include plate tectonics and the evolution of the ocean basins, the chemical composition of seawater, forces acting on water to generate waves and currents, interrelationships among physical, chemical and biological processes, and complex societal issues such as global climate change, fisheries management and pollution.
Registration Restrictions: Placement into Quantitative Skills GER
Crosslisted With: GEOL A178
Attributes: UAA Natural Sciences GER.

BIOL A179 Introduction to Oceanography Laboratory **1 Credit**
Laboratory exercises designed to illustrate principles and concepts developed in the lecture (BIOL/GEOL A178).
Registration Restrictions: Placement into Quantitative Skills GER
Prerequisites: BIOL A178 with a minimum grade of D or concurrent enrollment or GEOL A178 with a minimum grade of D or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

BIOL A190 Biota of Alaska: Selected Topics **1-4 Credits**
Explores characteristics of animals, plants, fungi, and protists of Alaska. Includes life history, habitat, ecology, and behavior.
Special Note: May include extensive hiking and camping. Can be repeated for a maximum of 6 credits.

BIOL A198 Individual Research **1-6 Credits**
Provides opportunities for lab and/or field investigations on specific subjects in biology, as approved and directed by mentoring faculty.
Special Note: May be repeated for a maximum of 6 credits.
Registration Restrictions: Instructor approval

BIOL A200 Introduction to Complexity **3 Credits**
Introduces the science of complexity, currently used to predict system behavior in the physical, life, and social sciences.
Prerequisites: MATH A121 with a minimum grade of D or MATH A151 with a minimum grade of D or MATH A152 with a minimum grade of D or MATH A155 with a minimum grade of D or MATH A211 with a minimum grade of D or MATH A212 with a minimum grade of D or MATH A221 with a minimum grade of D or MATH A251 with a minimum grade of D or MATH A251F with a minimum grade of D or MATH A252 with a minimum grade of D or MATH A252F with a minimum grade of D or MATH A253 with a minimum grade of D.
Attributes: UAA Natural Sciences GER.

BIOL A240 Introductory Microbiology for Health Sciences **3 Credits**
Provides a general introduction to microbiology covering bacterial metabolism and genetics, virology, host parasite interactions, host defense mechanisms and epidemiology.
Special Note: Recommended for associate and baccalaureate health science programs, not accepted for Biology degree credit.
Prerequisites: BIOL A112 with a minimum grade of C or concurrent enrollment and BIOL A112L with a minimum grade of C or concurrent enrollment.

BIOL A240L Introductory Microbiology for Health Sciences Laboratory **1 Credit**
Applies theory and lab practice in microbial ubiquity, growth, biosafety and aseptic practices, and identification of medically-important microorganisms. Emphasizes knowledge acquisition and practical lab application.
Special Note: Recommended for associate and baccalaureate health science programs. Laboratory exercises generally require students to return to the lab to record experimental results after 24 hours throughout the semester. Not accepted for biology degree credit. Students must attend lab the first week of class or they may be administratively dropped.
Prerequisites: BIOL A240 with a minimum grade of C or concurrent enrollment.

BIOL A242 Fundamentals of Cell Biology **3 Credits**
Fundamental concepts and processes important to the structure and function of the smallest unit of life.
Prerequisites: BIOL A108 with a minimum grade of C and CHEM A105 with a minimum grade of C and CHEM A105L with a minimum grade of C.

BIOL A243 Experiential Learning: Cell Biology and Genetics **4 Credits**
Experiential learning course that includes discussion of theories and concepts, and extensive laboratory exercises in cell and organismal culture, genetic analysis, nucleic acid and enzyme analysis, hypothesis testing and application of the scientific method. Introduces microscopy and spectroscopy, data analysis, statistical analysis, writing for scientific publication and oral presentation of scientific research.
Prerequisites: BIOL A242 with a minimum grade of C or concurrent enrollment and BIOL A252 with a minimum grade of C or concurrent enrollment.

BIOL A252 Principles of Genetics **3 Credits**
Basic principles of genes, heredity, and variation in living organisms at cellular, molecular and population levels.
Prerequisites: BIOL A108 with a minimum grade of C and CHEM A105 with a minimum grade of C and CHEM A105L with a minimum grade of C.

BIOL A271 Principles of Ecology **3 Credits**
Introduces the basic principles of ecology including the physical and biological nature of environment in relation to living systems; the physiological, morphological and behavioral adaptations of organisms; the dynamics and structures of populations, biological communities, ecosystems, and biomes; and the interdependence of natural and human systems.
Prerequisites: ENVI A211 with a minimum grade of C or (BIOL A108 with a minimum grade of C and CHEM A105 with a minimum grade of C and CHEM A106 with a minimum grade of C or concurrent enrollment).

BIOL A273 Experiential Learning: Ecology and Evolution **4 Credits**
Hands-on application of the principles of ecology and evolution in laboratory and field contexts including hypothesis testing, the use of the scientific method in practical laboratory and field applications, writing for scientific publication, and presentation of scientific information.
Prerequisites: BIOL A271 with a minimum grade of C or concurrent enrollment and BIOL A288 with a minimum grade of C or concurrent enrollment.

BIOL A288 Principles of Evolution **3 Credits**
Introduces the basic principles and mechanisms of the evolution of living systems emphasizing the evidence supporting modern understanding of the patterns and processes associated with individual and population variability, transmission of genetic information, lineage diversification, and biological change.
Prerequisites: BIOL A108 with a minimum grade of C.

BIOL A310 Principles of Animal Physiology **3 Credits**
Fundamental principles of cellular and system physiology of animals with emphasis on vertebrate and, in particular, human physiology.
Prerequisites: BIOL A242 with a minimum grade of C.

BIOL A311 Experiential Learning: Animal Physiology **2 Credits**
Focuses on the cellular and system physiology of animals. Emphasizes laboratory investigations of vertebrate physiology.
Prerequisites: BIOL A310 with a minimum grade of C or concurrent enrollment.

BIOL A320 Vertebrate Biology **3 Credits**
A survey of vertebrates of the world, with emphasis on their evolution, diversity and biogeography, and on comparative morphology, physiology, ecology, and behavior.
Prerequisites: BIOL A288 with a minimum grade of C.

BIOL A321 Experiential Learning: Vertebrate Biology **2 Credits**
Theory and practice in vertebrate biology including laboratory activities focusing on evolution, diversity and biogeography, comparative morphology, physiology, ecology, and behavior.
Prerequisites: BIOL A320 with a minimum grade of C or concurrent enrollment or BIOL A487 with a minimum grade of C or concurrent enrollment.

BIOL A325 Advanced Marine Skeletal Articulation **2 Credits**
Introduces the preparation of marine skeletons for museum-quality display and three-dimensional augmented reality atlases. Introduces basic anatomy, form and function, as well as materials and general techniques for excavating, cleaning, collecting data from and articulating marine vertebrates. Atlas construction focuses on comparative anatomy.
Special Note: May be repeated twice for credit.
Prerequisites: BIOL A271 with a minimum grade of C.

BIOL A330 Plant Biology **3 Credits**
Exploration of plant anatomy, morphology, basic physiology, ecology, evolution and relationship of humans to plants.
Prerequisites: BIOL A288 with a minimum grade of C.

BIOL A395 Internship in Fermentation Sciences **3 Credits**
Participates in supervised internship at a craft brewery or other approved commercial producer of fermented food or beverage products.

Special Note: Must be age 21 or older by the first day of class.
Registration Restrictions: Admission to the Occupational Endorsement in Fermentation Science and instructor approval

BIOL A412 Behavioral Endocrinology **3 Credits**
Introduces the concepts of chemical messengers and the principles of hormonal integration of physiology and behavior associated with reproduction, stress, biological rhythms, and learning and memory.
Prerequisites: BIOL A310 with a minimum grade of C.

BIOL A413 Neurophysiology **3 Credits**
Explores the relationship between molecules, cells, systems and behavior. Focuses on membrane and electrical properties of neurons, synaptic physiology, human neuropathologies, and sensory and motor system function. Provides opportunities for community outreach in comparative neuroanatomy and neuroscience.
Special Note: Not available for credit to students who have completed BIOL A613.
May Be Stacked With: BIOL A613
Prerequisites: (BIOL A111 with a minimum grade of C and BIOL A111L with a minimum grade of C) or (BIOL A112 with a minimum grade of C or concurrent enrollment and BIOL A112L with a minimum grade of C or concurrent enrollment) or BIOL A310 with a minimum grade of C or concurrent enrollment or PSY A370 with a minimum grade of C or concurrent enrollment.

BIOL A415 Comparative Animal Physiology **3 Credits**
An examination of the physiological adaptations of marine, freshwater and terrestrial organisms. The comparative approach will be used in order to better understand how animals are uniquely adapted to their physical environment.
Special Note: Students who complete BIOL A415 as part of their undergraduate degree cannot receive credit toward their graduate degree from BIOL A615.
May Be Stacked With: BIOL A615
Prerequisites: BIOL A310 with a minimum grade of D.

BIOL A417 Applied Kinesiology and Exercise Physiology **3 Credits**
Examines the effects of acute and chronic exercise on physiological and biochemical processes in the body and the role of exercise in health and disease, soreness, and fatigue.
Prerequisites: (BIOL A111 with a minimum grade of C and BIOL A111L with a minimum grade of C and BIOL A112 with a minimum grade of C and BIOL A112L with a minimum grade of C) or BIOL A310 with a minimum grade of C.

BIOL A418 Fish Physiology **3 Credits**
Overviews fish physiology with emphasis on understanding the ways in which fish are uniquely adapted to their physical environment.
Prerequisites: BIOL A310 with a minimum grade of C.

BIOL A419 Sleep and Chronobiology **3 Credits**
Examines the presence and physiological basis of biological rhythms and how changes in the different lighting of the seasons, sleep/wake patterns and non-photic cues can impact the biological clock.
Special Note: Not available for credit to students who have completed BIOL A619.
May Be Stacked With: BIOL A619
Prerequisites: (BIOL A111 with a minimum grade of C and BIOL A111L with a minimum grade of C and BIOL A112 with a minimum grade of C and BIOL A112L with a minimum grade of C) or BIOL A310 with a minimum grade of C.

BIOL A423 Ichthyology **3 Credits**
Overviews the evolution, taxonomy, anatomy, physiology and ecology of fish emphasizing Alaska's taxa.
Prerequisites: BIOL A252 with a minimum grade of C and BIOL A320 with a minimum grade of C.

BIOL A424 Experiential Learning: Ichthyology **1 Credit**
Introduces lab and field-based ichthyology exercises which complement material in BIOL A423 Ichthyology lecture that explores the evolution, taxonomy, anatomy, physiology and ecology of fishes.
Prerequisites: BIOL A423 with a minimum grade of C or concurrent enrollment.

BIOL A427 Marine Invertebrate Biology **3 Credits**
A study of functional morphology, life history, systematics, evolution and other selected aspects of the biology of marine invertebrates.
Prerequisites: BIOL A242 with a minimum grade of C and BIOL A252 with a minimum grade of C.

BIOL A430 Marine Mammal Biology **3 Credits**
Introduces the biology and ecology of marine mammals, with an emphasis on understanding how marine mammals are adapted to their habitat, and the roles they play in marine ecosystems.
May Be Stacked With: BIOL A630
Prerequisites: BIOL A271 with a minimum grade of C.

BIOL A431 Plant Diversity and Evolution **3 Credits**
Focuses on understanding, organizing and describing plant diversity in relation to evolutionary principles; integrating data to address hypotheses; and identifying and classifying Alaskan flora.
Prerequisites: BIOL A271 with a minimum grade of C or BIOL A288 with a minimum grade of C.

BIOL A432 Experiential Learning: Marine Mammal Biology **2 Credits**
Introduces the theory and practice in scientific study of marine mammal biology. Emphasis on understanding their adaptations and roles in marine ecosystems. Students survey live and dead marine mammals in nearshore environments, conduct research and share data in areas such as anatomy, diving physiology, habitat use, group composition, reproduction, and interspecific interactions, including those with humans.
Prerequisites: BIOL A430 with a minimum grade of C or concurrent enrollment.

BIOL A441 Animal Behavior **3 Credits**
Explores the ecological, evolutionary, physiological and genetic bases of animal behavior.
Prerequisites: BIOL A288 with a minimum grade of C.

BIOL A442 Experiential Learning: Animal Behavior **3 Credits**
Theory and practice in research methods and analysis in animal behavior. Students conduct research in areas such as foraging behavior, communication, predator avoidance, sensory systems and social behaviors.
Prerequisites: BIOL A273 with a minimum grade of C.
Corequisites: BIOL A441.

BIOL A446 Global Climate Change **3 Credits**
Introduces the 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, sea level change, ocean acidification and people with an emphasis on Alaska and the Arctic.
Prerequisites: BIOL A271 with a minimum grade of C or ENVI A211 with a minimum grade of C.

BIOL A452 Human Genome **3 Credits**
Explores the human genome with emphasis on social aspects. Topics include the genetics of normal traits, genome structure and mapping, generation and utilization of genomic data, monogenic and polygenic diseases, genetic screening, population genetics and precision medicine, genomic evidence of human evolution and migration, DNA forensics, and ethical, legal and social implications (ELSI).
Special Note: Normally offered in alternating years.
Registration Restrictions: Completion of Tier 1 GER courses and junior standing
Prerequisites: ANTH A205 with a minimum grade of C or BIOL A252 with a minimum grade of C or PSY A370 with a minimum grade of C.
Attributes: UAA Integrative Capstone GER.

BIOL A455 Experiential Learning: Bioinformatics **4 Credits**
Explores advanced computational theory and methods for analyses of biological phenomena. Utilizes algorithms and databases used in sequence alignment, sequence searching, metagenomics, phylogenetics, analysis of next-generation sequencing data, protein structures, and molecular pathways. Evaluates genomic approaches for understanding complex biological systems in model organisms and human disease.
Special Note: Not available for credit to students who have completed BIOL A655.
May Be Stacked With: BIOL A655
Prerequisites: BIOL A252 with a minimum grade of C and (MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C) and (STAT A253 with a minimum grade of C or STAT A307 with a minimum grade of C).

BIOL A456 Nonlinear Dynamics and Chaos **3 Credits**
Introduces nonlinear dynamics and chaos. Develops analytical methods and geometric intuition using concrete examples from physics, biology, chemistry, and engineering. Topics covered include phase plane analysis, iterated maps, fractals, and strange attractors.
Registration Restrictions: Completion of GER Tier 1 (basic college-level skills) courses and junior standing
Crosslisted With: CHEM A456 and PHYS A456
Prerequisites: MATH A253 with a minimum grade of C and (PHYS A124 with a minimum grade of C or PHYS A212 with a minimum grade of C).
Attributes: UAA Integrative Capstone GER.

BIOL A458 Behavioral Ecology of Marine Mammals **3 Credits**
Introduces the proximate and ultimate causes of behavioral ecology of marine mammals using an evolutionary approach. Focus on social behavior, animal communication, feeding and anti-predatory behavior, habitat selection, territoriality, reproductive behavior, mating systems, parental care, and adaptations in specific taxa. Methodology, natural and anthropogenic challenges, and marine conservation highlighted throughout.
Prerequisites: BIOL A271 with a minimum grade of C.

BIOL A459 Experiential Learning: Behavioral Ecology of Marine Mammals **2 Credits**
Introduces the theory and practice in field and lab on topics related to marine mammal behavioral ecology with focus on Alaskan species. Students conduct research and present findings in areas such as habitat use, social behavior, group dynamics, foraging ecology, predator avoidance, communication, sensory systems, reproductive behavior, mating systems and parental care. Methodology, natural and anthropogenic challenges, adaptations and marine conservation highlighted.
Prerequisites: BIOL A458 with a minimum grade of C or concurrent enrollment.

BIOL A461 Molecular Biology **3 Credits**
Study of molecular biology, with emphasis on molecular genetics and the molecular biology of eukaryotic cells and cancer cells, including current developments in the field.
May Be Stacked With: BIOL A661
Prerequisites: BIOL A252 with a minimum grade of D.

BIOL A463 Molecular Biology of Cancer **3 Credits**
Studies the molecular biology of cancer. Emphasizes the mechanisms by which a normal cell becomes a malignant cell including the role of chemicals, viruses and other environmental insults in carcinogenesis. Studies the fundamentals of cancer molecular biology and the current literature through a combination of team-based learning (TBL), research, discussions, term papers, and seminars.
Prerequisites: BIOL A252 with a minimum grade of C.

BIOL A465 Experiential Learning: Molecular Biology **4 Credits**
A practical implementation of the theory learned in molecular biology and biotechnology courses, which includes in vitro DNA techniques, gene expression analysis and genomics. Students will also learn experimental design, proposal writing, and oral and written presentation skills.
Special Note: Not available for credit to students who have completed BIOL A665.
May Be Stacked With: BIOL A665
Prerequisites: BIOL A461 with a minimum grade of C or concurrent enrollment or MBIO A251 with a minimum grade of C or concurrent enrollment.

BIOL A467 Wildlife Ecology **3 Credits**
Discusses the history and ecological principles underlying wildlife conservation and management, including key principles of population ecology, methods for estimating population size, survival, and recruitment, and their application to contemporary wildlife conservation and management topics in the face of uncertainty and habitat changes.
Special Note: Not available for credit to students who have completed BIOL A667.
May Be Stacked With: BIOL A667
Prerequisites: BIOL A271 with a minimum grade of C.

BIOL A469 Arctic Environmental Security **3 Credits**
Offers an introduction to a broad array of biological, ecological, political, economic, social and defense security issues that make the present day Arctic a focus of global interest, in the context of global climate change and the end of the Cold War.
Special Note: Not available for credit to students who have completed BIOL A669.
May Be Stacked With: BIOL A669

BIOL A471 Immunology **3 Credits**
Fundamental concepts of immunology including cells and tissues of the immune system, innate immunity, lymphocyte development, antigenicity, cytokine signaling, antibody responses, immunotherapies and vaccines. Discusses comparative immunological evolution of non-human species. Emphasizes immunological aspects of human disease including host-pathogen interactions, autoimmune diseases, immunodeficiencies and cancer.
Crosslisted With: CHEM A471.
Prerequisites: BIOL A242 with a minimum grade of C and BIOL A252 with a minimum grade of C.

BIOL A472 Biogeography **3 Credits**
Ecological basis and historical patterns of the distribution of organisms and ecosystems on a worldwide basis. Examines current theories regarding the origin of these distributions.
Prerequisites: BIOL A288 with a minimum grade of C.

BIOL A473 Conservation Biology **3 Credits**
Examines the human drivers of global environmental change (human population growth and consumption of resources) and the consequences of environmental degradation. Discusses the use of standard protocols and modern instruments to assess environmental change.
Special Note: Service-learning course. Includes fieldwork outside of class time.
Registration Restrictions: Completion of all GER Tier 1 (basic college-level skills) courses
Prerequisites: BIOL A271 with a minimum grade of C or ENVI A211 with a minimum grade of C.
Attributes: UAA Integrative Capstone GER.

BIOL A474 Ecotoxicology **3 Credits**
Examines the chemical and ecological nature of pollution processes and the major classes and environmental fate of pollutants.
Crosslisted With: CHEM A474
Prerequisites: BIOL A271 with a minimum grade of C or CHEM A321 with a minimum grade of C.
Attributes: UAA Integrative Capstone GER.

BIOL A477 Tundra and Taiga Ecosystems **3 Credits**
Analysis of tundra and taiga ecosystems with emphasis on system functions and dynamics. Comparisons with other terrestrial systems will be made and unique characteristics will be emphasized.
May Be Stacked With: BIOL A677
Prerequisites: BIOL A271 with a minimum grade of D.

BIOL A478 Biological Oceanography **3 Credits**
Discusses principles of biological oceanography. Emphasizes biological, chemical and physical processes in the world's oceans. Discusses linkages between biological ocean processes and carbon transport
Special Note: Not available for credit to students who have completed BIOL A678.
Registration Restrictions: Junior or senior standing
May Be Stacked With: BIOL A678

BIOL A481 Marine Biology **3 Credits**
Examines marine biology with a focus on understanding the pathways and transformation of energy and matter in coastal, pelagic and benthic waters, particularly those in Alaska. Studies the influence of the physical environment, climate change and human activities on marine species diversity, food webs, and tropho-dynamics.
Registration Restrictions: Junior or senior standing and completion of all GER Tier 1 (basic college-level skills) courses
Prerequisites: BIOL A271 with a minimum grade of C or ENVI A211 with a minimum grade of C.
Attributes: UAA Integrative Capstone GER.

BIOL A483 Exploration Ecology **2 Credits**
Explores principles and techniques used for study and collection of baseline ecological data in remote landscapes. Discusses survey and analytical resources and ecological project design.
Special Note: Not available for credit to students who have completed BIOL A683.
Registration Restrictions: Instructor approval
May Be Stacked With: BIOL A683
Prerequisites: BIOL A271 with a minimum grade of C.
Corequisites: BIOL A484.

BIOL A484 Experiential Learning: Exploration Ecology Field Study **4 Credits**
Explores principles and techniques used for study and collection of baseline ecological data in remote landscapes. Applies field survey and analytical resources to ecological project design and implementation.
Special Note: Not available for credit to students who have completed BIOL A684.
Registration Restrictions: Instructor approval
May Be Stacked With: BIOL A684
Corequisites: BIOL A483.

BIOL A486 Evolutionary Ecology **3 Credits**
Explores conceptual issues in the evolution of life histories and species interactions. Includes foundational and contemporary research in topics such as quantitative genetics, natural selection and the evolution of sex.
Prerequisites: BIOL A271 with a minimum grade of C and BIOL A288 with a minimum grade of C.

BIOL A487 Comparative Anatomy of Vertebrates **3 Credits**
Investigates the links between the forms and functions of shared organ systems. Discusses the evolutionary, ecological and physiological implications of shared organ systems.
Prerequisites: BIOL A288 with a minimum grade of C.

BIOL A490 Selected Lecture Topics in Biology **1-3 Credits**
Detailed coverage of a selected lecture topic in biology.
Special Note: May be repeated for a maximum of 12 credits with a change in subtitle. Prerequisites and corequisites may vary with topic.
Registration Restrictions: 16 credits in biology.
May Be Stacked With: BIOL A690

BIOL A490L Selected Laboratory Topics in Biology **1-3 Credits**
Covers in detail a selected laboratory topic in biology.
Special Note: May be repeated for a maximum of 12 credits with change in subtitle. Prerequisites and corequisites may vary with topic.
Registration Restrictions: Completion of 16 credits in biology
May Be Stacked With: BIOL A690L

BIOL A491 Experiential Learning: Marine Biology **2 Credits**
Introduces the theory and practice in marine biology lab and field designed to build student knowledge of marine organisms, communities and habitats. Students conduct explorations and research on environmental variables and their affects on organisms in coastal, pelagic and benthic zones.
Prerequisites: BIOL A481 with a minimum grade of C or concurrent enrollment.

BIOL A492 Undergraduate Seminar **1 Credit**
The exploration of current and emerging ideas and findings across the biological sciences, with an emphasis on critique of the primary literature. The course will use readings from the primary literature to illustrate scientific methods, experimental design, and applied statistics in biology. The course will also build and refine student's scientific writing skills, and sharpen analytical thinking and scientific creativity.
Special Note: May be repeated once for credit.
Registration Restrictions: Junior or senior standing.

BIOL A492A Undergraduate Seminar: Semester by the Bay **1 Credit**
Offered in conjunction with KPC's Semester by the Bay program. Introduces the exploration of current and emerging ideas and findings across the biological sciences, with an emphasis on critique of the primary literature. The course will use readings from the primary literature to illustrate scientific methods, experimental design, and applied statistics in biology. The course will also build and refine student's scientific writing and communication skills, sharpen analytical thinking and scientific creativity.
Special Note: Does not meet the BIOL A492 seminar requirement for biological sciences and natural sciences degrees. May be repeated once for credit.

BIOL A495 Instructional Practicum: Laboratory **1 Credit**
Supervised practical experience in a two-hour, three-hour or four-hour biology laboratory or experiential learning course. Planning, presentation of material, achievement testing and correlation with lecture under the direct supervision of department faculty.
Special Note: May be repeated once for credit.
Registration Restrictions: Minimum of 20 credits in biology.

BIOL A495A Internship in the Biological Sciences **3 Credits**
Professional work experience in appropriate areas of the biological sciences. Open to qualified students receiving faculty recommendation, and as placements are available.
Special Note: May be repeated three times for credit, but only 3 credits may be applied to elective upper-division credit requirements for the baccalaureate degree in any of the BA or BS degrees offered by the Department of Biological Sciences.
Registration Restrictions: Junior standing with a minimum of 12 credits in biology courses and faculty permission.

BIOL A498 Individual Research **1-6 Credits**
Lab and field investigations on specific subjects in biology. Topic for study to be approved and directed by a faculty member in biological sciences.
Special Note: May be repeated for a maximum of 6 credits.
Registration Restrictions: Faculty permission required.
Prerequisites: BIOL A252 with a minimum grade of D.

BIOL A499 Senior Thesis **3 Credits**
Guides students through the thesis writing process for undergraduate research that meets professional publication standards. Presents thesis in an oral or poster presentation in a science forum.
Special Note: Required for departmental honors in Biology.
Registration Restrictions: Faculty permission required; senior status in Biology or related discipline.

BIOL A601 Experimental Design and Statistics **3 Credits**
Study of the concepts of experimental design and statistics of particular relevance to ecological, environmental, evolutionary and physiological research in biology. Students directly apply the course content to the design and development of their own graduate research proposal as part of the course.
Special Note: Graduate students within the subdisciplines of ecology, physiology and evolutionary ecology are required to take this course during their first year of graduate study.
Registration Restrictions: Graduate standing and permission of instructor.

BIOL A605 Graduate Proseminar in Sciences **3 Credits**
The proseminar is a required course designed for graduate students in biology and other sciences and focuses on the range of current research methods and the writing, teaching, critical and analytical skills necessary for successful graduate study.
Registration Restrictions: Graduate standing, permission of instructor

BIOL A606 Advanced Analysis and Interpretation **3 Credits**
The course will cover advanced analytical techniques applying frequentist and Bayesian approaches. Topics will include applications of meta-analysis, data reduction, data mining, and parametric, non-parametric and descriptive statistics.
Registration Restrictions: Graduate standing, permission of instructor

BIOL A613 Neurophysiology **3 Credits**
Advanced course exploring the relationship between molecules, cells, systems and behavior. Focuses on membrane and electrical properties of neurons, synaptic physiology, human neuropathologies, and sensory and motor system function. Provides opportunities for community outreach in comparative neuroanatomy and neuroscience. Synthesizes knowledge on topics in neuroscience.
Special Note: Not available for credit to students who have completed BIOL A413.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A413

BIOL A615 Advanced Comparative Animal Physiology **4 Credits**
An in-depth examination of the physiological adaptations of marine, freshwater, and terrestrial organisms. The comparative approach will be used in order to better understand how animals are uniquely adapted to their physical environment. In addition to meeting all requirements for BIOL A415, graduate students will be required to lead class discussions, research the literature and prepare a research proposal that addresses a current topic in comparative physiology, and to orally present and defend that research proposal to the class as a whole.
Special Note: Students who completed BIOL A415 as part of their undergraduate degree cannot receive credit toward their graduate degree from BIOL A615.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A415

BIOL A619 Sleep and Chronobiology **3 Credits**
Examines the advanced presence and physiological basis of biological rhythms and how changes in the different lighting of the seasons, sleep/wake patterns and non-photic cues can impact the biological clock.
Special Note: Not available for credit to students who have completed BIOL A419.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A419

BIOL A630 Advanced Marine Mammal Biology **4 Credits**
Advanced study of the biology and ecology of marine mammals, with an emphasis on understanding how marine mammals are adapted to their habitat, and the roles that they play in the aquatic ecosystem.
Special Note: Not available for credit to students who have completed BIOL A430.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A430

BIOL A655 Experiential Learning: Advanced Bioinformatics **4 Credits**
Explores advanced computational theory and methods for analysis of biological phenomena. Utilizes algorithms and databases used in sequence alignment, sequence searching, metagenomics, phylogenetics, analysis of next-generation sequencing data, protein structures, and molecular pathways. Evaluates genomic approaches for understanding complex biological systems in model organisms and human disease. Analyzes authentic datasets.
Special Note: Not available for credit to students who have completed BIOL A455.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A455

BIOL A661 Advanced Molecular Biology **3 Credits**
Advanced study of molecular biology, with emphasis on molecular genetics and the molecular biology of eukaryotic cells and cancer cells, including current developments in the field.
Special Note: In addition to meeting all requirements for BIOL A461, graduate students will be required to research the literature on a current topic in molecular biology, submit an extensive paper summarizing their findings including designs for future experiments on the subject, and give a seminar on the same topic. Not available for credit to students who have completed BIOL A461.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A461
Prerequisites: BIOL A252 with a minimum grade of D.

BIOL A663 Advanced Molecular Biology of Cancer **3 Credits**
A study of the molecular biology of cancer, with emphasis on the mechanisms by which a normal cell becomes a malignant cell, including the role of chemicals, viruses and other environmental insults in carcinogenesis.
Registration Restrictions: Graduate standing
Prerequisites: BIOL A461 with a minimum grade of C.

BIOL A665 Experiential Learning: Advanced Molecular Biology **4 Credits**
A practical implementation of the theory learned in molecular biology and biotechnology courses, which includes in vitro DNA techniques, gene expression analysis and genomics. Students will also learn experimental design, proposal writing, and oral and written presentation skills, along with leading and mentoring of undergraduates in research.
Special Note: Not available for credit to students who have completed BIOL A465.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A465
Prerequisites: BIOL A461 with a minimum grade of C or BIOL A661 with a minimum grade of C or concurrent enrollment or MBIO A251 with a minimum grade of C.

BIOL A667 Wildlife Ecology **3 Credits**
Advanced course exploring the history and ecological principles underlying wildlife conservation and management, including key principles of population ecology, methods for estimating population size, survival, and recruitment, and their application to contemporary wildlife conservation and management topics in the face of uncertainty and habitat changes.
Special Note: Not available for credit to students who have completed BIOL A467.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A467

BIOL A669 Advanced Arctic Environmental Security **3 Credits**
Offers an introduction to a broad array of biological, ecological, political, economic, social and defense security issues that make the present day Arctic a focus of global interest, in the context of global climate change and the end of the Cold War. Graduate students will complete a publishable manuscript based on the course-based synthesis.

Special Note: Not available for credit to students who have completed BIOL A469.
May Be Stacked With: BIOL A469

BIOL A677 Advanced Tundra and Taiga Ecosystems **3 Credits**
In-depth analysis of tundra and taiga ecosystems with emphasis on system functions and dynamics. Comparisons with other terrestrial systems will be made, and unique characteristics will be emphasized.
Special Note: In addition to meeting all requirements for BIOL A477, graduate students will be required to research the literature on a current topic in tundra and taiga ecosystems, submit an extensive paper summarizing their findings including designs for future experiments on the subject, and give a seminar on the same topic. Not available for credit to students who have completed BIOL A477.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A477
Prerequisites: BIOL A271 with a minimum grade of D.

BIOL A678 Advanced Biological Oceanography **4 Credits**
Principles of biological oceanography with an emphasis on biological, chemical and physical processes in the world's oceans and linkages between biological ocean processes and carbon transport. Current literature on ocean processes will be reviewed with an emphasis on emerging areas of study.
Special Note: Not available for credit to students who have completed BIOL A478.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A478

BIOL A683 Advanced Exploration Ecology **2 Credits**
Explores principles and techniques used for study and collection of baseline ecological data in remote landscapes. Discusses survey and analytical resources and ecological project design. Focuses on developing and successfully synthesizing modern ecological field theory. Addresses advanced topics in exploratory research.
Special Note: Not available for credit to students who have completed BIOL A483.
Registration Restrictions: Graduate standing and instructor approval
May Be Stacked With: BIOL A483
Corequisites: BIOL A684.

BIOL A684 Experiential Learning: Advanced Exploration Ecology Field Study **4 Credits**
Explores principles and techniques used for study and collection of baseline ecological data in remote landscapes. Applies field survey and analytical resources to ecological project design and implementation. Addresses advanced topics in field-based exploratory research.
Special Note: Not available for credit to students who have completed BIOL A484.
May Be Stacked With: BIOL A484
Corequisites: BIOL A683.

BIOL A690 Advanced Lecture Topics in Biology **1-3 Credits**
Advanced coverage of a selected lecture topic in biology.
Special Note: May be repeated for a maximum of 12 credits with change in subtitle. May include additional requirements as outlined by the instructor. Not available for credit to students who have completed BIOL A490 having the same subtitle.
Registration Restrictions: Graduate standing
May Be Stacked With: BIOL A490

BIOL A698 Directed Research **1-6 Credits**
Thesis specific research for the MS in Biological Sciences thesis-based option. Topic for study to be approved and directed by a faculty member in the biological sciences.
Special Note: A maximum of 9 credits of BIOL A698 may apply toward the 30 credits required for the MS in Biological Sciences thesis-based option.
Registration Restrictions: Graduate standing and graduate advisor approval

BIOL A698A Non-thesis Capstone Project **1-6 Credits**
Planning, preparation and completion of non-thesis capstone project for the Non-thesis-based MS in Biological Sciences.
Special Note: No more than 6 credits of A698A can count towards the 30 credits required for graduation with non-thesis-based option in MS in Biological Sciences; however, more can be taken.
Registration Restrictions: Graduate standing and graduate advisor approval

BIOL A699 Thesis **1-6 Credits**
Planning, preparation and completion of thesis for the MS in Biological Sciences thesis-based option.
Special Note: A maximum of 3 credits of BIOL A699 may apply toward the 30 credits required for the MS in Biological Sciences thesis-based option.
Registration Restrictions: Graduate standing and graduate advisor approval