BIOE - Biology-Ecological

BIOE 103CS. Environmental Science and Society. 3 Credits. (3 Lec) F
The relationship between people and the environment using the earth as an ecosystem to show the effects of people’s activities on natural ecosystems. Environmental issues such as wilderness, wolf reintroduction, global warming, fire ecology, whirling disease, and grizzlies are covered.

BIOE 290R. Undergraduate Research. 1-3 Credits. (1-3 Ind; max unlimited) On Demand
PREREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis.

BIOE 291. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
Max. 12 crden prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

BIOE 292. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max) On Demand
PREREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis.

BIOE 370. General Ecology (equiv to 270). 3 Credits. (3 Lec) S
PREREQUISITE: BIOE 170IN; M 121Q or M 161Q or M 171Q; Recommended: STAT 216Q or BIOE 318. Relation of organisms to their environment. The composition, structure, function and distribution of populations, communities, and ecosystems. Emphasis on population ecology, including demography, population dynamics and evolutionary ecology.

BIOE 375. Ecological Responses to Climate Change. 3 Credits. (3 Lec) S
PREREQUISITE: BIOE 160, and BIOE 170IN, and BIOE 370 or NRSM 240. Students explore how ecosystems are responding to climate changes at a range of spatial and temporal scales. Case studies include changes in vegetation and soils, plant and animal phenology, and disease outbreaks.

BIOE 405. Behavioral and Evolutionary Ecology. 3 Credits. (3 Lec) S
PREREQUISITE: BIOE 370. Abundance and distribution of organisms in relation to their evolution, behavior, population biology and interactions with other organisms.

BIOE 408. Rocky Mountain Vegetation. 2 Credits. (1 Lec, 1 Lab) F
PREREQUISITE: Junior or senior status in biological sciences and consent of instructor. Field identification of major Rocky Mountain ecosystem types; the composition, structure and function of climax and alternate communities; their environments, geography and history; and discussion of management alternatives. Includes introduction to field methods, statistical evaluations, remote sensing, and library use.

BIOE 416. Alpine Ecology. 3 Credits. (1 Lec, 2 Lab) Su
PREREQUISITE: Junior standing, BIOE 170IN. The ecology characteristics of alpine areas. A three-day field trip will confirm and reinforce material presented in class and is a course requirement.

BIOE 420. Field Ornithology. 3 Credits. (3 Lab) S
PREREQUISITE: Junior standing, and either BIOE 100IN or BIOE 170IN. Field identification, habitat affinities and life histories of birds of the northern Rockies. Includes early morning field trips.

BIOE 421. Yellowstone Wildlife Ecology. 3 Credits. (2 Lec, 1 Lab) Su
PREREQUISITE: Junior standing, and either BIOE 100IN or BIOE 170IN. Basic ecology of the major animal species of the Yellowstone area and the ecological controversies surrounding their management.

BIOE 422. Insect Ecology. 3 Credits. (3 Lec) S

BIOE 424. Ecology of Fungi. 3 Credits. (2 Lec, 1 Lab) F alternate years, to be offered odd years.
PREREQUISITE: BIOE 170IN; BIOE 256, a comparable course in introductory biology, or consent of instructor. COREQUISITE: None, but an upper division biology course is recommended. This course emphasizes the importance and varied roles of the higher fungi in natural and managed systems, focusing on forest habitats. Fungi are the ecological backbone of many terrestrial systems, yet their ecological roles as saprophytes, symbionts, and mycorrhizal mutualists are often minimized. Both traditional techniques and more recent molecular methods will be presented at the individual, population, community, landscape, and biome levels, along with topics on fungal conservation and global change. This course consists of twice weekly sessions of two hours each for lecture, discussions, and demonstrations. One or two afternoon or morning field trips to nearby forests are required to initiate a final project.

BIOE 427R. Research in Freshwater Ecology. 3 Credits. (1 Lec, 2 Lab) F
PREREQUISITE: Prior or concurrent registration in BIOE 428. Optional laboratory for BIOE 428. Introduction to representative freshwater habitats, communities, organisms, and sampling methods through laboratory and field exercises and classroom discussions. Formal written reports are required after completed exercises.

BIOE 427RN. Research in Freshwater Ecology. 3 Credits. (1 Lec, 2 Lab) F
PREREQUISITE: Prior or concurrent registration in BIOE 428RN. Optional laboratory for BIOE 428RN. Introduction to representative freshwater habitats, communities, organisms, and sampling methods through laboratory and field exercises and classroom discussions. Formal written reports are required after completed exercises.

BIOE 428. Freshwater Ecology. 3 Credits. (3 Lec) F
PREREQUISITE: BIOE 370 or consent of instructor. This course examines relationships between freshwater organisms and their environment. Students learn about the ecology of rivers, lakes, reservoirs, and wetlands, with exposure to a wide diversity of organisms and processes. Emphasis is placed on linking basic concepts and real-world applications.

BIOE 439. Stream Ecology. 3 Credits. (2 Lec, 1 Lab) F
PREREQUISITE: BIOE 170, CHMY 121 or CHMY 141, and PHSX 205. Examination of the structure and function of stream ecosystems emphasizing connections among stream organisms, the aquatic chemical and physical environment, and the surrounding terrestrial landscape.

BIOE 440R. Conservation Biology. 3 Credits. (3 Lec) F
PREREQUISITE: BIOE 370, STAT 216Q and STAT 217. Examines issues relevant to conservation of wild populations, focusing primarily on animals. Emphasis is on approaches that use demography, population biology and genetics to address conservation questions. Readings are from the primary literature, rather than a textbook, including case studies. Cross-listed with BIOE 521.

BIOE 445. Macrosystems ecology: Linking plants, animals, and ecosystems across scales. 3 Credits. (3 Lec) S
PREREQUISITE: BIOE 370 Advanced ecology designed to help students “put the pieces together” and understand how plants, animals, and ecosystems interact. These interactions are examined across biomes of the world to better understand general principles and to derive effective local management strategies.

BIOE 455. Plant Ecology. 3 Credits. (3 Lec) S
PREREQUISITE: BIOE 170IN and BIOE 370 or NRSM 240. Principles of plant ecology, covering plant-environment relations, plant life histories, plant species interactions, plant community concepts, succession, and the role of plants in ecosystem processes.

BIOE 490R. Undergraduate Research. 1-6 Credits. (1-6 Lec; 12 cr max) F,S,Su
Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. Maximum of 6 credits as electives in Organismal Biology Option.

BIOE 491. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
Max. 12 crden prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

BIOE 492. Independent Study. 1-3 Credits. (1-3 Ind; 3 cr max) On Demand
PREREQUISITE: Junior standing, consent of instructor and approval of department head. Maximum of 6 as electives in Organismal Biology Option. Directed research and study on an individual basis.

BIOE 494. Seminar/Workshop. 1 Credit. (1 Sem; 4 cr max) F,S
Directed undergraduate research may which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. Maximum of 6 credits as electives in Organismal Biology Option.

BIOE 499. Senior Thesis/Capstone. 2 Credits. (2 Sem) F,S
PREREQUISITE: Senior standing in Ecology Department, and prior or concurrent registration in BIOE 420. Senior capstone course. Discussion of topics that integrate evolutionary theory with ecology, genetics, medicine, behavior, or other subjects that are part of the biology curriculum.

BIOE 513. Terrestrial Ecology of Plains and Prairies. 1 Credit. (1 Rct) Su
PREREQUISITE: Either BIOE 408 or BIOL 516, graduate standing, secondary teacher certification, two years teaching experience, and computer access. COREQUISITE: Suggested: ESCI 513. Students will develop plant keys for classroom use, quantitatively analyze two grassland communities, and develop classroom activities on ecology of grasslands. Distance learning, class offered by internet connection. This course is designed for secondary school teachers enrolled in MSSE program and cannot be used in graduate programs in Biological Sciences.
BIOE 514. Ecological Modeling. 3 Credits. (3 Lec) F alternate even years PREREQUISITE: BIOE 370. Interactions and feedbacks between vegetation, disturbance, and climate will be explored using biogeochemistry and biogeochemical models. Theory and computational techniques in ecological modeling.

BIOE 515. Landscape Ecol & Mgmt. 4 Credits. (2 Lec, 2 Lab) F alternate years, to be offered odd years. PREREQUISITE: Graduate standing or consent of instructor. Principles on landscape pattern, change, and function. Application of theory to conservation including population viability, reserve design, multiple-use landscapes. Lab introduces GIS, GPS, and simulation models. For graduate students and motivated undergraduates.

BIOE 517. Advances in Ecological Modeling. 3 Credits. (3 Lec) S PREREQUISITE: BIOE 513. Advancements in numerical modelling of disturbance, demography, and ecophysiology will be introduced with lectures and applied computational examples.

BIOE 519. Riparian Zones/Wetlands. 2 Credits. (2 Rct) Su PREREQUISITE: Either BIOL 516 or BIOE 408, secondary teacher certification, two years teaching experience, and computer access. COREQUISITE: Suggested: ESCI 512, ESCI 515. Students will develop plant keys for classroom use, quantitatively analyze two riparian and two wetland areas, and develop classroom activities about ecology of those areas. Distance learning class offered by internet connection. This course is designed for secondary school teachers enrolled in the MSSE program and cannot be used in graduate programs in Biological Sciences.

BIOE 520. Animal Biodiversity in GYE. 2 Credits. (1 Lec, 1 Lab) Su PREREQUISITE: BIOE 370, F&WL 301, BIOE 405, or equivalent and (a) 2 years science technology experience or (b) enrolled in MSSE. Exploration of biodiversity's meaning, importance & determinants; key ecological features of the Greater Yellowstone Ecosystem and patterns of change in those features; & possible strategies for maintaining biodiversity in the Greater Yellowstone Ecosystem.

BIOE 521. Conservation Biology. 3 Credits. (3 Lec) F PREREQUISITE: BIOE 370, BIOB 420, BIOB 420, STAT 216Q and STAT 217Q, or equivalents. RECOMMENDED: STAT 411 A broad survey of conservation biology, emphasizing approaches related to demography/population dynamics and evolution. Less extensively considers approaches related to community/ecosystem/landscape ecology. Approaches include empirical field studies, mathematical models, using R for modeling and empirical analysis, reading primary literature, writing a research paper and presenting a research talk. Cross-listed with BIOE 440.

BIOE 522. Birds of Prey. 2 Credits. (1 Lec, 1 Lab) Su PREREQUISITE: BIOE 370, WILD 301, BIOE 405, or equivalent and 2 years science technology experience or enrolled in MSSE. Exploration of the ecology and habitat of avian raptores in the Greater Yellowstone Ecosystem (GYE). Application of the scientific method to the study of raptors. Field identification of raptors, investigation of species life histories, and inquiry methods of species-specific habitat needs. Student will develop methods and skills for classroom based research on wildlife. This course is designed for secondary school teachers enrolled in the MSSE program and cannot be used in graduate programs in Biological Sciences.

BIOE 523. Wildlife Ecology. 2 Credits. (2 Lec) Su PREREQUISITE: BIOE 370, WILD 301, BIOE 405, or equivalent and 2 years science technology experience or enrolled in MSSE. Introduction to wildlife species and the range of habitats present in the Northern Rocky Mountain ecosystems. Emphasis on large carnivores and ungulates within montane terrestrial systems. Application of the scientific method to study interactions between predators, prey, and human impacts. This course is designed for middle and high school teachers and cannot be used in graduate programs in Biological Sciences.

BIOE 524. Frontiers in Landscape Ecology. 3 Credits. (2 Lec, 1 Lab) F alternate years, to be offered even years. PREREQUISITE: BIOE 370 or the equivalent. Students and instructors will write a scientific paper for publication that synthesizes an important question in landscape ecology. Students will select the topic, review and synthesize current knowledge on the topic, and write a scientific manuscript.

BIOE 532. Physiological Plant Ecol. 3 Credits. (3 Lec) F alternate years, to be offered odd years. PREREQUISITE: BIOE 370. Outlines the plant's Hutchinsonian niche through review of energy, material (water, nutrients and toxins) and mechanical (including animal) factors. Computer modeling of plant function in the environment is discussed.

BIOE 534. Vegetation Ecology. 3 Credits. (3 Lec) F offered in alternate spring semesters in odd numbered years PREREQUISITE: BIOE 370. Considers the composition, structure, function, distribution in time and space, ecology and classification of communities. Emphasizes universal methods, current studies and Rocky Mountain systems. Complementary field experience is available in BIOE 408.

BIOE 540. Analysis of Ecological Communities. 3 Credits. (1 Lec, 2 Lab) S alternate even years. Multivariate statistical analysis of data from terrestrial or aquatic, plant or animal communities. Classification, ordination, and predictive modeling of species and communities, emphasizing a hands-on approach and practical problem solving in community ecology.

BIOE 542. Community Ecology. 3 Credits. (3 Lec) S alternate years, to be offered odd years. PREREQUISITE: At least one undergraduate or graduate course in each of the following: ecology (e.g., M 171Q and statistics (e.g., STAT 216Q) or consent of instructor. Focuses on the origin, maintenance, and consequences of biological diversity within local communities by examining studies of natural patterns, explorations of mathematical models and direct experimentation. The complexities of species interactions are explored in multi species assemblages.

BIOE 548. Conservation Genetics. 3 Credits. (3 Lec) F PREREQUISITE: BIOE 375, STAT 216Q and STAT 217Q. Introduction to the application of genetics for the conservation of plant and animal populations. Emphasis will be placed on case studies from the primary literature and analyzing genetic data using mathematical models developed in class. Cross-listed with BIOE 480.

BIOE 554. Foundations of Ecology & Mgmt. 1 Credit. (1 Rct) F This course explores the origin, maturation, and application of core principles in ecology. Students gain an appreciation for the scope of ecology, how theory and application are linked, and how big ideas in ecology have matured (or not) over time.

BIOE 555. Communication in Ecol Sciences. 1 Credit. (1 Sem) S PREREQUISITES: Graduate standing - consent of instructor. This course will require students to gain experience presenting scientific information in a variety of communication methods.

BIOE 575. Professional Paper and Project. 1-4 Credits. (1 Ind; 4 cr max) F,S,Su Graduate standing and committee approval and consent of instructor. A research or professional paper or project dealing with a topic in the field. The topic must be mutually agreed upon by the student and his or her major advisor and graduate committee.

BIOE 590. Master's Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su PREREQUISITE: Master's standing.

BIOE 591. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BIOE 592. Independent Study. 1-3 Credits. (1 Ind; 6 cr max) On Demand PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies. Directed research and study on an individual basis.

BIOE 594. Seminar. 1 Credit. (1 Sem; 4 cr max) On Demand PREREQUISITE: Graduate standing or seniors by petition and course prerequisites as determined for each offering. Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

BIOE 598. Internship. 2-12 Credits. (2-12 Ind; 12 cr max) On Demand PREREQUISITE: Graduate standing, consent of instructor and approval of department head. An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

BIOE 600. Doctoral Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su PREREQUISITE: Doctoral standing.