Fall 2020 Course Descriptions as of 04/05/2020 08:11 PM

Information in Browse Course Catalog is subject to change. Information is term specific. Please refer to the appropriate term when searching for course content. Key to Course Descriptions may be found at: **http://rcs.registrar.arizona.edu/course_descriptions_key**.

Ecology & Evolutionary Biology (ECOL)

ECOL 170C1: Animal Sexual Behavior (3 units)
Description: This course will examine ideas of how sexual reproduction came about and the consequences the origin of sex has had on biological diversity. We will explore the diversity of animal courtship and mating behaviors using readings, group discussions, library research, writing, and class presentations, and we will conduct behavioral investigations in the lab.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Discussion — May Be Offered
Lecture — Required
Course typically offered:
Main Campus: Spring, Summer

Enrollment requirement: Enrollment not allowed if you have previously taken NATS 104 "Animal Sexual Behavior" (Top 1), "Human Var In Mod World" (Top 4), "Life on Earth' (Top 5) or 'Views of Life" (Top 8).
General Education: NATS 104

ECOL 170C2: The Diversity of Life (3 units)
Description: Students will learn the major groups of living organisms (including bacteria, archaeans, protists, fungi, plants, and animals); their basic morphology, ecology, and diversity; and the evolutionary relationships among these groups (the Tree of Life). Students will also learn about the evolutionary and ecological processes that have generated this diversity, and how human activities are threatening this diversity (and what we can do about it).
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture — Required
Course typically offered:
Main Campus: Spring

Field trip: Field trips will be optional and will require students to transport themselves to and from the location. There will be an on-campus field trip option, likely at UA Natural History Collections.
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 170C3: Marine Biology (3 units)
Description: In this course students will discover the beauty and wonder of marine life, explore the evolution and diversity of marine organisms and habitats, and consider threats presented to the marine habitat by human impacts such as over-fishing and climate change.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory — Required
Lecture — Required
Course typically offered:
Main Campus: Fall

ECOL 182L: Introductory Biology II Lab (1 unit)
Description: Diversity and evolution of life; structure and function of plants, animals, and organ systems; processes of micro and macroevolution, strategies and selection of different species; phylogenetics and descent
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $47
Course Components: Laboratory — Required
Lecture — May Be Offered
Equivalent to: BIOC 182L, MCB 182L, MIC 182L
Course typically offered:
Main Campus: Fall, Spring, Summer
Online Campus: Fall, Spring

Recommendations and additional information: ECOL 182R or concurrent registration. At least Level III placement on the Math Readiness Test. High school biology recommended.
Shared Unique Number: SUN# BIO 1182

ECOL 182R: Introductory Biology II (3 units)
Description: Origin, diversity and evolution of life; physiology of plants, animals and organ systems; processes of micro and macroevolution; animal behavior and ecology of populations, and communities emphasizing biotic interactions and biogeography.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Discussion — May Be Offered
Lecture — Required
Equivalent to: BIOC 182, BIOC 182H, BIOC 182R, ECOL 182, ECOL 182H, MCB 182, MCB 182H, MCB 182R, MIC 182, MIC 182R, MICR 182, MICR 182H
Course typically offered:
Main Campus: Fall, Spring, Summer
Online Campus: Fall, Spring

Shared Unique Number: SUN# BIO 1182

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 195C: Research Methods in Biology for STEM majors (1 unit)
Description: For any STEM major, a university like the UA offers many opportunities to be involved in actual scientific research. But how do you become involved, and how do you make the most of this experience? In this course you will learn about the rules of academia, how to perform rigorous research, how to do statistical analyses in R, and how to graph and present your results to peers and others. You will meet a group of fellow research-active undergraduate students, and we will also discuss possible next steps, such as how to apply for graduate school. This course is intended to be taken alongside your research (we will help you find a research position in the first week if you do not have one yet), so that the data you analyze and present in class will come from your ongoing work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Colloquium Required
Repeatable: Course can be repeated a maximum of 8 times.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Must concurrently be involved in research experience, e.g. through FWS, Independent Study, or Directed Research
Field trip: None

ECOL 195D: Introduction to Darwinian Medicine (1 unit)
Description: In this course we will review how the Darwinian theory of evolution by natural selection can help us understand and treat human disease. We will explore evolutionary explanations to questions such as: Why do parasites harm us? Why do we age? Why do we suffer from allergies or develop cancer? Why do we reproduce sexually? Why do babies cry? Through informal lectures, readings, student presentations, and class discussions students will become exposed to basic evolutionary principles that can be applied not only to medicine, but also to agriculture and other life sciences.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Colloquium Required
Freshman Colloquia: Freshman Colloquia

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 195M: Freshman Seminar: Introduction to the Biological Sciences (1 unit)
Description: The purpose of this course is to educate freshman College of Science biology majors in the diversity of biological sciences represented by academic units at UA (including EEB, BMB, MCB, RNR, NUSC, MICR, ENGR, PSIO, PCOL, and ENVR) and to have them engage this content through the lens of contemporary societal topics. Students will make connections with faculty members (through a speaker series) and their peers (through preceptor-led discussions).
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Colloquium Required
Equivalent to: BIOC 195M, MCB 195M
Course typically offered:
Main Campus: Fall

Freshman Colloquia: Freshman Colloquia

ECOL 199: Independent Study (1 - 4 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

ECOL 206: Environmental Biology (3 units)
Description: Fundamentals of ecology and their relevance to human interconnectedness with natural ecosystems. Non-majors orientation.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Recommendations and additional information: Two courses from Tier One, Natural Sciences (Catalog numbers 170A, 170B, 170C).
Field trip: Field trips
General Education: Tier 2 Natural Sciences

ECOL 220: Evolutionary Medicine (3 units)
Description: In this course we will examine how the Darwinian theory of evolution by natural selection can help us understand and treat human disease. We will explore evolutionary answers to questions such as: Why do parasites harm us? Why do we age? Why do we suffer from allergies or develop cancer? Why do we reproduce sexually? Why do babies cry? Through informal lectures, readings, student presentations, and class discussions students will become exposed to basic evolutionary principles that can be applied not only to medicine, but also to other life sciences and to general understanding of the human condition.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Discussion — May Be Offered
Lecture — Required
Recommendations and additional information: Consent of instructor.
General Education: Tier 2 Natural Sciences

ECOL 223: Human Genetics and Evolution (3 units)
Description: This Tier Two biology course focuses on aspects of biology from the perspective of humans and human populations.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture — Required
Equivalent to: BIOC 223
Recommendations and additional information: Two courses from Tier One, Natural Sciences (Catalog numbers 170A, 170B, 170C).
General Education: Tier 2 Natural Sciences

ECOL 230: Natural History of the Southwest (3 units)
Description: Elementary biology of the common plants and animals of the Southwest; identification, distribution, ecology.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $10
Course Components: Lecture — Required
Equivalent to: ENTO 130
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Prerequisite: two courses from Tier One-Natural Sciences.
Field trip: Field trips.
General Education: Tier 2 Natural Sciences

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 249: Evolution: Its Content and Its History (3 units)
Description: Introduction to the history of evolutionary thought with emphasis on the principal contributors to the theory, the relationship of their ideas to current opinion and the interplay between scientific discovery and societal context.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

ECOL 280: Sociobiology and the Evolution of Cooperation (3 units)
Description: Why do animals and other organisms sometimes compete and sometimes cooperate? How do organisms in groups interact, how do they organize themselves or make group decisions? This course will give you some answers to these questions. We will discuss how social behavior evolves, and how it changes the life style of the animals that display it. We will also discuss whether this research can teach us about human social behavior.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ANTH 280, ENTO 280, PSYC 280
Course typically offered:
Main Campus: Fall

General Education: Tier 2 Natural Sciences
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 296B: Seminar in Bioinformatics (1 unit)
Description: This seminar course provides an overview of and introduction to the field of bioinformatics. Talks by faculty who do research in bioinformatics and computational biology, as well as by scientists from the biotechnology industry, give a sense of the current directions in the field.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 2 times.
Also offered as: CSC 296B, MCB 296B
Course typically offered:
Main Campus: Fall

ECOL 299: Independent Study (1 - 4 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

ECOL 299H: Honors Independent Study (1 - 3 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

ECOL 302: Ecology (4 units)
Description: Single species population biology, competition, predation and mutualism, community and organization, behavioral ecology and evolutionary ecology.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $25
Course Components: Laboratory Required
Lecture Required
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL 182R, ECOL 182L, MATH 125 or MATH 124, MATH 129.

ECOL 310: Living in Symbiosis (3 units)
Description: This course will provide an overview of the diversity of associations that exist between microbes and eukaryotic hosts. The course will span from highly integrated obligatory symbioses to loose associations. Emphasis will be placed on symbiotic associations with relevance to human medicine, veterinary sciences, and agriculture.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 310, MIC 310, VSC 310
Also offered as: ACBS 310, ENTO 310, MIC 310
Course typically offered:
Main Campus: Fall

Home department: Entomology

ECOL 320: Genetics (4 units)
Description: The principles that govern the inheritance of all living organisms including molecular, chromosomal, organismal, population and evolutionary aspects of genetics. Extensive problem solving required.
Grading basis: Student Option ABCDE/PF
Career: Undergraduate
Course Components: Discussion May Be Offered
Lecture Required
Equivalent to: ECOL 320H, MCB 320, MCB 320H
Course typically offered:
Main Campus: Fall, Summer

Recommendations and additional information: ECOL 181R, ECOL 181L, ECOL 182, CHEM 103B, CHEM 104B.

ECOL 320H: Genetics (5 units)
Description: The principles that govern the inheritance of all living organisms including molecular, chromosomal, organismal, population and evolutionary aspects of genetics. Extensive problem solving required.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Discussion Required
Lecture Required
Equivalent to: ECOL 320, MCB 320, MCB 320H
Course typically offered:
Main Campus: Fall

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

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ECOL 321: Genetics Lab (2 units)
Description: Laboratory principles and techniques that govern genetic analysis, including molecular, chromosomal, organismal, population, and evolutionary aspects.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $35
Course Components: Laboratory Required
Equivalent to: MCB 321
Recommendations and additional information: ECOL 181R, ECOL 181L , ECOL 182R, ECOL 182L; ECOL 320 or equivalent or ECOL 320H or equivalent.

ECOL 326: Genomics (3 units)
Description: Introduction to the study of genomics and its relevance to molecular, cellular and organismal biology, human health and disease. This course integrates readings and discussions of current topics, and exercises that apply web-based computational tools for genome analysis.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: BIOC 326, MCB 326
Course typically offered:
Main Campus: Fall, Summer

Recommendations and additional information: ECOL 182L, ECOL 182R.

ECOL 329A: Microbial Diversity (3 units)
Description: Microbial diversity is a course offered to students in Microbiology, and to other majors with an interest in the remarkable genetic, species-level, phylogenetic, functional, and ecological diversity of prokaryotic and eukaryotic microorganisms.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 329A, MIC 329, MIC 329A, PLP 329, VSC 329, VSC 329A
Also offered as: ACBS 329A, MIC 329A, PLP 329A
Course typically offered:
Main Campus: Fall
Distance Campus: Fall

Recommendations and additional information: MCB 181R.
Home department: Plant Pathology

ECOL 330: Evolution of Animal Form and Function (4 units)
Description: This course integrates comparative aspects of ontogeny, physiology and anatomy of animals with the current concepts of evolutionary biology, life history, and behavioral ecology.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Writing Emphasis: Writing Emphasis Course

ECOL 335: Evolutionary Biology (4 units)
Description: Basic processes and patterns of evolution: natural selection, evolutionary genetics, the analysis of adaptation, the phylogeny of life, the fossil record, molecular evolution, macroevolution. Mandatory discussion session to meet once per week.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Discussion Required
Lecture Required
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ECOL 181R, ECOL 181L, ECOL 182R and ECOL 182L.

ECOL 340: Evolution of Plant Form and Function (3 units)
Description: The diversity in the interaction between the way organisms are put together ("form") and how they work ("function") in response to environmental challenges. The physiological mechanisms responsible for the flow and transformation of energy and materials within organisms and among organisms framed in the larger context of ecological processes.
Grading basis: Student Option ABCDE/PF
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Recommendations and additional information: MCB 181R, MCB 181L, ECOL 182R, and ECOL 182L.
Writing Emphasis: Writing Emphasis Course

ECOL 345: Biodiversity and the Tree of Life (3 units)
Description: Introduction to the diversity of life on Earth, using phylogenetic history as an organizing principle. Course emphasizes key evolutionary innovations in eukaryotes, such as multicellularity, parasitism, symbiosis, and complex morphological novelties.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ENTO 345, MCB 345, PLS 345
Recommendations and additional information: ECOL 181R or ECOL 182R or consent of instructor.
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 346: Bioinformatics (4 units)
Description: Advances in genomic and other high-throughput biological technologies are rapidly changing how biologists study the diversity of life. This course will introduce students to these new data and computational tools. As a field, bioinformatics is built around a core of fundamental evolutionary biology concepts and these will serve as an organizing theme for the course. Lectures provide 1) the conceptual and methodological basis of how large-scale biological data -- especially genomic and transcriptomic data -- are analyzed, 2) the basic biological principles that underlie bioinformatic analyses, in particular homology, duplication and loss of genes and genomic regions, types and rates of mutation in genomes, and the basic evolutionary forces that shape genomes 3) descriptions of contemporary problems in bioinformatics and computational and wet-laboratory approaches to addressing these issues, and 4) experience with current genomic and other large-scale data sets and databases as well as the computational methods for their analysis.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $50
Course Components: Laboratory Required
Lecture Required
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ECOL 320 or 326 or MCB 304
Honors Course: Honors Contract
Honors Course: Honors Contract

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-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 350: Insect Discovery (3 - 4 units)
Description: Insect Discovery is a special University of Arizona course that combines insect biology and inquiry-based science teaching experience Undergraduates are the teachers who lead visiting school children through a series of hands-on, inquiry-based activities that teach basic biology using insects. In this course you will learn both about insects and about communicating science to the public. At the same time, you will provide a special learning experience for children in the Tucson community.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory Required
Lecture Required
Recommendations and additional information: ECOL 182R.

ECOL 360: Marine Ecology & Conservation (3 units)
Description: In this course, we consider the important role that marine ecological research has played in our understanding both of ocean life and of the broader field of ecology. We analyze the major issues in ocean conservation, the challenges ahead for humans in maintaining a healthy ocean and planet, and the creative solutions proposed to address those challenges.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Pre-Requisite: ECOL 182R or ECOL 183.

ECOL 379: Evidence-based Medicine (3 units)
Description: Introductory probability and statistics, with an emphasis on randomized clinical trials, Bayes Theorem, and the interaction between science and society. Students design their own trials, generally on non-medical topics, and at least one of these trials will be carried out by the class. Update Characteristics, Course Requisites to read: Placement above MATH 112.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Recommendations and additional information: MATH 110 or 112 with a grade of C or higher.
Enrollment requirement: PPL 60+ or MCLG 88+ or SAT I MSS 620+ or ACT MATH 26+ or one recent course from MATH 112, 113, 116, 122B, or 125. Test scores expire after 1 year. Some students may need to take Math 100, then Math 112 first.
Writing Emphasis: Writing Emphasis Course

ECOL 386: Environmental Biophysics (3 units)
Description: The primary aim of this course will be to provide an introduction to principles of physics that influence how organisms interact with their surrounding environment. Topics include: the causes of flows of mass and energy within organisms, communities and ecosystems; the energy budgets of plants and animals; the forces that govern water movement from soils, through plants to the atmosphere; basics of solar radiation budgets for leaves and ecosystems; microenvironments of animals, plants and humans.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Recommendations and additional information: PHYS 102 and MATH 112.

ECOL 391: Preceptor (1 - 3 units)
Description: ECOL preceptors are highly motivated students who provide instructional support both in and out of the classroom for a course they have already completed. Preceptors are not expected to be content experts, but instead function as student mentors and guides, as well as instructional assistants. They complete specialized work on an individual basis, consisting of instructional practice in and service to actual ECOL courses with the goal of promoting independence in student learning. Students will gain leadership and mentoring skills while working with faculty and instructors.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 6 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Field trip: M. Bucci's section: includes 1 mandatory wknd field trip to the Southwestern Research Station (SWRS) in Portal, AZ in the Chiricahua Mountains. Peter Reinthal's section: Aravaipa fish surveyOther sections will not have FTs affiliated with preceptoring

ECOL 392: Directed Research (1 - 6 units)
Description: Individual or small group research under the guidance of faculty.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated for a maximum of 12 units.
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Consent of instructor.
Student Engagement Activity: Discovery
Student Engagement Competency: Innovation and Creativity

ECOL 395I: Genetics, Conservation, and Human/Plant Interactions (1 unit)
Description: This one-unit colloquium will explore the rich history of human/plant interactions, beginning with the earliest human efforts to domesticate plants and continuing through the present-day application of the latest genomic technologies in plant breeding. It will focus on the genetic and evolutionary changes accompanying these interactions. It also will assess the current conservation challenges associated with the loss of crop genetic diversity.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Colloquium Required
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL182R or consent to instructor.

ECOL 399: Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Student Engagement Activity: Discovery
Student Engagement Competency: Innovation and Creativity

ECOL 399H: Honors Independent Study (1 - 3 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

ECOL 401: Ecological Physiology (3 units)
Description: During ontogeny, organisms constantly have to adjust their physiology in response to the environment they encounter. This course will provide an integrative understanding of life history evolution from the perspective of the constraints imposed by their underlying physiology. We will emphasize how physiological tradeoffs at the level of the whole organism ultimately define an organism¿s life history and fitness. The course will provide students with a conceptual approach to the integration of whole-organism physiology underlying life history traits. Relevant physiological, evolutionary and ecological background necessary to understand the concepts discussed will be given in lecture. Course will focus primarily on insects and will also use examples from other animals.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Also offered as: ENTO 401, PSIO 401
Co-convened with: ECOL 501
Course typically offered:
Main Campus: Fall (odd years only)

Recommendations and additional information: MCB 181R, MCB 181L and ECOL 182R, ECOL 182L.
Home department: Entomology

ECOL 403L: Parasitology Laboratory (1 unit)
Description: Parasite morphology and diagnostic laboratory techniques.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory Required
Equivalent to: ECOL 403L, ENTO 403L, MIC 403L, MICR 403L
Also offered as: ACBS 403L, ENTO 403L, MIC 403L
Co-convened with: ECOL 503L
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Twelve units of biology and microbiology.
Home department: School of Animal & Comparative Biomedical Sciences

ECOL 403R: Biology of Animal Parasites (3 units)
Description: Biology of host-parasite relationships with emphasis on parasites of veterinary and human importance. Parasite morphology and physiology, life cycles, epidemiology, pathogenesis and zoonotic potential.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 403R, ENTO 403R, MIC 403R, MICR 403R
Also offered as: ACBS 403R, ENTO 403R, MIC 403R
Co-convened with: ECOL 503R
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Twelve units of biology and microbiology.
Home department: School of Animal & Comparative Biomedical Sciences

ECOL 404F: Biology of the Oceans Lab (1 unit)
Description: This course will provide a brief overview of oceanography only to set the stage for exploring the diversity and ecology of biological organisms in ocean systems, as well as how biological processes (including human activity) shape ocean physics, chemistry and geology.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $166
Course Components: Laboratory Required
Equivalent to: ECOL 404L, GEOS 404L, GEOS 404L, RNR 404L, RNR 404L
Co-convened with: ECOL 504F
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 404R: Biology of the Oceans (3 units)
Description: This course will provide a brief overview of oceanography only to set the stage for exploring the diversity and ecology of biological organisms in ocean systems, as well as how biological processes (including human activity) shape ocean physics, chemistry and geology.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 404A, ECOL 410A, GEOS 404A, GEOS 404R, RNR 404A, RNR 404R
Co-convened with: ECOL 504R
Recommendations and additional information: ECOL 182R or GEOS 412A or consent of instructor.
Honors Course: Honors Contract
Honors Course: Honors Contract
Writing Emphasis: Writing Emphasis Course

ECOL 405: Aquatic Entomology (4 units)
Description: Morphological, physiological and behavioral adaptations of insects to life in water; taxonomy and ecology of aquatic insects.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory Required
Lecture Required
Equivalent to: ECOL 405, WFSC 405
Also offered as: ENTO 405, WFSC 405
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ECOL 182R and ECOL 182L.
Field trip: Field trip.
Home department: Entomology

ECOL 406L: Conservation Biology in the Field (1 unit)
Description: Problem-solving, discussion, and field trips (binoculars recommended). One Saturday trip and two 3-day weekend trips in Oct-Nov.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $139
Course Components: Laboratory Required
Equivalent to: GEOS 406L, RNR 406L
Co-convened with: ECOL 506L
Recommendations and additional information: Concurrent registration, ECOL 406R.
Field trip: One Saturday trip and two 3-day weekend trips in Oct-Nov.

ECOL 406R: Conservation Biology (3 units)
Description: Biological principles applied to protection and recovery of threatened and endangered species and the processes which link species in natural ecosystems. Biological basis for conservation laws and regulations. Distribution, valuation and sustainable production of biodiversity benefits for humanity.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 406, GEOS 406, GEOS 406R, RNR 406, RNR 406R
Co-convened with: ECOL 506R
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ECOL 182L, ECOL 182R, ECOL 302.

ECOL 408L: Genes, Biotechnology and the Environment (2 units)
Description: This course is an intensive summer lab course in DNA technology for secondary school science teachers and pre-service teachers. Students use molecular techniques of PCR, DNA sequencing, and computer BLAST searches to learn how genes and molecules are linked to the ecology of many species. The course may include field trips and may involve high school student participants.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory Required
Repeatable: Course can be repeated a maximum of 3 times.
Equivalent to: BIOC 408L, MCB 408L
Co-convened with: ECOL 508L
Recommendations and additional information: Some background in biology, experience or interest in science teaching.

ECOL 409: Evolution of Infectious Disease (3 units)
Description: Causes and consequences of evolutionary change in pathogens. Evolutionary principles, vertebrate immunity, molecular epidemiology, evolution of virulence, evolution of antimicrobial resistance, predicting epidemics, impacts of infectious disease on host evolution, HIV evolution.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: CPH 409, MCB 409, VSC 409
Co-convened with: ECOL 509
Recommendations and additional information: ECOL 182R, ECOL 182L, MCB 181R or consent of instructor.

ECOL 410: Microbial Biogeochemistry and Global Change (3 units)
Description: Microbes are the drivers of planetary biogeochemistry. They produce half the oxygen on the planet, and fix half the carbon. They introduce bioavailable forms of nitrogen into the biosphere. If human life ceased to exist, the central biogeochemical cycles would continue turning. However, while the planet's biogeochemistry can persist readily in the absence of human life, that does not mean that humankind's presence lacks impact. The Anthropocene (era of human impact) has seen significant changes to planetary stocks and fluxes of C, N, S, etc. Many of these changes involve or impact microbes, and have significant impacts on biogeochemical cycles. To understand microbial biogeochemistry in today's world, one must include the context of global change. And, conversely, one cannot understand the trajectory of global change without understanding microbial feedbacks via biogeochemical cycles. In this interdisciplinary undergraduate and graduate class we will cover major microbial biogeochemical cycles, and how these cycles are impacted by, and feedback to, global change. To understand the research in this area, we will discuss current methods in both microbial ecology and biogeochemistry, ranging from molecular meta-omics to the use of isotopes as biogeochemical tracers, with a particular emphasis on the challenges and opportunities of integrating these two disciplines. Lectures will be mixed with journal club-style readings and discussions, so active participation is essential. This course is designed for graduate students from diverse backgrounds and advanced undergraduates.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Also offered as: ENVS 410, GEOS 410, PLS 410
Co-convened with: ECOL 510
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Background in biology or biogeochemistry, and openness to interdisciplinary learning.
Home department: Soil, Water, & Environmental Sciences

ECOL 412A: Ocean Sciences (3 units)
Description: This course offers an overview of the ocean sciences for undergraduate students with some scientific background. This course will broaden the exposure of UA undergraduates to marine science in a cross-disciplinary context. Students considering a career or graduate school in marine science will find this class a useful preview of the different areas of marine science, and students interested in natural or environmental sciences will gain a better understanding of the many linkages between the ocean and the broader natural world. We will cover the role of the ocean in diverse components of the Earth system, including geological, biological, climatic, and human aspects.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Also offered as: ATMO 412A, ENVS 412A, GEOS 412A
Recommendations and additional information: One year of science, or consent of instructor.
Home department: Geosciences

ECOL 412B: Ocean Sciences Field Course (1 unit)
Description: This course is a field trip component intended to complement GEOS 412A, Ocean Sciences. It offers an opportunity for students concurrently enrolled in GEOS 412A to gain hands-on experience with observational methods and data collection in Ocean Sciences. The 3-day trip, to southern California, will entail a half day of work aboard a working research vessel to learn oceanographic data collection techniques. Additionally, the class will make observational stops at several intertidal localities, at a marine geology locality and at other stops to consider marine environmental issues.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $156
Course Components: Laboratory Required
Also offered as: GEOS 412B
Recommendations and additional information: One year of science courses. Students in 412B must also be enrolled in 412A.
Field trip: Required 3 day field trip to California.
Home department: Geosciences

ECOL 414: Plants of the Desert (2 units)
Description: Designed for teachers and others wishing to become familiar with common native and cultivated plants; identification, ecology, and uses.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: ECOL 514
Course typically offered:
Main Campus: Summer

Field trip: Two required field trips outside normal class sessions

ECOL 415R: Insect Biology (3 units)
Description: Examination of how insects function morphologically, physiologically, and behaviorally. Investigation of relationships between members of Insecta and how they interact with other major taxa, both plant and animal. See http://ag.arizona.edu/classes/ento415/ for class information and list of lectures.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 415R
Also offered as: ENTO 415R
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL 182R and ECOL 182L.
Home department: Entomology

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 418: Spatio-Temporal Ecology (3 units)
Description: Population growth and species interactions in spatially and temporally varying environments. Meta populations and communities. The scale transition, the storage effect, nonlinear competitive variance, fitness-density covariance, disturbance, competition-colonization tradeoffs.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall (odd years only)

Recommendations and additional information: ECOL447/547 or a modeling course, or modeling experience, or consent of instructor.

ECOL 419: Introduction to Modeling in Biology (3 units)
Description: This course will give an introduction to different modeling methods used in biology research, including differential equations, individual-based simulations, Markov processes, stochastic models, network analysis, and others. Students will learn what questions can be answered and what the limitations of each of these methods are, and read scientific papers applying them. Students will also develop their own modeling project with advice from the instructor, and learn basics of writing scripts and programming.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: ECOL 519
Course typically offered:
Main Campus: Fall

Recommendations and additional information: MATH 129 and ECOL 182R.

ECOL 421: Philosophy of the Biological Sciences (3 units)
Description: Laws and models in biology, structure of evolutionary theory, teleological explanations, reductionism, sociobiology.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 421
Also offered as: PHIL 421
Co-convened with: ECOL 521
Course typically offered:
Main Campus: Spring (odd years only)

Home department: Philosophy

ECOL 423: Sex and Individuality in Evolution (3 units)
Description: Sex has profound effects throughout biology and much of human affairs, yet the evolution of sex remains one of the great unsolved mysteries in biology. To understand the evolution of sexual and asexual forms of reproduction, we need to understand what it means to be an individual in evolution. Why have the different kinds of biological individuals evolved that are found in the hierarchy of life? This course will explore these and related issues using a rigorous framework based on your introductory and mid-level biology courses. We will find that the Darwinian paradigm of competition needs some updating. When it comes to understanding the most general properties of life, cooperation plays an even greater role.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: ECOL 523
Recommendations and additional information: MCB 181R, MCB 181L, ECOL 182R and ECOL 182L.

ECOL 426: Population Genetics (3 units)
Description: General introductory course on empirical and theoretical population genetics. It will involve two weekly lectures, weekly problem sets, and regular readings from the primary literature. A major goal of this course is to make students familiar with basic models of population genetics and to acquaint students with empirical tests of these models. As much as any field of biology, population genetics has been divided into a theoretical and an empirical branch. However, these two bodies of knowledge are intimately related and this course will cover both in roughly equal amounts. We will discuss the primary forces and processes involved in shaping genetic variation in natural populations (mutation, drift, selection, migration, recombination, mating patterns, population size and population subdivision), methods of measuring genetic variation in nature, and experimental tests of important ideas in population genetics. The course will also cover a few more specialized topics such as transposable elements, the evolution of multigene families, and molecular clocks.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $50
Course Components: Lecture Required
Equivalent to: GENE 426
Co-convened with: ECOL 526
Recommendations and additional information: ECOL 182R, ECOL 182L, ECOL 335; ECOL 320 or PLS 312.

ECOL 428L: Microbial Genetics Laboratory (2 units)
Description: Laboratory associated with lecture course on Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Principles of regulation of gene expression. Biology of plasmids and bacteriophages.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $70
Course Components: Laboratory Required
Equivalent to: ECOL 428L, MCB 428L, MIC 428L, MICR 428L, PLS 428L, SWES 428L, VSC 428L
Also offered as: ACBS 428L, ENVS 428L, MIC 428L, PLP 428L, PLS 428L
Co-convened with: ECOL 528L
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ECOL 320, PLS 312 and PLP 428R.
Home department: Plant Pathology
Writing Emphasis: Writing Emphasis Course

ECOL 428R: Microbial Genetics (3 units)
Description: Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Principles of regulation of gene expression. Biology of plasmids and bacteriophages.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 428, ECOL 428R, GENE 428R, MCB 428, MIC 428, MIC 428R, MICR 428, MICR 428R, PLP 428, PLS 428R, SW 428, SWES 428, SWES 428R, VSC 428, VSC 428R
Also offered as: ACBS 428R, ENVS 428R, MIC 428R, PLP 428R, PLS 428R
Co-convened with: ECOL 528R
Course typically offered:
Main Campus: Spring
Distance Campus: Spring

Home department: Plant Pathology
Writing Emphasis: Writing Emphasis Course

ECOL 430: Conservation Genetics (3 units)
Description: Basic methods and theories of genetic/genomic analyses together with the application of these analyses to promote conservation, proper management, and long term survival of free-ranging species, including the exploration of current conservation genetic/genomic literature.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture — Required
Seminar — May Be Offered
Also offered as: GENE 430, WFSC 430
Co-convened with: ECOL 530
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL 320, PLS 312, basic genetics class, or consent of instructor.
Home department: School of Natural Resources and the Environment

ECOL 431: Primate Sexuality (3 units)
Description: Human sexuality is explored through discussing the evolution of non-human primate anatomy, physiology, and behavior. Topics include comparative reproductive anatomy and reproductive health, mating strategies, mate choice, parenting and parental investment, and socioendocrinology (the study of behavior-hormone relationships).
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture — Required
Also offered as: ANTH 431, FCSC 431, PSY 431
Co-convened with: ECOL 531
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ANTH 265 or ANTH 364 or consent of instructor.
Home department: School of Anthropology

ECOL 432: Comparative Immunology (3 units)
Description: How have vertebrate immune systems evolved from simple origins? We will cover comparative immunology of prokaryotes, protozoans, plants, fungi, invertebrates, and "lower" vertebrates. By studying the origins and evolution of immunity across the history of life, and following the progression of immune system complexity across different lineages, we begin to see patterns that help explain how our immune system developed from those of our ancestors. Such comparative study will highlight the strengths and weaknesses of our immune system, and point to ways in which other organisms have overcome the same pathogenic stresses we currently face. This class will pull together data from many fields, including immunology, molecular and cell biology, ecology, and evolution.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Also offered as: ACBS 432, ENTO 432, MCB 432, MIC 432
Co-convened with: ECOL 532
Course typically offered:
Main Campus: Fall

Home department: Entomology
Enrollment requirement: MCB 181R and MCB 181L, ECOL 182R and ECOL 182L, or instructor consent.

ECOL 437: Vertebrate Physiology (4 units)
Description: Basic principles of vertebrate physiology dealing particularly with physiological homeostasis maintained by interactions of complex organ systems.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $30
Course Components: Laboratory Required
Lecture Required
Equivalent to: MCB 437, TOX 437, VSC 437
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL 181R, ECOL 181L, ECOL 182R, ECOL 182L, and one semester of organic chemistry. Genetics and biochemistry suggested.
Writing Emphasis: Writing Emphasis Course

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ECOL 440: Mechanisms in Plant Development (3 units)
Description: Focuses on the molecular genetic mechanisms of plant development using primarily the current model systems.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 440, MCB 440
Also offered as: MCB 440, PLS 440
Co-convened with: ECOL 540
Course typically offered:
Main Campus: Fall

Recommendations and additional information: PLS 312 or ECOL 320. Recommend: BIOC 384, PLS 360 and MCB 304.
Home department: School of Plant Science
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 442: Limnology (4 units)
Description: Study of lakes and streams; biological characteristics, as related to physical, chemical, geological, and historical processes operating on fresh waters.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $23
Course Components: Laboratory May Be Offered
Lecture Required
Equivalent to: ECOL 441
Also offered as: ENVS 442, WFSC 442
Co-convened with:
Recommendations and additional information: Six units of biology, 3 units of chemistry and 3 units of ecology.
Home department: Environmental Science

ECOL 447: Introduction to Theoretical Ecology (3 units)
Description: Population growth and density dependence; predation; competition and apparent competition; coexistence mechanisms: niches, spatial and temporal variation; food web concepts and properties; applications. Emphasis on understanding through models and examples.
Grading basis: Student Option ABCDE/PF
Career: Undergraduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall (even years only)

Recommendations and additional information: MATH 124 or MATH 125 or equivalent and ECOL 302 or equivalent, or consent of instructor.

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ECOL 448A: Plant Biochemistry and Metabolic Engineering (3 units)
Description: Covering topics in plant metabolic engineering; photosynthesis; carbohydrate, nitrogen and lipid metabolism; specialized metabolism. This course covers biochemical processes specific to plants and allows students to gain an understanding and appreciation of how (bio)chemical components are synthesized and utilized by plants during growth and development and in their interactions with their environment, as well as how these processes can be manipulated. A background in plant biology, general biochemistry or chemistry is expected. Note that concurrent registration in any of these courses will NOT meet this requirement. Students must have completed both semesters of O-chem and a biochemistry course that covers general metabolism prior to taking this course.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: BIOC 448A, CHEM 448A, ECOL 448A, MCB 448A
Also offered as: BIOC 448A, CHEM 448A, MCB 448A, PLS 448A
Co-convened with: ECOL 548A
Course typically offered:
Main Campus: Fall

Recommendations and additional information: CHEM 241A/B or CHEM 242A/B; BIOC 462A/B or BIOC 460 or consent of instructor.
Home department: School of Plant Science

ECOL 449A: Plant Genetics and Genomics (3 units)
Description: A 3 unit lecture/discussion course that provides an advanced treatment of the current knowledge and experimental approaches used in genetic and genomic analysis, with emphasis on plants. Basic understanding of Mendelian genetics, gene and genome structure and function is required.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 449A, GENE 449A, MCB 449A
Also offered as: GENE 449A, MCB 449A, PLS 449A
Co-convened with: ECOL 549A
Recommendations and additional information: PLS 312.
Home department: School of Plant Science

ECOL 449B: Discovering Evolution: From Lamarck to the Modern Synthesis (3 units)
Description: Examination of the personalities and events leading to the discovery of evolution, the scientific community's response thereto and subsequent developments including the incorporation of genetics into evolutionary theory. Time permitting, the following topics will also be addressed: Neo-Larmackianism and the Lysenko affair, social Darwinism, craniometry and eugenics, sociobiology, and the implications of recent discoveries in genetics and development.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: BIOC 449B, BIOC 449B
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL181L or ECOL181R and ECOL182 or ECOL182R or consent of instructor.
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 450: Marine Discovery (4 units)
Description: Participate in this marine biology outreach program for grades 3-8. Undergraduates do all of the instruction in on-campus, inquiry-based workshops featuring marine diversity and conservation with a focus on the nearby Sea of Cortez. You will gain experience in developing your own teaching style, while learning about marine biology. As of June 1, 2009, a current US passport is required of all students taking the course for the trip to Mexico. Course includes one required field trip.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $83
Course Components: Laboratory Required
Lecture Required
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL 182R and ECOL 182L or ECOL 183 or GEOS 212 or GEOS 412A.
Field trip: Field trip
Student Engagement Activity: Community Partnership
Student Engagement Competency: Civic and Community

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 451: Drosophila: Model System for Evolution (3 units)
Description: Drosophila is the most important eukaryotic model system for comparative studies in biology. We will explore several aspects of its ecology, genetics and evolution, making connections to general concepts of biology and applied research. The course will combine lectures with hands-on activities (lab and computer) and field trips.
Grading basis: Student Option ABCDE/PF
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: MCB 451
Co-convened with: ECOL 551
Recommendations and additional information: Consent of instructor.
Field trip: One field trip to collect flies.
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 452: Dryland Ecohydrology and Vegetation Dynamics (4 units)
Description: Overview of ecological and hydrological interrelationships, including ecologically meaningful water budgets, and associated vegetation dynamics for water-limited, dryland ecosystems.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Also offered as: HWRS 452, RNR 452, WSM 452
Co-convened with: ECOL 552
Course typically offered:
Main Campus: Fall

Recommendations and additional information: RNR 316, ECOL 302, or consent of instructor.
Home department: Watershed Management

ECOL 453: Functional and Evolutionary Genomics (4 units)
Description: Computational, functional, and evolutionary approaches to genomics, including bioinformatics and laboratory methods relevant to many modern research approaches in biology.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: BIOC 453, BIOC 453R, ECOL 453R, MCB 453, MCB 453R
Co-convened with: ECOL 553
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Genetics or molecular biology beyond introductory biology or consent of instructor.

ECOL 453L: Functional and Evolutionary Genomics - Laboratory (1 unit)
Description: Computational, functional, and evolutionary approaches to genomics, including bioinformatics and laboratory methods.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory — Required
Lecture — May Be Offered
Equivalent to: BIOC 453L, MCB 453L
Co-convened with: ECOL 553L
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Concurrent registration, ECOL 453R.

ECOL 454: Water Harvesting (3 units)
Description: Course focuses on water harvesting principles and techniques at a variety of scales and settings. Students participate in hands-on implementation of water harvesting projects on the UA campus.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture — Required
Equivalent to: ECOL 454, WFSC 454
Also offered as: ENVS 454, WFSC 454
Co-convened with: ECOL 554
Course typically offered:
Main Campus: Spring

Home department: Soil, Water, & Environmental Sciences
Honors Course: Honors Contract
Honors Course: Honors Contract
Student Engagement Activity: Discovery
Student Engagement Competency: Sustainability

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 457: Medical-Veterinary Entomology (3 units)
Description: An overview of medically important arthropods and the diseases they transmit. Special attention will be paid to newly emerging and locally important vectors and diseases. Basic coursework in biology or entomology is required.
Grading basis: Student Option ABCDE/PF
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 457, INSC 457, VSC 457
Also offered as: ACBS 457, ENTO 457
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ECOL 182R, ECOL 182L.
Home department: Entomology

ECOL 463: Ecology & Natural History of the Sonoran Desert & Gulf of California (4 - 6 units)
Description: Hands-on, field-based exploration of the Sonoran Desert, its Sky Islands, and the Upper Gulf of California. Students will be introduced to the ecological, taxonomic, and natural-history diversity of the region. To accomplish this ecological Sense of Place immersion, we will conduct several small independent research projects, visit with topical experts, foray into some of the most beautiful and iconic portions of the desert southwest, and read about the important, exciting, and interesting science to come out of the area. Conservation will be an important sub-theme of the course. Prior to enrollment, students are expected to have the equivalent of a college-sophomore/junior-level background in ecology and evolutionary biology. Students should be prepared for, and able to participate in, desert & mountain hiking, camping, and boating. Contact instructor for more course details.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $1250
Course Components: Laboratory Required
Lecture Required
Repeatable: Course can be repeated for a maximum of 18 units.
Co-convened with:
Recommendations and additional information: ECOL 182R, ECOL 302, ECOL 335 or similar background.
Field trip: Ability to hike on uneven terrain in the desert in hot conditions. Overall good health for field activities, camping, and boating.

ECOL 464: Sonoran Desert Discovery (3 units)
Description: In Sonoran Desert Discovery, enrolled students will teach biological, ecological, and ecosystem principles (Biosphere 1) to school groups and the public (kindergarten to retiree) at Biosphere 2 and other Tucson venues. Students will build inquiry-based workshops (on campus and in small groups) to lead for the public. Students will develop public-speaking skills and their own effective teaching style while learning about Sonoran desert ecology and natural history.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 4 times.
Also offered as: RNR 464
Co-convened with: ECOL 564
Recommendations and additional information: ECOL 182L and ECOL 182R or equivalent biology & ecology background. ECOL 302 and other ECOL courses recommended. Especially motivated students without biology/ecology background may also do well.
Field trip: Course includes several, usually Saturday, field trips.
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 465: Phylogenetic Biology (3 units)
Description: Concepts in phylogenetic biology, focusing on the phylogenetic (evolutionary) tree of species. The form of the tree, character evolution, speciation, and gene trees.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ENTO 465, GEOS 465
Co-convened with: ECOL 565
Course typically offered:
Main Campus: Spring (even years only)

Recommendations and additional information: ECOL 320; ECOL 476B or GEOS 476A or other course in evolution, or consent of instructor.

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 467: Pollination Ecology-Behavior, Cognition, & Ecology of Pollinators (2 units)
Description: We will discuss current research topics related to the coevolution of pollinators and plants. This will include issues of cognitive ecology, signal detection & evolution, evolution of mutualisms, cheating and cooperation, foraging theory, biological markets, etc. Students will also have the opportunity to suggest topics for discussion.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ENTO 467
Co-convened with: ECOL 567
Course typically offered:
Main Campus: Spring

Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 472: Systematic Botany (4 units)
Description: Evolutionary relationships and characteristics of seed plants: systems of classification; acquisition of skills to identify members of almost 50 families, collection and identification of local flora.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Laboratory May Be Offered
Lecture Required
Equivalent to: PLS 472
Co-convened with: ECOL 572
Course typically offered:
Main Campus: Spring (odd years only)

ECOL 473: Topics in Behavioral Ecology (3 units)
Description: Theory and practice of behavioral ecology. Focuses on the ecology and evolution of animal behavior. Analytical and critical approach to frontier issues and techniques in behavioral research.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 4 times.
Co-convened with: ECOL 573
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Consent of instructor.

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 474: Aquatic Plants and the Environment (4 units)
Description: The role of riparian areas, estuaries, and constructed wetlands in the environment. Emphasis on plants as wildlife habitat for nutrient cycling and bioremediation.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: ECOL 474, WFSC 474
Also offered as: ENVS 474, WFSC 474
Co-convened with: ECOL 574
Course typically offered:
Main Campus: Fall

Home department: Soil, Water, & Environmental Sciences

ECOL 475: Freshwater and Marine Algae (4 units)
Description: Systematics, ecology, and evolution of planktonic and benthic species; field techniques and lab culture.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $25
Course Components: Laboratory May Be Offered
Lecture Required
Equivalent to: SW 475, SWES 475, WFSC 475
Co-convened with: ECOL 575
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Four units of biological or plant sciences.
Field trip: Field trips.
Writing Emphasis: Writing Emphasis Course

ECOL 479: Art of Scientific Discovery (3 units)
Description: Techniques of posing questions and solving puzzles encountered in scientific research, with emphasis on life sciences and mathematics.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Equivalent to: ECOL 479, MCB 479
Also offered as: CMM 479, MCB 479
Co-convened with: ECOL 579
Course typically offered:
Main Campus: Fall

Home department: Cellular & Molecular Medicine

ECOL 480: Mathematical Models in Biology (3 units)
Description: For advanced undergraduates and graduate students in biological and ecological sciences, and math students: learn how to apply basic tools of mathematical tools (from simple back-of-the-envelope estimates to formal stability analysis using difference and differential equations) to biological problems including population dynamics, species coexistence, population genetics, links between ecosystems ecology and Global biogeochemistry, and biological scaling.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Equivalent to: MATH 380
Course typically offered:
Main Campus: Spring

Recommendations and additional information: MATH 129 or consent of instructor.
Enrollment requirement: MATH 129.

ECOL 482: Ichthyology (4 units)
Description: Ecology, evolution and systematics of fishes, with field and lab emphasis on Gulf of California and Arizona fishes.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $64
Course Components: Laboratory Required
Lecture May Be Offered
Equivalent to: WFSC 482
Co-convened with: ECOL 582
Course typically offered:
Main Campus: Fall (odd years only)

Recommendations and additional information: ECOL 182R and ECOL 182L.
Field trip: Weekend field trip.
Writing Emphasis: Writing Emphasis Course

ECOL 483: Herpetology (4 units)
Description: Systematics, ecology, and evolution of the amphibians and reptiles.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $142
Course Components: Laboratory Required
Lecture Required
Equivalent to: WFSC 483
Co-convened with:
Course typically offered:
Main Campus: Spring (even years only)

ECOL 484: Ornithology (4 units)
Description: Natural history of birds and its bearing upon the problems of animal behavior, distribution, and evolution.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $50
Course Components: Laboratory Required
Lecture Required
Equivalent to: WFSC 484
Co-convened with: ECOL 584
Course typically offered:
Main Campus: Spring

Recommendations and additional information: One basic biology course.
Field trip: Field trip.
Writing Emphasis: Writing Emphasis Course

ECOL 485: Mammalogy (4 units)
Description: Systematics, ecology, and evolution of mammals.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $240
Other Fee: This course is pending a course fee review from ABOR and the fee is subject to change if approved.
Course Components: Laboratory Required
Lecture Required
Equivalent to: WFSC 485
Co-convened with: ECOL 585
Course typically offered:
Main Campus: Fall

ECOL 487L: Animal Behavior Lab (1 unit)
Description: Exposure to current topics in behavior and process of behavioral research through video presentations, demonstrations of live animals and readings.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $28
Course Components: Laboratory Required
Co-convened with: ECOL 587L
Course typically offered:
Main Campus: Fall

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 487R: Animal Behavior (3 units)
Description: Concepts and principles of the mechanism, development, function and evolution of behavior, with emphasis on its adaptiveness.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Lecture Required
Co-convened with: ECOL 587R
Course typically offered:
Main Campus: Fall

Recommendations and additional information: 8 units of biology.
Writing Emphasis: Writing Emphasis Course

ECOL 488: Arizona Mammals (4 units)
Description: This course will include ecology and evolution of mammals, taxonomic identification, biomes and communities of the Sonoran Desert region, and field methods in mammalian research. The lecture/laboratory portions of this course are designed to provide students with experience conducting research on mammals in the wild, and will rely heavily on fieldwork. Field work includes small mammal trapping, mist-netting for bats, camera trapping, and other methods. ECOL 488 is for students interested in nature, mammals, camping, and wildlife fieldwork.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $190
Course Components: Lecture Required
Equivalent to: ECOL 488R, WFSC 488, WFSC 488R
Co-convened with: ECOL 588
Course typically offered:
Main Campus: Summer

Recommendations and additional information: ECOL 182R and ECOL 182L or equivalent.
Field trip: Two required field trips to be scheduled, each from 2pm to midnight. Flashlights required.

ECOL 492: Directed Research (1 - 6 units)
Description: Individual or small group research under the guidance of faculty.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated for a maximum of 12 units.
Equivalent to: GEOS 492, MCB 492
Course typically offered:
Main Campus: Fall, Spring, Summer

Recommendations and additional information: Consent of instructor.
Student Engagement Activity: Discovery
Student Engagement Competency: Innovation and Creativity

ECOL 495B: Insect Biodiversity and Land Use in Sonora (Mexico) (3 units)
Description: Site: Guaymas Campus of the Monterey Technological University, Mexico. This course provides an introduction to (1) the natural history of Sonora and its desert ecosystem, (2) land use patterns and change in Sonora, (3) insect systematics and natural history, particularly of insect pests and pollinators, (4) field collecting methods and identification, (5) construction of biodiversity databases, and (6) biodiversity theory and analysis. Indices of insect biodiversity can provide important means of assessing ecosystem health and responses to anthropogenic landscape change. Analyses will be made of insect communities and biodiversity in urban, suburban, agricultural, and native habitats. Responses of insect populations to land use change can include outbreaks of insect pests and insect-vectored human and animal diseases, therefore special attention will be paid to insect pests and vectors.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Colloquium Required
Equivalent to: ENTO 495B
Co-convened with: ECOL 595B

ECOL 496A: Conservation Biology Internship Advanced Seminar I (2 units)
Description: This is the third of a four course sequence designed for students participating in our Conservation Biology Internship Program. This seminar will be a critical assessment of students research, with a treatment of experimental design.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Equivalent to: RNR 496A
Recommendations and additional information: Acceptance into Conservation Biology Internship Program.

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 496C: Conservation Biology Internship Advanced Seminar II (2 units)
Description: This seminar will focus on analysis and presentation of research results, with an emphasis on publication.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Equivalent to: RNR 496C
Recommendations and additional information: ECOL 320 or ECOL 335 or consent of instructor.

ECOL 496G: Complex Systems: Networks & Self-organization in Biology (2 units)
Description: We will discuss current and classic literature on complex systems research at multiple levels, including gene regulatory networks, neural net(work)s, ecological networks, and social networks. We will try to identify the commonalities of these systems and what is so exciting about 'systems biology.' We will also discuss what types of models are used to describe and study self-organization and networks in general.
Grading basis: Student Option ABCDE/PF
Career: Undergraduate
Course Components: Seminar Required
Equivalent to: GWS 496G
Co-convened with: ECOL 596G
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 496J: Plant Population Ecology (1 - 3 units)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Repeatable: Course can be repeated for a maximum of 18 units.
Co-convened with: ECOL 596J
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Some introductory botany, ecology and consent of instructor.

ECOL 496N: Non-Linear Dynamics of Biological Systems (2 - 4 units)
Description: Non-linear dynamics of biological systems with applications in biochemistry, ecology, epidemiology, and molecular biology. Student/faculty presentations, opportunity for independent projects.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 5 times.
Equivalent to: BIOC 496N, MATH 496N, MCB 496N
Recommendations and additional information: Two semesters of calculus, consent of instructor.

ECOL 496O: Galapagos Marine Ecology (1 - 6 units)
Description: Galapagos Marine Ecology is a three-week summer course taught on the island of San Cristobal, Galapagos, Ecuador. Students conduct their own marine ecology research investigations under the guidance of the instructors, using the natural reef as a living "laboratory". Students are introduced to the local history and culture of the people who live on San Cristobal and the environmental issues that predominate in this unique world heritage site. There is a required service component helping children from a local school with English language instruction. This course is designed to meet the needs of diverse audiences: K-12 teachers interested in incorporating the Galapagos into their classroom instruction, other interested graduate students, and upper division undergraduate students. Students enrolled for the first time will take the course for 3 units. Students may repeat the course up to 3 times for 1-6 units.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 4 times.
Co-convened with: ECOL 596O
Course typically offered:
Main Campus: Summer

Student Engagement Activity: Community Partnership
Student Engagement Competency: Sustainability

ECOL 496R: Species Diversity (2 units)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Co-convened with: ECOL 596R

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 496T: Ecology and Biogeochemistry of the Amazon (2 units)
Description: This is an intensive field course focusing on the ecology and biogeochemistry of Amazonian ecosystems. It combines classroom lectures by an international group of instructors, field-based instruction, and small group projects to provide theoretical and practical tools to tackle global change problems in a setting designed to foster effective international collaboration. The location of the course is a fully equipped Brazilian field site in a national forest in the heart of the Amazon Basin.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 2 times.
Co-convened with: ECOL 596T
Recommendations and additional information: Permission of Director.

ECOL 497A: Undergraduate Teaching Training in Ecology and Evolutionary Biology (1 - 5 units)
Description: The practical application of theoretical learning within a group setting and involving an exchange of ideas and practical methods, skills, and principles.
Grading basis: Regular Grades
Career: Undergraduate
Flat Fee: $87
Course Components: Workshop Required
Repeatable: Course can be repeated for a maximum of 12 units.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Consult department before enrolling.

ECOL 497B: Biology Lecture Tutor (1 - 5 units)
Description: Enrolled students serve as peer tutors for ECOL courses, with the goal of promoting independence in student learning. Tutors will work with ECOL faculty and gain leadership and mentoring skills while brushing up on biology (helpful for those about to take MCATs or GREs) and establishing contacts and skills beneficial for future job searches.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Workshop Required
Repeatable: Course can be repeated for a maximum of 12 units.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: ECOL 182R, ECOL 182L, ECOL 302, ECOL 335, ECOL 320 or PLS 312.

ECOL 497S: Topics in Social Insect Biology (2 units)
Description: We will discuss current and classic literature on social insect research including, but not limited to, insect ecology, collective and individual behavior, multilevel selection and conflict within colonies, and sociogenomics. After introductory lectures, the course will include student presentations, discussions of current papers, and guest lectures by experts on various topics.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Workshop Required
Co-convened with: ECOL 597S
Honors Course: Honors Contract
Honors Course: Honors Contract

ECOL 498: Senior Capstone (1 - 3 units)
Description: A culminating experience for majors involving a substantive project that demonstrates a synthesis of learning accumulated in the major, including broadly comprehensive knowledge of the discipline and its methodologies. Senior standing required.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Course typically offered:
Main Campus: Fall, Spring

Student Engagement Activity: Discovery
Student Engagement Competency: Innovation and Creativity

ECOL 498H: Honors Thesis (3 units)
Description: An honors thesis is required of all the students graduating with honors. Students ordinarily sign up for this course as a two-semester sequence. The first semester the student performs research under the supervision of a faculty member; the second semester the student writes an honors thesis.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated for a maximum of 9 units.
Course typically offered:
Main Campus: Fall, Spring

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course
Writing Emphasis: Writing Emphasis Course

ECOL 499: Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Alternative Grading: S, P, F
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Student Engagement Activity: Discovery
Student Engagement Competency: Innovation and Creativity

ECOL 499H: Honors Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work.
Grading basis: Regular Grades
Career: Undergraduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

Enrollment requirement: Student must be active in the Honors College.
Honors Course: Honors Course
Honors Course: Honors Course

ECOL 501: Ecological Physiology (3 units)
Description: During ontogeny, organisms constantly have to adjust their physiology in response to the environment they encounter. This course will provide an integrative understanding of life history evolution from the perspective of the constraints imposed by their underlying physiology. We will emphasize how physiological tradeoffs at the level of the whole organism ultimately define an organism¿s life history and fitness. The course will provide students with a conceptual approach to the integration of whole-organism physiology underlying life history traits. Relevant physiological, evolutionary and ecological background necessary to understand the concepts discussed will be given in lecture. Course will focus primarily on insects and will also use examples from other animals. Graduate-level requirements include a 5 page essay requiring independent reading and development of a conceptual framework of how the topics discussed in the course tie into the natural life history of their organism. Grades are based on sophistication and logical structure of thinking.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: EIS 501, PSIO 501
Co-convened with: ECOL 401
Course typically offered:
Main Campus: Fall (odd years only)

Home department: Committee on Entomology and Insect Science

ECOL 503L: Parasitology Laboratory (1 unit)
Description: Parasite morphology and diagnostic laboratory techniques.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory Required
Equivalent to: ECOL 503L, EIS 503L, ENTO 503L, IMB 503L, INSC 503L, MBIM 503L, MICR 503L, VSC 503L
Also offered as: ACBS 503L, EIS 503L, IMB 503L, MIC 503L
Co-convened with:
Course typically offered:
Main Campus: Fall

Home department: Veterinary Science & Microbiology

ECOL 503R: Biology of Animal Parasites (3 units)
Description: Biology of host-parasite relationships with emphasis on parasites of veterinary and human importance. Parasite morphology and physiology, life cycles, epidemiology, pathogenesis and zoonotic potential. Graduate-level requirements include an in-depth research paper on the molecular biology/immune response of a single parasite.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 503R, EIS 503R, ENTO 503R, IMB 503R, INSC 503R, MBIM 503R, MICR 503R, VSC 503R
Also offered as: ACBS 503R, EIS 503R, IMB 503R, MIC 503R
Co-convened with: ECOL 403R
Course typically offered:
Main Campus: Fall

Home department: Veterinary Science & Microbiology

ECOL 504F: Biology of the Oceans Lab (1 unit)
Description: This course will provide a brief overview of oceanography only to set the stage for exploring the diversity and ecology of biological organisms in ocean systems, as well as how biological processes (including human activity) shape ocean physics, chemistry and geology.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $166
Course Components: Laboratory Required
Equivalent to: ECOL 504L, GEOS 504L, GEOS 504L, RNR 504L, RNR 504L
Co-convened with: ECOL 404F
Interdisciplinary Interest Area: GEOS - Geosciences

ECOL 504R: Biology of the Oceans (3 units)
Description: This course will provide a brief overview of oceanography only to set the stage for exploring the diversity and ecology of biological organisms in ocean systems, as well as how biological processes (including human activity) shape ocean physics, chemistry and geology. Graduate-level requirements include writing an NSF-style Graduate Student Research Fellowship targeted to the Biological Oceanography directorate on an instructor-approved topic of their choice.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 504A, GEOS 504A, GEOS 504R, RNR 504A, RNR 504R
Also offered as: RNR 504R
Co-convened with: ECOL 404R
Recommendations and additional information: ECOL 182R or GEOS 412A or consent of instructor.
Interdisciplinary Interest Area: GEOS - Geosciences

ECOL 505: Aquatic Entomology (4 units)
Description: Morphological, physiological and behavioral adaptations of insects to life in water; taxonomy and ecology of aquatic insects. Graduate-level requirements include an original research or review paper on some aspect of aquatic entomology agreed upon by the student and the professor.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory Required
Lecture Required
Equivalent to: ECOL 505, ENTO 505, INSC 505, WFSC 505
Also offered as: EIS 505, WFSC 505
Course typically offered:
Main Campus: Spring

Field trip: Field trip.
Home department: Committee on Entomology and Insect Science

ECOL 506L: Conservation Biology in the Field (1 unit)
Description: Problem-solving, discussion, and field trips (binoculars recommended). One Saturday trip and two 3-day weekend trips in Oct-Nov. Graduate-level requirements include participation as team leaders.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $139
Course Components: Laboratory Required
Equivalent to: GEOS 506L, RNR 506L
Also offered as: RNR 506L
Co-convened with: ECOL 406L
Recommendations and additional information: Concurrent registration, ECOL 506R.
Field trip: One Saturday trip and two 3-day weekend trips in Oct-Nov.
Interdisciplinary Interest Area: GEOS - Geosciences

ECOL 506R: Conservation Biology (3 units)
Description: Biological principles applied to protection and recovery of threatened and endangered species and the processes which link species in natural ecosystems. Biological basis for conservation laws and regulations. Distribution, valuation and sustainable production of biodiversity benefits for humanity. Graduate-level requirements include a research paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 506, GEOS 506, GEOS 506R, RNR 506, RNR 506R
Also offered as: RNR 506R
Co-convened with: ECOL 406R
Course typically offered:
Main Campus: Spring

Interdisciplinary Interest Area: GEOS - Geosciences

ECOL 508L: Genes, Biotechnology and the Environment (2 units)
Description: This course is an intensive summer lab course in DNA technology for secondary school science teachers and pre-service teachers. Students use molecular techniques of PCR, DNA sequencing, and computer BLAST searches to learn how genes and molecules are linked to the ecology of many species. The course may include field trips and may involve high school student participants. Graduate-level requirements include writing and presenting to the class a plan for applying course material to a secondary science classroom by using biotechnology and bioinformatics to answer a problem in ecology and/or evolution.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory Required
Lecture May Be Offered
Repeatable: Course can be repeated a maximum of 3 times.
Equivalent to: BIOC 508L, MCB 508L
Co-convened with: ECOL 408L
Recommendations and additional information: Some experience with lab techniques/biotechnology required (equivalent to BIOC 597A "DNA Recombinant Techniques").
Interdisciplinary Interest Area: BIOC - Biochemistry
Interdisciplinary Interest Area: MCB - Molecular & Cell Biology

ECOL 509: Evolution of Infectious Disease (3 units)
Description: Causes and consequences of evolutionary change in pathogens. Evolutionary principles, vertebrate immunity, molecular epidemiology, evolution of virulence, evolution of antimicrobial resistance, predicting epidemics, impacts of infectious disease on host evolution, HIV evolution. Graduate-level requirements include a term paper and an in-class presentation on the same topic.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: CPH 509, MCB 509, VSC 509
Also offered as: ACBS 509, EPID 509
Co-convened with: ECOL 409
Interdisciplinary Interest Area: MCB - Molecular & Cell Biology

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 510: Microbial Biogeochemistry and Global Change (3 units)
Description: Microbes are the drivers of planetary biogeochemistry. They produce half the oxygen on the planet, and fix half the carbon. They introduce bioavailable forms of nitrogen into the biosphere. If human life ceased to exist, the central biogeochemical cycles would continue turning. However, while the planet's biogeochemistry can persist readily in the absence of human life, that does not mean that humankind's presence lacks impact. The Anthropocene (era of human impact) has seen significant changes to planetary stocks and fluxes of C, N, S, etc. Many of these changes involve or impact microbes, and have significant impacts on biogeochemical cycles. To understand microbial biogeochemistry in today's world, one must include the context of global change. And, conversely, one cannot understand the trajectory of global change without understanding microbial feedbacks via biogeochemical cycles. In this interdisciplinary undergraduate and graduate class we will cover major microbial biogeochemical cycles, and how these cycles are impacted by, and feedback to, global change. To understand the research in this area, we will discuss current methods in both microbial ecology and biogeochemistry, ranging from molecular meta-omics to the use of isotopes as biogeochemical tracers, with a particular emphasis on the challenges and opportunities of integrating these two disciplines. Lectures will be mixed with journal club-style readings and discussions, so active participation is essential. This course is designed for graduate students from diverse backgrounds and advanced undergraduates. Graduate-level requirements include (i) a twice-as-extensive background reading and synthesis component for their final presentation as the undergraduates, (ii) an active leadership role in group discussions.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: ENVS 510, GEOS 510, PLS 510
Co-convened with: ECOL 410
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Background in biology or biogeochemistry, and openness to interdisciplinary learning.
Home department: Soil, Water, & Environmental Sciences
Interdisciplinary Interest Area: ECOL - Ecology & Evolution Bio
Interdisciplinary Interest Area: GEOS - Geosciences

ECOL 514: Plants of the Desert (2 units)
Description: Designed for teachers and others wishing to become familiar with common native and cultivated plants; identification, ecology, and uses. Graduate-level requirements include a research paper on a relevant topic.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with: ECOL 414
Course typically offered:
Main Campus: Summer

Field trip: Two required field trips outside normal class sessions

ECOL 515R: Insect Biology (3 units)
Description: Examination of how insects function morphologically, physiologically, and behaviorally. Investigation of relationships between members of Insecta and how they interact with other major taxa, both plant and animal. See http://ag.arizona.edu/classes/ento415/ for class information and list of lectures. Graduate-level requirements include submission of reports on landmark papers in insect biology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 515R, ENTO 515R
Also offered as: EIS 515R
Course typically offered:
Main Campus: Fall

Home department: Committee on Entomology and Insect Science

ECOL 518: Spatio-Temporal Ecology (3 units)
Description: Population growth and species interactions in spatially and temporally varying environments. Meta populations and communities. The scale transition, the storage effect, nonlinear competitive variance, fitness-density covariance, disturbance, competition-colonization tradeoffs. Graduate-level requirements include the additional challenge of including less assistive text, as these students are expected to possess a broader knowledge base.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall (odd years only)

ECOL 519: Introduction to Modeling in Biology (3 units)
Description: This course will give an introduction to different modeling methods used in biology research, including differential equations, individual-based simulations, Markov processes, stochastic models, network analysis, and others. Students will learn what questions can be answered and what the limitations of each of these methods are, and read scientific papers applying them. Students will also develop their own modeling project with advice from the instructor, and learn basics of writing scripts and programming. Graduate-level requirements include written summaries of scientific papers using particular modeling techniques.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with: ECOL 419
Course typically offered:
Main Campus: Fall

ECOL 520: Insect Systems Biology (3 units)
Description: This course combines insect physiology and insect molecular biology. It provides a current and comprehensive understanding of how insect systems function from the molecular to the organismal levels. It identifies emerging areas of research in insect physiology and molecular biology. This course also explores the evolutionary conservation of these mechanisms and its consequences for all animals.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Equivalent to: ECOL 520, ENTO 520, INSC 520
Also offered as: EIS 520
Course typically offered:
Main Campus: Spring (odd years only)

Recommendations and additional information: ENTO 415R. Courses in Biochemistry, Cell Biology, or Molecular Genetics or consent of instructor.
Home department: Committee on Entomology and Insect Science

ECOL 521: Philosophy of the Biological Sciences (3 units)
Description: Laws and models in biology, structure of evolutionary theory, teleological explanations, reductionism, sociobiology. Graduate-level requirements include an in-depth research paper on a central theme or topic of the course.
Grading basis: Student Option ABCDE/PF
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 521
Also offered as: PHIL 521
Co-convened with: ECOL 421
Course typically offered:
Main Campus: Spring (odd years only)

Home department: Philosophy

ECOL 523: Sex and Individuality in Evolution (3 units)
Description: Sex has profound effects throughout biology and much of human affairs, yet the evolution of sex remains one of the great unsolved mysteries in biology. To understand the evolution of sexual and asexual forms of reproduction, we need to understand what it means to be an individual in evolution. Why have the different kinds of biological individuals evolved that are found in the hierarchy of life? This course will explore these and related issues using a rigorous framework based on your introductory and mid-level biology courses. We will find that the Darwinian paradigm of competition needs some updating. When it comes to understanding the most general properties of life, cooperation plays an even greater role. Graduate-level requirements include additional questions on each exam and they will be assigned more working problems than undergraduates in the problem sets. In addition an in-class presentation of a class project will be required of graduate students.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with: ECOL 423

ECOL 524: Chance, Purpose & Progress in Evolution & Religion (1 unit)
Description: The scientific theory of evolution by natural selection has had a profound philosophical influence on ideas of chance, purpose and progress, sometimes running into conflict with religion in the process. This course will provide a forum for rigorous, authentic, respectful but not circumscribed discussion of these core philosophical issues, including both scientific and theological perspectives.
Grading basis: Regular Grades
Career: Graduate
Course Components: Discussion Required
Repeatable: Course can be repeated a maximum of 3 times.
Also offered as: PHIL 524, RELI 524
Course typically offered:
Main Campus: Spring

ECOL 525: Speciation (2 units)
Description: [Taught alternate years 1999 - 2000] Mechanisms of evolution in the formation of races and species of animals and plants.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Equivalent to: GENE 525
Also offered as: GENE 525
Course typically offered:
Main Campus: Spring

Recommendations and additional information: ECOL 320.

ECOL 526: Population Genetics (3 units)
Description: General introductory course on empirical and theoretical population genetics. It will involve two weekly lectures, weekly problem sets, and regular readings from the primary literature. A major goal of this course is to make students familiar with basic models of population genetics and to acquaint students with empirical tests of these models. As much as any field of biology, population genetics has been divided into a theoretical and an empirical branch. However, these two bodies of knowledge are intimately related and this course will cover both in roughly equal amounts. We will discuss the primary forces and processes involved in shaping genetic variation in natural populations (mutation, drift, selection, migration, recombination, mating patterns, population size and population subdivision), methods of measuring genetic variation in nature, and experimental tests of important ideas in population genetics. The course will also cover a few more specialized topics such as transposable elements, the evolution of multigene families, and molecular clocks. Graduate-level requirements include additional exam questions, additional readings from the literature, and presentation of a 15 minute overview and synthesis of a specialized topic in population genetics.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $50
Course Components: Lecture Required
Equivalent to: GENE 526
Also offered as: GENE 526
Co-convened with: ECOL 426

ECOL 528L: Microbial Genetics Laboratory (2 units)
Description: Laboratory associated with lecture course on Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Graduate-level requirements include the DNA sequence of an entire operon from any one of a variety of bacteria and additionally analyze one product from the operon using several GCG protein analysis programs. Also extra exam questions.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $70
Course Components: Laboratory Required
Equivalent to: ECOL 528L, MCB 528L, MIC 528L, MICR 528L, PLS 528L, SWES 528L, VSC 528L
Also offered as: ACBS 528L, ENVS 528L, MCB 528L, MIC 528L, PLP 528L, PLS 528L
Co-convened with: ECOL 428L
Course typically offered:
Main Campus: Spring

Home department: Plant Pathology

ECOL 528R: Microbial Genetics (3 units)
Description: Prokaryotic gene structure and function; methods of gene transfer and mapping, DNA structure, replication, transcription, and translation. Hands-on computer analysis of DNA sequences and gene cloning strategies. Principles of regulation of gene expression. Graduate-level requirements include a DNA sequence of an entire operon from any one of a variety of bacteria and additionally analyze one product from the operon using several GCG protein analysis programs plus an extensive exam.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 528R, GENE 528, GENE 528R, MCB 528R, MIC 528R, MICR 528R, PLP 528, PLS 528R, SWES 528R, VSC 528R
Also offered as: ACBS 528R, ENVS 528R, MCB 528R, MIC 528R, PLP 528R, PLS 528R
Co-convened with:
Course typically offered:
Main Campus: Spring
Distance Campus: Spring

Home department: Plant Pathology

ECOL 530: Conservation Genetics (3 units)
Description: Basic methods and theories of genetic/genomic analyses together with the application of these analyses to promote conservation, proper management, and long term survival of free-ranging species, including the exploration of current conservation genetic/genomic literature. Graduate level requirements include a term project and an oral presentation.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture — Required
Seminar — May Be Offered
Equivalent to: ECOL 530, GENE 530
Also offered as: GENE 530, WFSC 530
Co-convened with: ECOL 430
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ECOL 320, PLS 312, basic genetics class, or consent of instructor.
Home department: School of Natural Resources and the Environment

ECOL 530L: Conservation Genetics Lab (1 unit)
Description: This course is offered to meet the needs of students wanting to work in conservation genetics and to provide a genetic prospective to students working in other areas of conservation biology. The two primary goals of the class are to give students first-hand experience in a conservation genetics lab and to publish a research paper as a class. This is a laboratory based course with an emphasis on producing useful conservation related data and subsequently publishing our results. The class will be structured to mirror the steps involved in taking a research project from an idea all the way through to publication. Emphasis will be primarily on the lab work, data analyses, and writing and review process, though grant writing and sample collection will be introduced. Graduate students will have additional paper-editing and laboratory duties.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory — Required
Also offered as: GENE 530L, WFSC 530L
Co-convened with: WFSC 430L
Course typically offered:
Main Campus: Fall

Home department: School of Natural Resources and the Environment
Enrollment requirement: Concurrent enrollment in WFSC/GENE/ECOL 530 required.

ECOL 531: Primate Sexuality (3 units)
Description: Human sexuality is explored through discussing the evolution of non-human primate anatomy, physiology, and behavior. Topics include comparative reproductive anatomy and reproductive health, mating strategies, mate choice, parenting and parental investment, and socioendocrinology (the study of behavior-hormone relationships).
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: ANTH 531, FCSC 531, PSY 531
Co-convened with: ECOL 431
Course typically offered:
Main Campus: Spring

Home department: School of Anthropology

ECOL 532: Comparative Immunology (3 units)
Description: How have vertebrate immune systems evolved from simple origins? We will cover comparative immunology of prokaryotes, protozoans, plants, fungi, invertebrates, and "lower" vertebrates. By studying the origins and evolution of immunity across the history of life, and following the progression of immune system complexity across different lineages, we begin to see patterns that help explain how our immune system developed from those of our ancestors. Such comparative study will highlight the strengths and weaknesses of our immune system, and point to ways in which other organisms have overcome the same pathogenic stresses we currently face. This class will pull together data from many fields, including immunology, molecular and cell biology, ecology, and evolution. Graduate students will prepare and give one oral presentation of a specific topic to the class, which will be graded.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: ACBS 532, EIS 532, IMB 532, MCB 532, MIC 532
Co-convened with: ECOL 432
Course typically offered:
Main Campus: Fall

Home department: Committee on Entomology and Insect Science
Enrollment requirement: MCB 181R and MCB 181L, ECOL 182R and ECOL 182L, or instructor consent.

ECOL 535: Plants under Stress: Plant-Environment Interactions in a Changing World (3 units)
Description: Plant ecophysiology is the study of a plant's physiological response to its environment. These responses within vegetation serve to determine patterns in biogeography and community, landscape, and ecosystem ecology. This 3-hour course will (1) revisit the core principles and underlying assumptions that plant ecophysiology is based upon, (2) examine plant responses to a myriad of biotic and abiotic stresses, and (3) familiarize students with ecophysiological tools available to assess those plant responses. Upon completion of this course, students should be prepared to confidently outline and conduct ecophysiological experiments ~ including running, trouble-shooting, and maintaining commonly used equipment and interpreting measured response functions.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: GEOG 535
Co-convened with: GEOG 435
Course typically offered:
Main Campus: Spring

Field trip: Students will visit local research sites.
Home department: School of Geography and Development

ECOL 538: Biogeography (3 units)
Description: The role of historical events and ecological processes in determining the past and present geographic distribution of plants and animals. Graduate-level requirements include a research paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 538, GEOS 538
Also offered as: GEOG 538, GEOS 538
Co-convened with: ECOL 438
Course typically offered:
Main Campus: Fall

Home department: School of Geography and Development

ECOL 540: Mechanisms in Plant Development (3 units)
Description: Focuses on the molecular genetic mechanisms of plant development using primarily the current model systems. Graduate-level requirements include seven journal club discussions and presentations for graduate students and honors undergraduate students.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 540, MCB 540
Also offered as: MCB 540, PLS 540
Co-convened with: ECOL 440
Course typically offered:
Main Campus: Fall

Recommendations and additional information: PLS 312 or ECOL 320. Recommend: BIOC 384, PLS 360 and MCB 304.
Home department: School of Plant Science

ECOL 542: Limnology (4 units)
Description: Study of lakes and streams; biological characteristics, as related to physical, chemical, geological, and historical processes operating on fresh waters. Graduate-level requirements include a report that synthesizes literature on a research issue of current concern, an in-class presentation and several discussion meetings.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $23
Course Components: Laboratory May Be Offered
Lecture Required
Equivalent to: ECOL 541
Also offered as: ENVS 542, WFSC 542
Co-convened with: ECOL 441
Field trip: Weekend field trip
Home department: Environmental Science

ECOL 544: Insect Ecology (3 units)
Description: The study of how variation in the environment, interactions with other species and the special features of insect "design," have determined the evolution of diverse insect life histories, the dynamics of insect population and the roles of insects in communities.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 544, ENTO 544, INSC 544
Also offered as: EIS 544
Course typically offered:
Main Campus: Fall (odd years only)

Home department: Committee on Entomology and Insect Science

ECOL 547: Introduction to Theoretical Ecology (3 units)
Description: Population growth and density dependence; predation; competition and apparent competition; coexistence mechanisms: niches, spatial and temporal variation; food web concepts and properties; applications. Emphasis on understanding through models and examples. Graduate-level requirements include additional questions of a more advanced nature on exams.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall (even years only)

ECOL 548A: Plant Biochemistry and Metabolic Engineering (3 units)
Description: Covering topics in plant metabolic engineering; photosynthesis; carbohydrate, nitrogen and lipid metabolism; specialized metabolism. This course covers biochemical processes specific to plants and allows students to gain an understanding and appreciation of how (bio)chemical components are synthesized and utilized by plants during growth and development and in their interactions with their environment, as well as how these processes can be manipulated. A background in plant biology, general biochemistry or chemistry is expected. Note that concurrent registration in any of these courses will NOT meet this requirement. Students must have completed both semesters of O-chem and a biochemistry course that covers general metabolism prior to taking this course. Graduate-level requirements include 2 or 3 short individual oral presentations and a term paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: BIOC 548A, CHEM 548A, ECOL 548A, MCB 548A
Also offered as: BIOC 548A, CHEM 548A, MCB 548A, PLS 548A
Co-convened with: ECOL 448A
Course typically offered:
Main Campus: Fall

Home department: School of Plant Science

ECOL 549A: Plant Genetics and Genomics (3 units)
Description: A 3-unit lecture/discussion course that provides an advanced treatment of the current knowledge and experimental approaches used in genetic and genomic analysis, with emphasis on plants. Basic understanding of Mendelian genetics, gene and genome structure and function is required. Graduate-level requirements include leading 3 course discussions on review articles and problem sets and write a paper based on each of the three research discussions that they lead.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 549A, GENE 549A, MCB 549A
Also offered as: GENE 549A, MCB 549A, PLS 549A
Co-convened with:
Home department: School of Plant Science

ECOL 551: Drosophila: Model System for Evolution (3 units)
Description: Drosophila is the most important eukaryotic model system for comparative studies in biology. We will explore several aspects of its ecology, genetics and evolution, making connections to general concepts of biology and applied research. The course will combine lectures with hands-on activities (lab and computer) and field trips. Graduate-level requirements include a review paper on one of the topics discussed in class and additional homework.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: MCB 551
Co-convened with: ECOL 451
Field trip: One field trip to collect flies.
Interdisciplinary Interest Area: MCB - Molecular & Cell Biology

ECOL 552: Dryland Ecohydrology and Vegetation Dynamics (4 units)
Description: Overview of ecological and hydrological interrelationships, including ecologically meaningful water budgets, and associated vegetation dynamics for water-limited, dryland ecosystems. Graduate-level requirements include different grading criteria and exam components plus completing a group research project in coordination with the instructor.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: HWRS 552, RNR 552, WSM 552
Co-convened with: ECOL 452
Course typically offered:
Main Campus: Fall

Recommendations and additional information: RNR 316, ECOL 302, or consent of instructor.
Home department: Watershed Management

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-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 553: Functional and Evolutionary Genomics (4 units)
Description: Computational, functional, and evolutionary approaches to genomics, including bioinformatics and laboratory methods relevant to many modern research approaches in biology. Graduate-level requirements include students completing independently designed lab exercises and relate these to the primary literature in a paper. Undergraduate students will only complete defined lab exercises.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: BIOC 553, BIOC 553R, ECOL 553R, MCB 553
Also offered as: BIOC 553, EIS 553, MCB 553
Co-convened with: ECOL 453
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Concurrent registration, ECOL 553L for first year IGERT fellows.

ECOL 553L: Functional and Evolutionary Genomics - Laboratory (1 unit)
Description: Computational, functional, and evolutionary approaches to genomics, including bioinformatics and laboratory methods. Graduate-level requirements include completion of independently designed lab exercises and relating them to the primary literature in a paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory Required
Lecture May Be Offered
Equivalent to: BIOC 553L
Also offered as: BIOC 553L
Co-convened with: ECOL 453L
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Concurrent registration, ECOL 553R.

ECOL 554: Water Harvesting (3 units)
Description: Course focuses on water harvesting principles and techniques at a variety of scales and settings. Students participate in hands-on implementation of water harvesting projects on the UA campus.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 554, WFSC 554
Also offered as: ENVS 554, WFSC 554
Co-convened with: ECOL 454
Course typically offered:
Main Campus: Spring

Home department: Soil, Water, & Environmental Sciences

ECOL 557: Medical-Veterinary Entomology (3 units)
Description: An overview of medically important arthropods and the diseases they transmit. Special attention will be paid to newly emerging and locally important vectors and diseases. Basic coursework in biology or entomology is required. Graduate-level requirements include an in-depth review article on a relevant topic of medical entomology. The paper (15 to 20 pages of double-spaced text, including references) should be written in the same form and bibliographic style as articles in the Annual Review of Entomology. Spelling, grammar, sentence and paragraph construction, and overall organization will be considered for the grade.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 557, ENTO 557, INSC 557, VSC 557
Also offered as: ACBS 557, EIS 557
Course typically offered:
Main Campus: Spring

Home department: Committee on Entomology and Insect Science

ECOL 560: Advanced Plant Biology (4 units)
Description: Advanced, graduate-level treatment of current understanding of development, metabolism, response to environmental signals and stress, interactions with other organisms, and plant origins and crop domestication.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: MCB 560, PLP 560, PLS 560
Course typically offered:
Main Campus: Fall

Recommendations and additional information: MCB 181R, PLS 360, and BIOC 462A. Basic molecular biology, plant biology and biochemistry are necessary to succeed in this class. Equivalent courses will be acceptable to fulfill these requisites.
Home department: School of Plant Science

ECOL 563: Ecology & Natural History of the Sonoran Desert & Gulf of California (4 - 6 units)
Description: Hands-on, field-based exploration of the Sonoran Desert, its Sky Islands, and the Upper Gulf of California. Students will be introduced to the ecological, taxonomic, and natural-history diversity of the region. To accomplish this ecological Sense of Place immersion, we will conduct several small independent research projects, visit with topical experts, foray into some of the most beautiful and iconic portions of the desert southwest, and read about the important, exciting, and interesting science to come out of the area. Conservation will be an important sub-theme of the course. Prior to enrollment, students are expected to have the equivalent of a college-sophomore/junior-level background in ecology and evolutionary biology. Students should be prepared for, and able to participate in, desert & mountain hiking, camping, and boating. Contact instructor for more course details. Graduate-level requirements include more rigorous expectations for all assignments, including research projects and presentations, as well as additional outside reading and synthesis of relevant primary literature.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $1250
Course Components: Laboratory Required
Lecture Required
Repeatable: Course can be repeated for a maximum of 18 units.
Co-convened with: ECOL 463
Recommendations and additional information: ECOL 182R, ECOL 302, ECOL 335 or similar background.
Field trip: Ability to hike on uneven terrain in the desert in hot conditions. Overall good health for field activities, camping, and boating.

ECOL 564: Sonoran Desert Discovery (3 units)
Description: In Sonoran Desert Discovery, enrolled students will teach biological, ecological, and ecosystem principles (Biosphere 1) to school groups and the public (kindergarten to retiree) at Biosphere 2 and other Tucson venues. Students will build inquiry-based workshops (on campus and in small groups) to lead for the public. Students will develop public-speaking skills and their own effective teaching style while learning about Sonoran desert ecology and natural history. Graduate-level requirements include earning 200 additional points for one of two options: 1. Overhaul this course to improve it, or 2. Develop an innovative, exciting, web-based outreach workshop/module consistent with the goals of this course.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 4 times.
Also offered as: RNR 564
Co-convened with: ECOL 464
Recommendations and additional information: Especially motivated students without biology/ecology background may also do well.
Field trip: Course includes several, usually Saturday, field trips.

ECOL 565: Phylogenetic Biology (3 units)
Description: Concepts in phylogenetic biology, focusing on the phylogenetic (evolutionary) tree of species. The form of the tree, character evolution, speciation, and gene trees. Graduate-level requirements include a more in-depth term paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: EIS 565, ENTO 565, GEOS 565, MCB 565
Also offered as: EIS 565
Co-convened with: ECOL 465
Course typically offered:
Main Campus: Spring (even years only)

Interdisciplinary Interest Area: GEOS - Geosciences

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 567: Pollination Ecology-Behavior, Cognition, & Ecology of Pollinators (2 units)
Description: We will discuss current research topics related to the coevolution of pollinators and plants. This will include issues of cognitive ecology, signal detection & evolution, evolution of mutualisms, cheating and cooperation, foraging theory, biological markets, etc. Students will also have the opportunity to suggest topics for discussion. Graduate-level requirements at least one, possibly more 30-minute presentations in class and will organize discussions.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture — Required
Seminar — May Be Offered
Equivalent to: EIS 567, ENTO 567, INSC 567
Also offered as: EIS 567
Co-convened with: ECOL 467
Course typically offered:
Main Campus: Spring

ECOL 572: Systematic Botany (4 units)
Description: Evolutionary relationships and characteristics of seed plants: systems of classification; acquisition of skills to identify members of almost 50 families, collection and identification of local flora. Graduate-level requirements include study of additional plant families and increased depth regarding class project.
Grading basis: Regular Grades
Career: Graduate
Course Components: Laboratory — May Be Offered
Lecture — Required
Equivalent to: PLS 572
Also offered as: PLS 572
Co-convened with: ECOL 472
Course typically offered:
Main Campus: Spring (odd years only)

ECOL 573: Topics in Behavioral Ecology (3 units)
Description: Theory and practice of behavioral ecology. Focuses on the ecology and evolution of animal behavior. Analytical and critical approach to frontier issues and techniques in behavioral research. Graduate-level requirements include different exams in both number and difficulty. Graduate student discussion group leaders will be graded.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture — Required
Repeatable: Course can be repeated a maximum of 4 times.
Co-convened with: ECOL 473
Course typically offered:
Main Campus: Spring

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-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 574: Aquatic Plants and the Environment (4 units)
Description: The role of riparian areas, estuaries, and constructed wetlands in the environment. Emphasis on plants as wildlife habitat for nutrient cycling and bioremediation. Graduate-level requirements include an additional research project and class presentation.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: ENVS 574, WFSC 574
Co-convened with: ECOL 474
Course typically offered:
Main Campus: Fall

Home department: Environmental Science

ECOL 575: Freshwater and Marine Algae (4 units)
Description: Systematics, ecology, and evolution of planktonic and benthic species; field techniques and lab culture. Graduate-level requirements include a special topic report on an aspect of freshwater algae.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $25
Course Components: Lecture Required
Equivalent to: SWES 575, WFSC 575
Also offered as: ENVS 575, WFSC 575
Co-convened with: ECOL 475
Course typically offered:
Main Campus: Spring

ECOL 578: Global Change (3 units)
Description: Analysis of the Earth system through an examination of its component parts (particularly climate and biogeochemistry) and their interactions with human activities, emphasizing information needed to understand modern and future environmental changes. Graduate-level requirements include an in-depth written exercise and additional activities as described in the syllabus.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ECOL 578, GC 578, GEOG 578, HWRS 578, HYDR 578, RNR 578, SW 578
Also offered as: GC 578, GEOG 578, GEOS 578, HWRS 578, RNR 578
Course typically offered:
Main Campus: Fall

Home department: Geosciences
Interdisciplinary Interest Area: ECOL - Ecology & Evolution Bio

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-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 579: Art of Scientific Discovery (3 units)
Description: Techniques of posing questions and solving puzzles encountered in scientific research, with emphasis on life sciences and mathematics. Graduate-level requirements include use of all techniques in a semester-long research project and final paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Equivalent to: ECOL 579, MCB 579
Also offered as: CMM 579, MCB 579
Co-convened with: ECOL 479
Course typically offered:
Main Campus: Fall

Home department: Cellular & Molecular Medicine

ECOL 580: Mathematical Models in Biology (3 units)
Description: For advanced undergraduates and graduate students in biological and ecological sciences, and math students: learn how to apply basic tools of mathematical tools (from simple back-of-the-envelope estimates to formal stability analysis using difference and differential equations) to biological problems including population dynamics, species coexistence, population genetics, links between ecosystems ecology and Global biogeochemistry, and biological scaling.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Also offered as: MATH 580
Co-convened with: ECOL 480
Course typically offered:
Main Campus: Spring

Recommendations and additional information: MATH 129.

ECOL 581: Advanced Topics in Biological Statistics (3 units)
Description: Advanced topics in statistical methodology relevant to Biology, Genetics and Ecology. Maximum likelihood, General Linear models, randomization methods, power, distribution theory.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Seminar May Be Offered
Recommendations and additional information: Basic course in statistics and/or matrix algebra.

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May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 582: Ichthyology (4 units)
Description: Ecology, evolution and systematics of fishes, with field and lab emphasis on Gulf of California and Arizona fishes. Graduate-level requirements include an in-depth research project on a single aspect of the course topic.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $64

Course Components:	Laboratory	Required
	Lecture	May Be Offered

Equivalent to: WFSC 582
Also offered as: WFSC 582
Co-convened with: ECOL 482
Course typically offered:
Main Campus: Fall (odd years only)

ECOL 583: Herpetology (4 units)
Description: Systematics, ecology, and evolution of the amphibians and reptiles. Graduate-level requirements include an in-depth paper.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $142

Course Components:	Laboratory	May Be Offered
	Lecture	Required

Equivalent to: WFSC 583
Also offered as: WFSC 583
Co-convened with: ECOL 483
Course typically offered:
Main Campus: Spring (even years only)

ECOL 584: Ornithology (4 units)
Description: Natural history of birds and its bearing upon the problems of animal behavior, distribution, and evolution. Graduate-level requirements include an independent research project.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $50

Course Components:	Laboratory	Required
	Lecture	Required

Equivalent to: WFSC 584
Also offered as: WFSC 584
Co-convened with: ECOL 484
Course typically offered:
Main Campus: Spring

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 585: Mammalogy (4 units)
Description: Systematics, ecology, and evolution of mammals. Graduate-level requirements include an exercise in mammalian taxonomy and a higher level of performance.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $240
Other Fee: This course is pending a course fee review from ABOR and the fee is subject to change if approved.
Course Components: Laboratory Required
Lecture Required
Equivalent to: WFSC 585
Also offered as: WFSC 585
Co-convened with: ECOL 485
Course typically offered:
Main Campus: Fall

ECOL 586: Biological Scaling (2 - 3 units)
Description: Evolution of body size and the scaling of physiological, morphological, and ecological requirements, biomechanics, functional morphology, and dimensional analysis.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Recommendations and additional information: ECOL 302.

ECOL 587L: Animal Behavior Lab (1 unit)
Description: Exposure to current topics in behavior and process of behavioral research through video presentations, demonstrations of live animals and readings. Graduate-level requirements include organizing and leading of group discussion.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $28
Course Components: Laboratory Required
Co-convened with: ECOL 487L
Course typically offered:
Main Campus: Fall

ECOL 587R: Animal Behavior (3 units)
Description: Concepts and principles of the mechanism, development, function and evolution of behavior, with emphasis on its adaptiveness. Graduate-level requirements include term paper involving hands-on research.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Co-convened with: ECOL 487R
Course typically offered:
Main Campus: Fall

ECOL 588: Arizona Mammals (4 units)
Description: This course will include ecology and evolution of mammals, taxonomic identification, biomes and communities of the Sonoran Desert region, and field methods in mammalian research. The lecture/laboratory portions of this course are designed to provide students with experience conducting research on mammals in the wild, and will rely heavily on fieldwork. Field work includes small mammal trapping, mist-netting for bats, camera trapping, and other methods. ECOL 488 is for students interested in nature, mammals, camping, and wildlife fieldwork.
Grading basis: Regular Grades
Career: Graduate
Flat Fee: $190
Course Components: Lecture Required
Equivalent to: ECOL 588R, WFSC 588, WFSC 588R
Also offered as: WFSC 588
Co-convened with: ECOL 488
Course typically offered:
Main Campus: Summer

Field trip: Two required field trips to be scheduled, each from 2pm to midnight. Flashlights required.

ECOL 591: Preceptorship (1 - 4 units)
Description: Specialized work on an individual basis, consisting of instruction and practice in actual service in a department, program, or discipline. Teaching formats may include seminars, in-depth studies, laboratory work and patient study.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.

ECOL 595B: Insect Biodiversity and Land Use in Sonora (Mexico) (3 units)
Description: Site: Guaymas Campus of the Monterey Technological University, Mexico. This course provides an introduction to (1) the natural history of Sonora and its desert ecosystem, (2) land use patterns and change in Sonora, (3) insect systematics and natural history, particularly of insect pests and pollinators, (4) field collecting methods and identification, (5) construction of biodiversity databases, and (6) biodiversity theory and analysis. Indices of insect biodiversity can provide important means of assessing ecosystem health and responses to anthropogenic landscape change. Analyses will be made of insect communities and biodiversity in urban, suburban, agricultural, and native habitats. Responses of insect populations to land use change can include outbreaks of insect pests and insect-vectored human and animal diseases, therefore special attention will be paid to insect pests and vectors.
Grading basis: Regular Grades
Career: Graduate
Course Components: Colloquium Required
Equivalent to: ENTO 595B
Co-convened with: ECOL 495B

ECOL 596A: Evolutionary Ecology (2 units)
Description: This seminar-style graduate-level course will explore standing questions at the interface of ecology and evolution, with an emphasis on how evolutionary processes affect the ecology that we observe in natural populations. Underlying concepts will be reviewed briefly in lectures by the instructor, but the majority of class time will be spent discussing current literature and major questions in the field.
Grading basis: Student Option ABCDE/PF
Career: Graduate
Course Components: Seminar Required
Course typically offered:
Main Campus: Fall

ECOL 596B: Population Biology (1 unit)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 7 times.
Recommendations and additional information: Open to majors only.

ECOL 596C: Biology of Symbiosis (2 units)
Description: We will survey new findings on intimate associations of microbes with marine and terrestrial animals, plants, and other microbes. Evolutionary, genetic, physiological and ecological aspects will be included. Course aims are (1) to synthesize recent data from different fields and (2) to identify holes in existing knowledge.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Recommendations and additional information: Graduate standing or consent of instructor.

ECOL 596D: Environmental Genomics (2 units)
Description: This predominately seminar-style graduate-level course will provide an overview of the emerging field of environmental genomics. The course is not comprehensive, but rather sets the stage for focused exploration of how genomic-enabled technologies can be used to study wild populations of microbes and viruses.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 2 times.
Recommendations and additional information: ECOL 553 and consent of instructor.

ECOL 596E: Concepts in Developmental Evolution (3 units)
Description: This course examines foundations of evolutionary developmental biology with the specific goal of integrating of classic concepts and approaches of ecological and population genetics with recent advances in developmental and molecular biology. The purpose of the class is to facilitate critical reexamination and discussion of the modern evolutionary synthesis and its role in guiding empirical studies in biology and to review novel conceptual approaches that explicitly integrate development into evolutionary studies.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required

ECOL 596F: Community Ecology (1 unit)
Description: A seminar discussing current literature in community ecology. New literature will be discussed every semester with no overlap except for the occasional classic paper.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring

ECOL 596G: Complex Systems: Networks & Self-organization in Biology (2 units)
Description: We will discuss current and classic literature on complex systems research at multiple levels, including gene regulatory networks, neural net(work)s, ecological networks, and social networks. We will try to identify the commonalities of these systems and what is so exciting about 'systems biology.' We will also discuss what types of models are used to describe and study self-organization and networks in general.
Grading basis: Student Option ABCDE/PF
Career: Graduate
Course Components: Seminar Required
Co-convened with: ECOL 496G

ECOL 596I: Biology of Introduced and Invasive Species (2 units)
Description: This seminar-style graduate-level course will explore standing questions about the biology, ecology, and evolution of introduced and invasive species. Class time will be spent discussing current literature and major questions in the field.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Course typically offered:
Main Campus: Fall (odd years only)

ECOL 596J: Plant Population Ecology (1 - 3 units)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated for a maximum of 18 units.
Co-convened with: ECOL 496J
Course typically offered:
Main Campus: Fall

ECOL 596L: Current Topics in Tropical Forest Ecology and Biogeochemistry (2 units)
Description: This graduate reading seminar will explore current questions in tropical forest ecology and biogeochemistry, including: why are tropical forests are so diverse? Do new datasets from a network of large forest plots support or contradict theories of scaling in vegetation? Are intact tropical forests sequestering carbon due to excess atmospheric CO2 and does this balance the losses from anthropogenic deforestation? Will Amazonian tropical forests suffer large-scale die-back as a consequence of future climate change, and does evidence from the past climate changes provide evidence about the future? The course is structured around weekly readings, and instructor and student presentations and discussion of the readings. A final paper, in the form of a written review of scholarly literature in a topic corresponding to each student's presentation, is required.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 3 times.

ECOL 596M: Exploring Life on the WWW: The Digital Dissemination of Biological Research (3 units)
Description: This course is designed for aspiring life scientists and science teachers. It will improve students' literacy in the areas of life science data management, information technology, and the effective exchange of scientific information across disciplines and professional cultures. Graduate-level requirements include an individual project and participation in a group project. Undergraduates will only have to participate in group projects.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 2 times.
Equivalent to: ECOL 596M, ENTO 596M, IRLS 596M, MCB 596M, TTE 596M
Also offered as: EIS 596M, IRLS 596M, MCB 596M, TLS 596M
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Consent of instructor.
Home department: GIDP on Entomology and Insect Science

ECOL 596O: Galapagos Marine Ecology (1 - 6 units)
Description: Galapagos Marine Ecology is a three-week summer course taught on the island of San Cristobal, Galapagos, Ecuador. Students conduct their own marine ecology research investigations under the guidance of the instructors, using the natural reef as a living "laboratory". Students are introduced to the local history and culture of the people who live on San Cristobal and the environmental issues that predominate in this unique world heritage site. There is a required service component helping children from a local school with English language instruction. This course is designed to meet the needs of diverse audiences: K-12 teachers interested in incorporating the Galapagos into their classroom instruction, other interested graduate students, and upper division undergraduate students. Students enrolled for the first time will take the course for 3 units. Students may repeat the course up to 3 times for 1-6 units. Graduate-level requirements include the creation of a lesson plan for the classroom.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 4 times.
Co-convened with: ECOL 496O

ECOL 596R: Species Diversity (2 units)
Description: The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Co-convened with: ECOL 496R

ECOL 596T: Ecology and Biogeochemistry of the Amazon (2 units)
Description: This is an intensive field course focusing on the ecology and biogeochemistry of Amazonian ecosystems. It combines classroom lectures by an international group of instructors, field-based instruction, and small group projects to provide theoretical and practical tools to tackle global change problems in a setting designed to foster effective international collaboration. The location of the course is a fully equipped Brazilian field site in a national forest in the heart of the Amazon Basin. Graduate-level requirements include submitting a paper -- a written version of the final project.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 2 times.
Co-convened with: ECOL 496T
Recommendations and additional information: Permission of Director.

ECOL 596U: Molecular Phylogenetics (2 units)
Description: This course will cover (1) the theoretical and methodological aspects of inferring phylogeny from molecular data, and (2) the use of phylogenetic trees for investigating a wide variety of biological questions, with readings from the primary literature forming the basis of discussions.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Equivalent to: EIS 596U, ENTO 596U, PLS 596U, RNR 596U
Also offered as: EIS 596U, PLS 596U, RNR 596U
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Graduate standing or consent of instructor.

ECOL 596V: Microbial Meta-omics and Ecosystem Function (2 units)
Description: A gram of soil or a milliliter of water contain ~10^6-10^9 microbial cells, and there are more microbial cells in a human body than human cells. Not only numerically dominant, microbes are the drivers of planetary biogeochemistry, and ecosystem function cannot be understood in their absence. In this cross-disciplinary graduate seminar we will discuss research that uses biogeochemistry and molecular microbial ecology to address ecosystem function, while we introduce the current cutting-edge methods and thinking in each field. Methods covered range from molecular meta-genomics to the use of isotopes as biogeochemical tracers at multiple scales. Lectures will be mixed with journal club-style readings and discussions, so active participation essential. Graduate students from diverse backgrounds are welcome, and advanced undergraduates are welcome with instructor permission.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 3 times.
Course typically offered:
Main Campus: Spring

ECOL 596W: Special Topics in Ecology and Evolution A (1 - 3 units)
Description: This seminar will allow advanced graduate students to explore special topics in ecology and evolutionary biology. Topic will be determine each semester based on timeliness of issues and needs of advanced graduate students.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 4 times.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Contact department.

ECOL 596X: Special Topics in Ecology and Evolution B (1 - 3 units)
Description: This seminar will allow advanced graduate students to explore special topics in ecology and evolutionary biology. Topic will be determined each semester based on timeliness of issues and needs of advanced graduate students.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Repeatable: Course can be repeated a maximum of 4 times.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Contact department.

ECOL 597B: Phylogenetic Workshop (2 units)
Description: The workshop provides students with hands-on exposure to phylogenetics. The course will (1) lead students through the task of phylogeny inference, using the latest available computer software tools, covering practical issues in the process, and/or (2) lead students through the process of building their own software tools, so that they may create their own phylogenetic analyses. Some years both topics will be accommodated, in other years only one. Contact the instructor for the topics covered in any given year.
Grading basis: Regular Grades
Career: Graduate
Course Components: Workshop Required
Equivalent to: ECOL 597B, ENTO 597B
Also offered as: EIS 597B
Course typically offered:
Main Campus: Fall

Recommendations and additional information: ENTO 465 or EIS 565 or consent of instructor.
Home department: Committee on Entomology and Insect Science

ECOL 597G: Grant Writing in the Biological Sciences (3 units)
Description: This course will focus on writing proposals for grants available to graduate students and post-docs, with specific focus on NSF's Doctoral Dissertation Improvement Grants (DDIG). Students will 1) become familiar with the NSF panel review system, 2) learn basic features of funded and non-funded grants, and 3) write, review, and critique each other's DDIG grants in time for the November submission deadline. This workshop will be primarily for students who are planning to submit a DDIG or applying for post-doctoral funding.
Grading basis: Regular Grades
Career: Graduate
Course Components: Independent Study May Be Offered
Workshop Required
Course typically offered:
Main Campus: Fall

ECOL 597S: Topics in Social Insect Biology (2 units)
Description: We will discuss current and classic literature on social insect research including, but not limited to, insect ecology, collective and individual behavior, multilevel selection and conflict within colonies, and sociogenomics. After introductory lectures, the course will include student presentations, discussions of current papers, and guest lectures by experts on various topics. Graduate-level requirements include giving at least one, possibly more, 30-minute presentations in class. Undergraduate students will only give one 15-minute presentation.
Grading basis: Regular Grades
Career: Graduate
Course Components: Workshop Required
Co-convened with: ECOL 497S

ECOL 599: Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

ECOL 600A: Fundamentals of Evolution (3 units)
Description: The fundamentals of modern Evolutionary Biology, including molecular evolution, phylogenetics, macroevolution, and population/quantitative genetics.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Spring

Recommendations and additional information: Graduate status in EEB or related department.

ECOL 600B: Fundamentals of Ecology (3 units)
Description: The fundamentals of modern Ecology, including behavioral ecology, population ecology, species interactions and community/ecosystem ecology.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Graduate status in EEB or related department.

ECOL 603J: Sustainability and Environmental Policy (2 - 3 units)
Description: Over the past twenty years "sustainability" (or "sustainable development") has emerged as a central goal of environmental policy making. Contemporary tools of environmental policy including ecosystem management, adaptive management, and restoration have been displaced by what seems like a clearer goal that captures ends as well as means. Sustainability has moved from the work of scholars and activists to laws and administrative regulations. The language of sustainability has extended to the world of business and commerce.
Grading basis: Alternative Grading: ABCDE/SP
Career: Graduate
Course Components: Lecture Required
Equivalent to: ANTH 603J, ECOL 603J, PA 603J, SWES 603J
Also offered as: ANTH 603J, LAW 603J, PA 603J
Course typically offered:
Main Campus: Spring

Home department: Law

ECOL 610A: Research in Ecology and Evolution (1 unit)
Description: Introduction to the research currently being pursued by faculty and staff in the department.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Open to majors only.

ECOL 610B: Research in Ecology and Evolution (1 unit)
Description: Introduction to the research currently being pursued by faculty and staff in the department.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Fall

Recommendations and additional information: Open to majors only.

ECOL 610C: Internship Presentation and Planning (1 unit)
Description: Required for first year doctoral students in Ecology. Consists of discussion and advisory sessions regarding development of research ideas. There will be 3 two hour group meetings, a planning meeting and two meetings for presentations of internships. Occasional group discussions of research ideas and methods. Coordinated by a rotating member of Ecol faculty.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 2 times.
Course typically offered:
Main Campus: Fall, Spring

Recommendations and additional information: Concurrent registration, ECOL 610A, ECOL 610B.

ECOL 619: Ecology of Savannas, Shrublands, and Woodlands (3 units)
Description: [Taught Spring semester in even-numbered years] The functional ecology and dynamics of biogeographically diverse savanna, shrubland and woodland ecosystems will be examined. Interactions among co-occurring life forms and growth forms will be emphasized with in the context of climate, soils and disturbance.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Equivalent to: ARL 619, ECOL 619, GEOG 619, SWES 619
Also offered as: ARL 619, ENVS 619, GEOG 619, RAM 619
Course typically offered:
Main Campus: Spring (even years only)

Home department: Range Management

ECOL 670: Recent Advances in Genetics (2 units)
Description: Recent advances in the field of genetics.
Grading basis: Regular Grades
Career: Graduate
Course Components: Lecture Required
Repeatable: Course can be repeated a maximum of 99 times.
Equivalent to: ECOL 670
Also offered as: GENE 670
Course typically offered:
Main Campus: Fall, Spring

Home department: Committee on Genetics

ECOL 696C: Informatic and Comparative Analysis of Genomes (1 - 3 units)
Description: This course provides hands-on experience in the manipulation and analysis of genomic data and teaches the steps in the preparation of writing scientific manuscripts.
Grading basis: Regular Grades
Career: Graduate
Course Components: Seminar Required
Workshop Required
Repeatable: Course can be repeated a maximum of 4 times.
Equivalent to: ECOL 696C, MCB 696C, PLS 696C
Also offered as: PLS 696C
Recommendations and additional information: ECOL 553.
Interdisciplinary Interest Area: BIOC - Biochemistry
Interdisciplinary Interest Area: MCB - Molecular & Cell Biology

ECOL 699: Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

ECOL 799: Independent Study (1 - 5 units)
Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

ECOL 900: Research (1 - 8 units)
Description: Individual research, not related to thesis or dissertation preparation, by graduate students.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

ECOL 910: Thesis (1 - 8 units)
Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.

ECOL 920: Dissertation (1 - 9 units)
Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).
Grading basis: Alternative Grading: S, P, F
Career: Graduate
Course Components: Independent Study Required
Repeatable: Course can be repeated a maximum of 99 times.
Course typically offered:
Main Campus: Fall, Spring, Summer

-SA represents a Student Abroad & Student Exchange offering
-CC represents a Correspondence Course offering
May Be Offered Departments may offer this component in some semesters. See the Schedule of Classes for term-specific offerings.