BIOLOGY (BIOL)

BIOL 500 INDEPENDENT STUDY OR RESEARCH1-3 Credits
Designed to permit individual students to participate in a progressively more complex series of investigations and independent studies in biology at the graduate level.
Add Consent: Instructor Consent
Requirements: Permission of instructor, Dean of Graduate Studies, and Academic Vice President.

BIOL 501 ORNITHOLOGY2 Credits
Biology of birds, including their classification, anatomy, physiology, life history, behavior, ecology, and identification with emphasis on local species.
Co-requisites: BIOL 501L
Dual-listed: BIOL 401

BIOL 501L ORNITHOLOGY LABORATORY1 Credit
Laboratory and field experience in anatomy, behavior, and identification of birds.
Co-requisites: BIOL 501

BIOL 527 BIOLOGY OF POPULATIONS3 Credits
Population ecology and the genetic processes of adaptation and evolution. Lecture and class discussions of current and historical literature, plus application of concepts in a literature review paper.
Prerequisites: BIOL 332, BIOL 336, and BIOL 336L
Dual-listed: BIOL 427

BIOL 529 AQUATIC MICROBIOLOGY3 Credits
The detection and study of bacteria in streams, lakes, wells, etc. and a basic review of water-borne viruses that are of public health significance. Oral and written presentations.
Prerequisites: BIOL 241 and BIOL 241L
Dual-listed: BIOL 429

BIOL 531 ENTOMOLOGY2 Credits
Taxonomy, morphology, physiology, life history, behavior, ecology and economic importance of insects. Lecture, lab and field trips.
Prerequisites: BIOL 139, BIOL 139L, BIOL 239, and BIOL 239L
Co-requisites: BIOL 531L
Dual-listed: BIOL 431

BIOL 531L ENTOMOLOGY LABORATORY1 Credit
Laboratory and field experience in insect morphology and taxonomy. A student insect collection project is required. Field trips required.
Prerequisites: BIOL 139, BIOL 139L, BIOL 239, and BIOL 239L
Co-requisites: BIOL 531
Dual-listed: BIOL 431L

BIOL 532 DEVELOPMENTAL BIOLOGY2 Credits
Molecular and cellular aspects of development, including the regulation and expression of the genome during development, fertilization, cleavage, gastrulation, morphogenesis and organogenesis.
Prerequisites: BIOL 332
Co-requisites: BIOL 532L
Dual-listed: BIOL 532L

BIOL 532L DEVELOPMENTAL BIOL LABORATORY1 Credit
Laboratory experience in vertebrate embryology and morphological development.
Co-requisites: BIOL 532

BIOL 533 HUMAN BIOMECHANICS2 Credits
Utilization of anatomy, physiology and physics in the study of human movement. Emphasis on biomechanics, control and integration of muscle groups in maintaining posture and producing complicated movements, bioenergetics, adaptation of the body to stress and exercise, and training regimens.
Prerequisites: BIOL 342, BIOL 342L, PHYS 241, and PHYS 241L
Co-requisites: BIOL 533L
Dual-listed: BIOL 433

BIOL 533L HUMAN BIOMECHANICS LABORATORY1 Credit
Laboratory experience in human movement. Technology and donor bodies will be used.
Co-requisites: BIOL 533

BIOL 535 MAMMALOGY2 Credits
The systematics, life history, physiology and behavior of mammals. Field trips may be required.
Cross-Listed: AGRI545/BIOL535
Co-requisites: BIOL 535L
Dual-listed: BIOL 435

BIOL 535L MAMMALOGY LABORATORY1 Credit
Laboratory experience in mammal structure and function.
Cross-Listed: AGRI545L/BIOL535L
Co-requisites: BIOL 535

BIOL 536A MICROSCOPY THEORY1 Credit
Microscopic principles and techniques focusing on the use of microscopes in scientific inquiry and diagnosis. Includes light and optic theory, specimen preparation, image collection and interpretation and types of research microscopes.
Cross-Listed: BIOL536A/GEOS526A
Prerequisites: Twelve (12) hours of lower-level Biology or Geoscience courses
Dual-listed: BIOL 436A

BIOL 536B INTRODUCTION TO SCIENTIFIC RESEARCH2 Credits
Scientific research methodology, including development of testable hypotheses, research design, data analysis introduction, grant proposal writing, and writing research papers.
Cross-Listed: BIOL536B/GEOS526B
Prerequisites: Twelve (12) hours of lower-level Biology or Geoscience courses
Dual-listed: BIOL 436B

BIOL 538 TAXONOMY OF PLANTS2 Credits
Applied taxonomy of vascular plants, with emphasis on families of flowering plants in the northern Great Plains.
Prerequisites: BIOL 138 and BIOL 138L
Co-requisites: BIOL 538L
Dual-listed: BIOL 438

BIOL 538L TAXONOMY OF PLANTS LABORATORY1 Credit
Laboratory experience in collecting, identifying and preparing vascular plant specimens, with emphasis on family recognition. A student plant collection project is required.
Prerequisites: BIOL 138 and BIOL 138L
Co-requisites: BIOL 538
Dual-listed: BIOL 438L

BIOL 539 PLANT PHYSIOLOGY2 Credits
Physiological and developmental processes occurring in cells, tissues and organs of plants. Emphasis on hormonal, environmental and other control mechanisms of plant behavior and development.
Prerequisites: BIOL 138 or AGRI 141 and CHEM 131 or CHEM 140
Co-requisites: BIOL 539L
Dual-listed: BIOL 436

BIOL 539L PLANT PHYSIOLOGY LABORATORY1 Credit
Laboratory experience in plant structure and function, with an emphasis on applied plant biochemistry.
Co-requisites: BIOL 539

BIOL 540 TOPICS IN BIOLOGY1-3 Credits
Designed to meet the needs of students desiring knowledge in an area of biology not covered in another biology course. Study topics and credit will be arranged to meet the needs of the students.
Notes: Can be repeated, with a change in emphasis, for a total of six (6) course credits.

BIOL 544 FRESHWATER ECOLOGY2 Credits
Biological, chemical, and physical studies of inland surface waters. Includes both classic Limnology and Ichthyology.
Cross-Listed: BIOL544/GEOS544
Prerequisites: BIOL 336 and BIOL 336L
Co-requisites: BIOL 544L or GEOS 544L
Dual-listed: BIOL 444
Requirements: Field trips required

BIOL 544L FRESHWATER ECOLOGY LABORATORY1 Credit
Laboratory and field experience in biological, chemical, and physical studies of inland surface waters. Includes both classic Limnology and Ichthyology.
Cross-Listed: BIOL544L/GEOS544L
Co-requisites: BIOL 544

BIOL 546 REGIONAL FLORA3 Credits
The study of plants and plant communities of the region. Workshop format for majors and non-majors. Requirements: Field trips.
Dual-listed: BIOL 446

BIOL 547 PHYLOGENY OF PLANTS1 Credit
The phylogenetic treatment of land plants, living and extinct.
Prerequisites: BIOL 138 and BIOL 138L or AGRI 141 and BIOL 336
Co-requisites: BIOL 547L
Dual-listed: BIOL 447

BIOL 547L PHYLOGENY OF PLANTS LABORATORY2 Credits
Survey of land plant groups with emphasis on the taxonomy and ecology of bryophytes. Field trips required.
Prerequisites: BIOL 138 and BIOL 138L or AGRI 141 and BIOL 336
Co-requisites: BIOL 547
Dual-listed: BIOL 447L

BIOL 548 ETHNOBOTANY3 Credits
Plants useful or harmful to man, their origins and history, botanical relationships, chemical constituents which make them economically important, roles in prehistoric and modern cultures and civilizations, and the potential of the plant kingdom for new economically-important species.
Co-requisites: BIOL 548L
Dual-listed: BIOL 448

BIOL 549 MOLECULAR BIOLOGY OF THE CELL3 Credits
An in-depth analysis of eukaryotic cellular biology, including cell-cell communication, signal transduction, apoptosis, control of cell cycle, and other advanced topics (cancer, gene therapy, prokaryotic cells, viruses).
Prerequisites: BIOL 332 and BIOL 332L
Co-requisites: BIOL 549L
Dual-listed: BIOL 449

BIOL 550 FIELD LIMNOLOGY3 Credits
Lecture and field methods for studying the biological, chemical and physical processes in lakes and streams. Note: Includes an extended field trip to Yellowstone National Park or other areas.
Dual-listed: BIOL 450
Requirements: Additional fees; early registration is required and one year of college-level science.

BIOL 556 PATHOGENIC MICROBIOLOGY2 Credits
Major, communicable diseases of humans caused by bacteria, fungi, and viruses. Global and regional impact, host-parasite relationships, morphology and physiology, diagnostic techniques used in isolation and identification, treatment, prevention, and modes of transmission are discussed.
Prerequisites: BIOL 341 and BIOL 341L
Co-requisites: BIOL 556L
Dual-listed: BIOL 456

BIOL 556L PATHOGENIC MICROBIOLOGY LABORATORY1 Credit
Laboratory experience in isolation and clinical identification of pathogenic microbes.
Prerequisites: BIOL 341 and BIOL 341L
Co-requisites: BIOL 556

BIOL 560 FIELD EXPERIENCE IN BIOLOGY1-6 Credits
A one to five-week course, offered between fall and spring semesters, or during spring break. One (1) credit earned per 45 hours of full-time study. Itinerary for each class will be announced several weeks prior to registration.
Requirements: Additional fees and early registration.

BIOL 600 INDEPENDENT STUDY OR RESEARCH1-3 Credits
Designed to permit individual students to participate in a progressively more complex series of investigations and independent studies in biology at the graduate level.
Add Consent: Instructor Consent
Requirements: Permission of instructor, Dean of Graduate Studies, and Academic Vice President.

BIOL 612 ADVANCED BIOTECHNOLOGY3 Credits
Independent research project, utilizing current biotechnology and molecular biology techniques. Project will be developed with assistance from the faculty member. Integration with undergraduate teaching will be a component of the research completed. Learning communities will be established with the students in BIOL 314.
Cross-Listed: BIOL612/CHEM612
Prerequisites: BIOL 332

BIOL 620 ETHOLOGY3 Credits
A study of animal behavior, particularly under natural conditions. Consideration will be given to the three different experimental approaches to the study of animal behavior; comparative psychology, ethology, and sociobiology. Considerable time will be spent on making observations and analyzing the behaviors of selected invertebrate and vertebrate animals.

BIOL 630 TOPICS IN BIOLOGY1-3 Credits
Meets special needs of individual students or groups, and is offered when demand can be demonstrated.

BIOL 632 TOPICS IN ADVANCED HUMAN BIOLOGY1-3 Credits
Designed to meet the needs of different groups of people desiring advanced work in gross and living anatomy, physiology, embryology, histology, and neurobiology. Study topics and credit will be arranged to meet the needs of the students.
Notes: Can be repeated, with a change in emphasis, for a total of twelve (12) hours of credit.

BIOL 638 SYSTEMATICS OF PLANTS3 Credits
The principles of taxonomy and the identification and classification of plants. Considerable time will be spent on a survey on representative flowering plant families, hybridization and evolution of plant groups.

BIOL 639 PLANT ANATOMY AND MORPHOLOGY3 Credits
Origin and structure of plant cell types, tissues, and organs along with a survey of the plant world illustrated by specific examples from both living and fossil plants.

BIOL 655 SCHOLARLY PROJECT1-3 Credits
For students selecting Plan II, as listed under Program Requirements. Scholarly project pertaining to a field of specialization. Designed in consultation with the student's graduate committee and includes an extensive paper summarizing the project.
Requirements: Must complete three (3) course credits.

BIOL 658 EVOLUTIONARY SYNTHESIS3 Credits
Study of the fundamental theory of evolution, including phylogeny and earth history, macroevolutionary patterns, microevolutionary processes, and synthesis. Student will conduct a literature research project and engage in teaching concepts. Learning communities will be established with students in BIOL 458.
Prerequisites: BIOL 332 and BIOL 332L
Dual-listed: BIOL 458

BIOL 660 THESIS1-6 Credits
For students selecting Plan I, as listed under Program Requirements. Original investigations in science leading to the master's thesis.
Requirements: Must complete six (6) course credits; prior to registration, the proposal must be approved by the student's committee and Dean of Graduate Studies.

BIOL 690 INTERNSHIP IN BIOLOGY1-3 Credits
Provides practical experience as a biologist in government, business, or industry. Interested students should contact the Career and Academic Planning Services office to secure application materials. The amount of credit will be based on the availability of a suitable work position, the qualifications of the applicant and the work hours required.
Add Consent: Department Consent
Notes: Credits cannot be counted in the basic 36 course credits for a Master's degree; application should be made prior to the semester in which the internship will be started.
Requirements: Students must first complete a minimum of 18 course credits in their degree program.