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 A075 Local Flora 1 Credit
The study of local plants with emphasis on identification and use.
Special Note: May be repeated for credit. May include preparation of pressed plant specimens and field trips. 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
Selected introductory biological concepts including the chemical basis of life, cell structure, energetics, physiology, genetics, biotechnology, evolution, ecology and scientific methodology. This course will provide the non-biologist with a working knowledge of life science that will be useful in making informed decisions on health and the environment.
Special Note: Primarily for non-science majors. Satisfies CAS B.S. degree requirements.
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 or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

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 A111 Human Anatomy and Physiology I 4 Credits
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.
Special Note: Does not apply for biology major credit. One three-hour lab per week.
May Be Stacked With: BIOL A113
Corequisites: BIOL A111L.
Attributes: UAA Natural Science w/ Lab GER.

BIOL A112 Human Anatomy and Physiology II 4 Credits
Integrated view of human structure and function. 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. One three-hour lab per week.
May Be Stacked With: BIOL A114
Prerequisites: BIOL A111 with a minimum grade of C.
Corequisites: BIOL A112L.
Attributes: UAA Natural Science w/ Lab GER.

BIOL A113 Lectures in Human Anatomy and Physiology I 3 Credits
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. Lecture only, no laboratory.
Registration Restrictions: Current Alaska registered nurse license and permission of both the Associate Dean of Nursing and the course instructor.
May Be Stacked With: BIOL A111

BIOL A114 Lectures in Human Anatomy and Physiology II 3 Credits
Integrated view of human structure and function. Continuation of Lectures in Human Anatomy and Physiology I. Covers endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems. Lecture only, no laboratory.
Registration Restrictions: Current Alaska registered nurse license and permission of both the Associate Dean of Nursing and the course instructor.
May Be Stacked With: BIOL A111

BIOL A112 Lectures in Human Anatomy and Physiology II 3 Credits
Integrated view of human structure and function. Continuation of Lectures in Human Anatomy and Physiology I. Covers endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems. Lecture only, no laboratory.
Registration Restrictions: Current Alaska registered nurse license and permission of both the Associate Dean of Nursing and the course instructor.
May Be Stacked With: BIOL A111

BIOL A114 Lectures in Human Anatomy and Physiology II 3 Credits
Integrated view of human structure and function. Continuation of Lectures in Human Anatomy and Physiology I. Covers endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems. Lecture only, no laboratory.
Registration Restrictions: Current Alaska registered nurse license and permission of both the Associate Dean of Nursing and the course instructor.
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Integrated view of human structure and function. Continuation of Lectures in Human Anatomy and Physiology I. Covers endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems. Lecture only, no laboratory.
Registration Restrictions: Current Alaska registered nurse license and permission of both the Associate Dean of Nursing and the course instructor.
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Registration Restrictions: Current Alaska registered nurse license and permission of both the Associate Dean of Nursing and the course instructor.
May Be Stacked With: BIOL A111

BIOL A112 Lectures in Human Anatomy and Physiology II 3 Credits
Integrated view of human structure and function. Continuation of Lectures in Human Anatomy and Physiology I. Covers endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary and reproductive systems. Lecture only, no laboratory.
Registration Restrictions: Current Alaska registered nurse license and permission of both the Associate Dean of Nursing and the course instructor.
May Be Stacked With: BIOL A111

BIOL A124 Biota of Alaska: Selected Topics 1-4 Credits
Explores characteristics of animals, plants, fungi and protists of Alaska. Can include life history, habitat, ecology and behavior.
Special Note: May include extensive hiking and camping. Can be repeated once with a change of subtitle for a maximum of 4 credits.
BIOL A141 Introduction to Medicine and the Health Professions 4 Credits
Provides students with skills to succeed at college and to proceed into medicine, nursing or another health profession. Includes modules in oral communication, written communication, medical terminology, how to succeed in college, biomedical ethics, microbiology, genetics, anatomy and physiology. Supplemented with guest lectures by medical faculty, nursing faculty and other health professionals, tours of medical and teaching facilities, and job-shadowing of doctors, nurses and other health professionals.
Registration Restrictions: Admission to the Alaska WWAMI biomedical program's Della Keats/UDoC program.

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 or concurrent enrollment or GEOL A178 or concurrent enrollment.
Attributes: UAA Natural Sci Lab Only GER.

BIOL A198 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 once for a maximum of 6 credits.
Registration Restrictions: Faculty permission required.

BIOL A200 Introduction to Complexity 3 Credits
An introduction to the science of complexity, currently used to predict system behavior in the physical, life, and social sciences.
Crosslisted With: CPLX A200.
Prerequisites: MATH A121 or MATH A151.
Attributes: UAA Natural Sciences GER.

BIOL A240 Introductory Microbiology for Health Sciences 4 Credits
General introductory 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. 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.
Registration Restrictions: Concurrent enrollment in BIOL A112 or 8 hours in biology or chemistry.
May Be Stacked With: BIOL A241
Corequisites: BIOL A240L.

BIOL A241 Lectures in Introductory Microbiology for Health Sciences 3 Credits
Lectures in introductory microbiology covering metabolism and genetics, virology, host parasite interactions, host defense mechanisms and epidemiology.
Special Note: BIOL A241 is the lecture part of BIOL A240 only; it does not have a lab session. Recommended for students who have previously received credit for a microbiology course and who need to update their understanding of health science-related microbiology and for associate and baccalaureate health science programs. Not open to students who have completed BIOL A240 or BIOL/MBIO A340 during the previous five years. Not accepted for Biology degree credit.
Registration Restrictions: 8 hours in biology or chemistry or concurrent enrollment in BIOL A112.
May Be Stacked With: BIOL A240

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 A316 Principles of Plant Physiology 3 Credits
Physiology of vascular plants: growth, development, photosynthesis, transpiration, uptake of water and nutrients, transportation of materials, and metabolism.
Prerequisites: Biol A242 with a minimum grade of C.

Biol A317 Experiential Learning: Plant Physiology 2 Credits
Focuses on cellular and system physiology of plants. Emphasizes laboratory investigations of vascular plants, in particular flowering plants.
Prerequisites: Biol A316 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 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 A332 Experiential Learning: Plant Biology 2 Credits
Laboratory and field applications in plant biology emphasizing relevant ecological questions and techniques, and the floristic diversity of Alaska.
Prerequisites: Biol A271 with a minimum grade of C and Biol A330 or concurrent enrollment.

Biol A365 Astrobiology 3 Credits
A comprehensive examination of the possibility of the existence of life (microbial and advanced) outside of the Earth, the probability of discovery of extraterrestrial life (methods of planet detection, chemical signatures of microbial life, and contact with advanced life), and the scientific and cultural implications of such a discovery. Includes the study of star and planet formation rates, habitability zones, origin of life, evolution, and formation of intelligence.
Registration Restrictions: Junior standing and completion of all GER Tier 1 (basic college-level skills) courses.
Crosslisted With: Astr A365
Prerequisites: Biol A108 and (Phys A123 or Phys A211).
Attributes: UAA Integrative Capstone GER.

Biol A406 Experiential Learning: Biostatistics 4 Credits
Covers design of biological experiments and explores and applies statistics to biological problems.
Prerequisites: Biol A271 with a minimum grade of C and Stat A253 with a minimum grade of C.

Biol A408 Experiential Learning: Scanning Electron Microscopy (SEM) 6 Credits
Combines theory and practice of scanning electron microscopy (SEM) with laboratory training in the practical operation of the SEM and ancillary equipment.
Registration Restrictions: Departmental approval
Prerequisites: Biol A242 with a minimum grade of C and Biol A252 with a minimum grade of C.

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.
Prerequisites: BIOL A310 with a minimum grade of C.

BIOL A414 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.
Prerequisites: (BIOL A111 with a minimum grade of C and BIOL A112 with a minimum grade of C) or BIOL A310 with a minimum grade of C.

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.

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 A310 with a minimum grade of C or (BIOL A111 with a minimum grade of C and BIOL A112 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 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 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 4 Credits
An introduction to 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 marine ecosystem.
Prerequisites: BIOL A271.

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 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 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 A453 Experiential Learning: Microbial Ecology 4 Credits
Theory and application of laboratory techniques in microbial ecology, diversity and evolution. Emphasizes experimental design, scientific writing and oral presentation skills.
Prerequisites: BIOL A342 with a minimum grade of C and BIOL A450 with a minimum grade of C or concurrent enrollment.

BIOL A455 Experiential Learning: Bioinformatics 4 Credits
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) 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
An introduction to nonlinear dynamics and chaos. Concrete examples from physics, biology, chemistry, and engineering are used to develop analytical methods and geometric intuition. 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 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.

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 A464 Metals in Biology 3 Credits
Investigates the fundamental roles of metals in biological systems. Includes transition metals, catalysis of reactions, cellular and organismal homeostasis, evolutionary and ecological relevance, deficiency and toxicity. Incorporates basic concepts of bioinorganic chemistry and structural biology.

**Registration Restrictions:** Junior or Senior standing

**Prerequisites:** CHEM A106 with a minimum grade of C and BIOL A242 with a minimum grade of C.

BIOL A465 Experiential Learning: Molecular Biology 4 Credits
A practical implementation of the theory learned in BIOL A461 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.

BIOL A466 Fish Ecology 3 Credits
A broad survey of fish habitats and the ecological processes that govern the performance of individuals, abundance and productivity of populations, and stricture of communities. Emphasizes Alaska's salmon populations.

**Prerequisites:** BIOL A271 with a minimum grade of C and BIOL A320 with a minimum grade of C.

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 A471 Immunology 3 Credits

**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.

**Prerequisites:** BIOL A271 with a minimum grade of C.

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.
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 A479 Physiological Plant Ecology 3 Credits
Analysis of interactions between plants and their environment. Deals with acquisition of resources, both energy and matter. Radiation interception and energy dissipation will be analyzed using energy balance equations. The nature of low and high temperature stress and adaptations to deal with these will be described.

May Be Stacked With: BIOL A679
Prerequisites: BIOL A271 and BIOL A316.

BIOL A480 Ecological and Conservation Genetics 3 Credits
Examines the primary focus and processes involved in shaping genetic variation in natural populations such as mutation, drift, selection, migration, recombination, mating patterns, population size and population subdivision. Discusses methods of measuring genetic variation in nature and experimental tests of important ideas in population genetics and microevolution theory.

Prerequisites: BIOL A252 with a minimum grade of C and BIOL A288 with a minimum grade of C.

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 trophodynamics.

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 A482 Spatial Ecology 3 Credits
Analyzes the physical and ecological nature of landscapes. Uses GIS tools to map and understand patterns in physical and biological properties such as migration of ungulates and birds; local, regional, continental and global patterns of precipitation chemistry; associations of societal practices; and spatial patterns in the water and carbon cycles.

Prerequisites: BIOL A271 with a minimum grade of C.

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.

Registration Restrictions: Instructor approval
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.

Registration Restrictions: Instructor approval

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 A489 Population Genetics and Evolutionary Processes 3 Credits
Examines the primary forces and processes involved in shaping genetic variation in natural populations. Evaluates and applies methods of measuring genetic variation in nature.

Registration Restrictions: Senior standing and completion of all GER Tier 1 (basic college-level skills) courses

Prerequisites: BIOL A252 with a minimum grade of C or BIOL A288 with a minimum grade of C.

Attributes: UAA Integrative Capstone GER.

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
Detailed coverage of 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: 16 credits in biology.

May Be Stacked With: BIOL A690L

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.
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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.

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 A610 Microscopic Anatomy 3 Credits
Lectures and laboratories in microscopic anatomy are designed to provide the principles and concepts of histology, to define the morphological characteristics of the cells, tissues and organs of the human body and to relate this information to functional processes studied in concurrent and subsequent courses.

Registration Restrictions: Admission to graduate program in Biology, and approval of WWAMI Biomedical Program Director and faculty.

Crosslisted With: BIOM A610

BIOL A611 Gross Anatomy I and Embryology 5 Credits
Provides a broad understanding of the structural organization of the human body, as well as a basis in medical terminology. Goal is to provide foundation for physical examination and function assessment of the human organism. Course deals with organization of the human body at the macroscopic level. Integrates embryological development with study of the human cadaver and with examination of the normal living body. Course concentrates on study of the human torso and its cavities and the viscera they contain.

Registration Restrictions: Admission to graduate program in Biology and approval of WWAMI program director and faculty.

Crosslisted With: BIOM A611

BIOL A612 Mechanisms in Cell Physiology 4 Credits
Fundamental cellular events underlying the following topics: physiology of the cell membrane including ionic and electrical potential gradients, active transport, excitability and action potentials; biophysics of sensory receptors; neuromuscular transmission; muscle energetics and contractility; spinal reflexes and central synaptic transmission; autonomic nervous system; energy metabolism and temperature regulation; epithelial transport; gastrointestinal motility and secretions.

Registration Restrictions: Admission to a graduate program in Biology, and approval of WWAMI Biomedical Program Director and faculty.

Crosslisted With: BIOM A612

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 A621 Microbiology and Infectious Disease I 5 Credits
Registration Restrictions: Admission to graduate program in Biology and approval of WWAMI Biomedical Program Director and faculty.
Crosslisted With: BIOM A621

BIOL A623 Introduction to Immunology 2 Credits
Introduces basic immunological concepts and the role of these basic concepts in conditions such as immunodeficiencies, hypersensitivities, autoimmunity, blood transfusion, and transplantation.
Registration Restrictions: Admission to graduate program in Biology, and approval of WWAMI Biomedical Program Director and faculty.
Crosslisted With: BIOM A623

BIOL A631 Gross Anatomy II (Head, Neck, Ear, Nose, and Throat) 4 Credits
Gross anatomy of the skull, larynx, and pharynx. Also covers: audition and balance; physiology; clinical evaluation; maxillofacial disorders; diseases of nasal passages; naso- and oropharynx; accessory sinuses; and physical examination.
Registration Restrictions: Admission to graduate program in Biology, and approval of WWAMI Biomedical Program Director and faculty.
Crosslisted With: BIOM A631

BIOL A632 Nervous System 5 Credits
Integrated approach to the normal structure and function of the nervous system, including the eye. Neuropathological examples are presented as well as clinical manifestations of neurological disease.
Registration Restrictions: Admission to graduate program in Biology, and approval of WWAMI Biomedical Program Director and faculty.
Crosslisted With: BIOM A632

BIOL A634 Microbiology and Infectious Disease II 3 Credits
Continuation of BIOL A621/BIOM A621.
Registration Restrictions: Admission to graduate program in Biology, and approval of WWAMI Biomedical Program Director and faculty.
Crosslisted With: BIOM A634

BIOL A653 Gross Anatomy III: Musculoskeletal System 3 Credits
Gross, surface, applied and X-ray anatomy of musculoskeletal system including the spine, but excluding head and neck. Also covers histology of bone, cartilage, tendon-myotendinal junction and joints; musculoskeletal trauma and healing; pathology and clinical manifestations of other degenerative, inflammatory, metabolic, nutritional and congenital disorders; and physical examinations.
Registration Restrictions: Admission to graduate program in Biology, and approval of WWAMI Biomedical Program Director and faculty.
Crosslisted With: BIOM A653

BIOL A655 Experiential Learning: Advanced Bioinformatics 4 Credits
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.

BIOL A665 Experiential Learning: Advanced Molecular Biology 4 Credits
A practical implementation of the theory learned in BIOL A661, 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 mentorship and leadership skills.
Special Note: Not available for credit to students who have completed BIOL A465.
Registration Restrictions: Graduate standing
Prerequisites: BIOL A461 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 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.

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 A679 Advanced Physiological Plant Ecology 3 Credits
In-depth analyses of interactions between plants and their environment. Deals with acquisition of resources, both energy and matter. Radiation interception and energy dissipation will be analyzed using energy balance equations. The nature of low and high temperature stress and adaptations to deal with these will be described.
**Special Note:** In addition to meeting all requirements for BIOL A479, graduate students will be required to research the literature on a current topic in ecological plant physiology, submit an extensive paper summarizing their findings including designs for future experiments and give a seminar on the same subject. Not available for credit to students who have completed BIOL A479.
**Registration Restrictions:** Graduate standing

**May Be Stacked With:** BIOL A479

Prerequisites: BIOL A271 and BIOL A316.

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. Prerequisites and corequisites may vary with topic. In addition to meeting all requirements for BIOL A490L, graduate students will be required to research the literature and/or conduct a research project on an advanced topic in 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 A490L having the same subtitle.
**Registration Restrictions:** Graduate standing

**May Be Stacked With:** BIOL A490

BIOL A690L Advanced Laboratory Topics in Biology 1-3 Credits
Advanced coverage of 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. In addition to meeting all requirements for BIOL A490L, graduate students will be required to research the literature and/or conduct a research project on an advanced topic in 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 A490L having the same subtitle.
**Registration Restrictions:** Graduate standing

**May Be Stacked With:** BIOL A490L

BIOL A692 Graduate Seminar 1 Credit
Topical subjects in biology presented by graduate students, biology faculty, and guest speakers.
**Special Note:** May be repeated for a maximum of 2 credits.

**Registration Restrictions:** Graduate standing

BIOL A696 Graduate Research Techniques 1 Credit
Training in data collection, analysis, presentation, and synthesis techniques, as appropriate to the field of biological research into which the graduate student has entered.
**Special Note:** May be repeated for a maximum of 6 credits.

**Registration Restrictions:** Graduate standing

BIOL A698 Directed Research 1-6 Credits
Thesis specific research for the MS in Biological Sciences. Topic for study to be approved and directed by a faculty member in the biological sciences.
**Special Note:** May be repeated for a maximum of 12 credits in combination with BIOL A699; total for both courses not to exceed 12 credits toward MS degree.

**Registration Restrictions:** Graduate standing; permission of graduate advisor.

BIOL A699 Thesis 1-6 Credits
Planning, preparation and completion of thesis for the MS in Biological Sciences.
**Special Note:** May be repeated for a maximum of 12 credits in combination with BIOL A698; total for both courses not to exceed 12 credits toward MS degree.

**Registration Restrictions:** Graduate standing; permission of graduate advisor.