

Integrative Biology

Overview

The Department of Integrative Biology offers a program of instruction that focuses on the integration of structure and function that influences the biology, ecology, and evolution of organisms. It investigates integration at all levels of organization from molecules to the biosphere and in all branches of the tree of life: plants, animals, fungi, and microbes.

The department draws from many traditional and emerging fields and levels of biological organization in forging new research directions and answering traditional questions in new ways. The faculty has special strengths in the disciplines of functional morphology, organismal physiology, animal behavior, biomechanics, ecology, systematic biology, paleobiology, population genetics, and evolution.

Research Facilities

The Botanical Garden, located on 34 acres in Strawberry Canyon, provides opportunities for research with living plants, supplies teaching material for classes on campus, and serves as an outdoor laboratory for students. Independent student and internship opportunities are available in horticulture and plant conservation. The garden is organized primarily by geographic region: California, South America, Mexico/Central America, South Africa, Australasia, Mediterranean, Eastern North America, and Asia. Specialized collections include succulents and cacti, carnivorous plants, orchids, ferns, roses, tropical plants, a Chinese medicinal herb garden, and an herb garden. Laboratory and greenhouse facilities are available at the Botanical Garden Plant Conservation Research Center. For further information about events, programs, and opportunities, visit the Botanical Garden website. (<http://botanicalgarden.berkeley.edu>) Inquiries can be addressed to the director by mail at UC Botanical Garden, 200 Centennial Drive #5045, Berkeley, CA 94720-5045, by email to garden@berkeley.edu, or by phone at 510-643-2755.

The Cancer Research Laboratory (CRL) is a research institute on the Berkeley campus that carries on a research, teaching, and service program designed to foster interdepartmental participation in cancer research. The central research program represents a multidisciplinary approach to an understanding of the mechanism of neoplastic transformation using a variety of systems. Graduate student and postdoctoral research programs are supported in various areas of tumor biology: biochemistry, cell biology, endocrinology, genetics, immunology, molecular biology, and tumor virology. Currently, CRL provides advanced technical resources to cancer and biomedical researchers in the areas of advanced microscopy, flow cytometry, gene targeting/transgenic mouse technology, human stem-cell facility, and an infectious disease facility. Instrumentation in the facilities is operated by highly-trained staff who offer instruction in the methods and techniques associated with each facility. For more information, visit the CRL website (<http://crl.berkeley.edu/>).

The Center for Interdisciplinary Bio-Inspiration in Education and Research (CIBER) has been established to lead in the development of a new field of Integrative Systems Biomechanics that moves biology toward greater integration with other disciplines such as physics, mathematics, and engineering to a degree not seen before. The discipline focuses on the physics of how organisms function and interact with their environment. The goal is to discover basic physical principles that can be applied to a diversity of organisms and unique innovations. The fluid and

solid mechanics of organisms are examined using direct experimentation, comparative and phylogenetic approaches, and both mathematical and physical modeling. Using this approach, the next generation of scientists and engineers will gain experience in collaboration across disciplines, as well as how to extract principles in biology that inspire novel design in engineering. In addition to developing innovative methods of teaching and research, CIBER has established an interdisciplinary teaching laboratory that allows students in undergraduate as well as graduate courses to address challenging problems that will give them a meaningful interdisciplinary learning experience. These facilities are being used in a number of existing and new courses at both the undergraduate and graduate levels. For more information on CIBER, visit their website. (<http://ciber.berkeley.edu>)

The Center for Stable Isotope Biogeochemistry (CSIB), located on campus, is an analytical facility established as a University education, research, training, and service unit. The center provides high-precision, state-of-the-art instrumentation for analyzing the stable isotope composition of a diverse array of materials (e.g., plant and animal tissue samples, soils, atmospheric gasses, water, specific compounds, organic matter, etc.), as well as space for purifying, extracting, and preparing sample material for analysis. The center also serves as a focal point for research and training for many programs at Berkeley (e.g., in Biology, Ecology, Paleontology, Anthropology, Geography, Chemistry, Hydrology, Atmospheric, and Soil Sciences). The specialized equipment housed in the facility serves a broad range of student, postdoctoral, and faculty needs. This equipment includes several gas-phase isotope ratio mass spectrometers (IRMS); these mass spectrometers have the capabilities of analyzing the isotopic composition of hydrogen, carbon, oxygen, nitrogen, and sulfur in biological and geological samples, gases (biogenic and atmospheric), and water. In addition to the instrument laboratory, the center houses a fully-equipped sample extraction and preparation laboratory for handling a full range of sample types. For more information, visit the CSIB website. (<http://ib.berkeley.edu/groups/biogeochemistry.html>)

The Field Station for Behavioral Research is a research institute that supports behavioral studies on animals under natural and semi-natural conditions. Situated on 20 acres of wooded hillside at the top of Strawberry Canyon two miles from the central campus, the field station maintains and observes a variety of animal species. Faculty from several Berkeley departments including Integrative Biology conduct research at the station. Its facilities are available for graduate and postdoctoral research with the approval of the director. People interested in the field station may contact the director via the Department of Integrative Biology.

The Gump South Pacific Research Station, French Polynesia, is located on Moorea (17° 30' S 149° 50' W), one of the Society Islands, 15 km northwest of the main island of Tahiti. Moorea offers diverse habitats ranging from coral reefs, lagoons, coastal beaches, freshwater streams, wetlands, and mountain forests. The Gump Station occupies 14 hectares (35 acres) of land from the shore to 149m (489 ft.) at the entrance to Cook's Bay, providing excellent access to the ocean, lagoon, and island interior. A range of housing options (shared dormitories or private bungalows) and laboratories allow long- and short-term research and education in a diversity of fields, including marine, freshwater, and terrestrial biology; evolutionary and conservation biology; archaeology; anthropology; ethnobotany; geology; and geomorphology. Facilities include boats and 4WD vehicles. A waterfront marine laboratory contains an open seawater system and equipment for UC Scientific Diving. A large climate-controlled research building contains offices, library/conference room, and several laboratories including space for morphological work (high-quality microscopes) and molecular genetic analyses. The

station is connected to the Internet via multiple ADSL lines and has WiFi access in all common areas. For further information, contact Dr. Neil Davies, Executive Director at ndavies@moorea.berkeley.edu (ndavies@nature.berkeley.edu). More information can be found on the station's website. (<http://moorea.berkeley.edu>)

The Human Evolution Research Center (HERC) is dedicated to the study of human origins and evolution. HERC represents an international focal point for field and laboratory research and education. It is a center for the study of the process and products of human evolution. Research by HERC includes both field and laboratory investigation. The center's collections and facilities provide support to faculty and students working on important, large-scale investigations. These include The Middle Awash Project and The Revealing Hominid Origins Initiative (RHOI). For more information on HERC and RHOI, visit the HERC website (<http://herc.berkeley.edu>) and the RHOI website (<http://rhoi.berkeley.edu>).

The Jane Gray Research Greenhouse is operated by the Department of Integrative Biology and comprises approximately 2,400 square feet of state-of-the-art research space used for projects by faculty and students. The climate management system is computer-controlled and monitors temperature, humidity, light energy, and wind speed and direction. The system's responses to these conditions can be controlled centrally or from a remote location through an on-screen ARGUS interface to gas heaters, evaporative coolers, vents, fans, and sunshades. The facility provides an ideal resource for plant growth investigations that require closely controlled and monitored conditions. For more information, visit the greenhouse's website. (<https://ib.berkeley.edu/research/facilities/greenhouse/>)

The Museum of Paleontology (UCMP), a research institute for faculty, staff, students, and qualified visiting scholars, has one of the largest collections of fossil protists, invertebrates, plants, and vertebrates in the nation, as well as large collections of modern vertebrate skeletal elements and invertebrates. The collection is worldwide in scope and especially strong in materials from western North America. Research activities include systematic, paleobiogeographic, paleoecologic, biostratigraphic, evolutionary, and theoretical paleobiologic studies. Fieldwork on all continents by researchers and students associated with the museum continues to sustain substantial collection growth. Special facilities include molecular biology and fossil preparation laboratories, as well as specialized laboratories for microfossils, pollen, and cast production.

UCMP has an active education and outreach program which uses the web as its primary venue for sharing science with a broader audience. The UCMP website (<http://www.ucmp.berkeley.edu>) contains a wealth of information on evolution, paleontology, systematics, and associated sciences, as well as access to collections data and specimen images. Requests for the use of the collections or facilities should be mailed to the Director, Museum of Paleontology, Valley Life Sciences Building, University of California, Berkeley; Berkeley, CA 94720.

The Museum of Vertebrate Zoology is an Organized Research Unit affiliated with the Department of Integrative Biology and the Berkeley Natural History Museums. It was established in 1908 and has grown to be one of the largest and most important collections of amphibians, reptiles, birds, and mammals in the world. The museum has no public exhibits; it is primarily a research organization and a center for graduate and postdoctoral education. The museum's space in the Valley Life Sciences Building includes all of the collections as well as administrative and research offices for faculty, postdoctoral, and graduate students. In addition, there are laboratories for molecular genetics and biodiversity

informatics. Research activities center on problems in evolutionary biology, with an emphasis on systematics, ecology, functional and developmental morphology, behavior, population and conservation biology, and biogeography. Integration of field and laboratory methods are encouraged. For more information, write to the Director, Museum of Vertebrate Zoology, UC Berkeley; Berkeley, CA 94720, or for the Hastings Reservation, write to Jen Hunter at jshunter@berkeley.edu. More information can be found on the museum's website. (<http://mvz.berkeley.edu>)

The University and Jepson Herbaria offer a worldwide reference-research collection, laboratories, archive, and library that form a foundation for basic research in systematic botany, ecology, phytogeography, evolution, and comparative genomics. These resources are available not only to faculty, staff, and students but also to visiting scholars and biologists throughout the United States and other countries. Resources include the following:

1. The collection itself, more than 2.2 million specimens with special strengths in the angiosperm flora of California and elsewhere around the Pacific Rim as well as in cryptogamic groups including ferns, bryophytes, fungi, and algae.
2. Modern laboratories for all types of plant studies ranging from morphology/anatomy to molecular systematics.
3. Extensive electronic resources, including an online flora of California and interface for accessing electronic records from all California herbaria, the world's standard index of algal nomenclature, to the tree of life for green plants.

Visit the website (<http://ucjeps.berkeley.edu>) for more information. Inquiries should be directed to the Collections Manager at ucjeps-collections@berkeley.edu.

The University of California Natural Reserve System (NRS) was founded in 1965 to establish and maintain significant examples of California's diverse aquatic and terrestrial ecosystems for university-level teaching, research, and public service. The 33 reserves are open to all qualified individuals and institutions for scholarly work in disciplines ranging from geology and environmental sciences to anthropology and art. For information regarding the four reserves administered by the Berkeley campus, contact faculty reserve Director Peggy L. Fielder at 510-987-0143 or peggy.fielder@ucop.edu. The Berkeley campus administers the following four reserves:

- **The Angelo Coast Reserve** in Mendocino County is one of the most diverse reserves, with 26 terrestrial and four aquatic habitat types. Located along a belt of highly-deformed, well-defined coastal ridges cut by the South Fork of the Eel River, the reserve contains the largest virgin Douglas fir community left in the state as well as four undisturbed watersheds. It is part of the UNESCO California Coast Ranges Biosphere Reserve. For more information, contact Peter Steel at 707-984-6653 or psteel@nature.berkeley.edu.
- **The Chickering American River Reserve** in Placer County is located in the sub-alpine headwaters basin of the North Fork of the American River. The reserve has diverse topography, soil, and moisture regimes on sedimentary, igneous, and metamorphic substrates. It supports approximately 1,000 plant species, unusual red fir and mixed-conifer old-growth forest communities, and a variety of large mammals. Long-term research continues on the endangered wolverine. For more information, contact Robert Rhew at rrhew@berkeley.edu (kirchner@geomorph.berkeley.edu).

- **The Hans Jenny Pygmy Forest Reserve** in Mendocino County supports elfin forests of endemic pygmy cypress, bishop pine, and unusual evergreen shrub species on highly podzolized old marine terrace soils. This reserve is adjacent to lands managed by The Nature Conservancy.
- **The Hastings Natural History Reserve** in Monterey County contains a representative sample of California's interior Coast Range ecosystem with annual and perennial grasslands, oak woodlands, chaparral, and running streams. The reserve has 620 vascular plant species and 166 bird species. While noted for its 50-year research history on vertebrate ecology and oak woodland biology, the reserve is also conducting important research on native grassland restoration. For more information, contact Jen Hunter at 831-659-2664 or jshunter@berkeley.edu.

Undergraduate Program

Integrative Biology (<https://guide.berkeley.edu/undergraduate/degree-programs/integrative-biology/>): BA

Graduate Program

Integrative Biology (<https://guide.berkeley.edu/graduate/degree-programs/integrative-biology/>): PhD

Integrative Biology

INTEGBI 11 California Natural History 3 Units

Terms offered: Fall 2024, Summer 2024 Second 6 Week Session, Fall 2023

An introduction to the biomes, plants, and animals of California. The lectures will introduce natural history as the foundation of the sciences, with an overview of geology, paleontology, historical biology, botany, zoology, ecosystem ecology, and conservation biology. The field labs will include activities on the UC Berkeley campus and around the Bay Area. Course is open to all students without prerequisite and will provide a foundation for advanced study in biology and field biology.

Objectives & Outcomes

Course Objectives: Create detailed natural history observations with georeferenced photos and videos

Enjoy local ecosystems and museum collections as sources of study and inspiration

Identify the common organisms in your community with colloquial and scientific names

Produce sophisticated observations of organismal behavior and ecosystem processes

Synthesize your observations into comprehensive species lists for specific geographic areas

Understand the relationship between history, climate, and species composition in California

Rules & Requirements

Credit Restrictions: Students will receive no credit for INTEGBI 11 after completing INTEGBI W11. A deficient grade in INTEGBI 11 may be removed by taking INTEGBI W11.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of fieldwork per week

Summer: 6 weeks - 4.5 hours of lecture and 3 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI C13 Origins: from the Big Bang to the Emergence of Humans 4 Units

Terms offered: Fall 2018, Fall 2016, Fall 2014

This course will cover our modern scientific understanding of origins, from the Big Bang to the formation of planets like Earth, evolution by natural selection, the genetic basis of evolution, and the emergence of humans. These ideas are of great intrinsic scientific importance and also have far reaching implications for other aspects of people's lives (e.g., philosophical, religious, and political). A major theme will be the scientific method and how we know what we know.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Marshall, Quataert

Also listed as: ASTRON C13

INTEGBI 24 Freshman Seminars 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.

Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final Exam To be decided by the instructor when the class is offered.

INTEGBI 31 The Ecology and Evolution of Animal Behavior 3 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 8 Week Session

Principles of evolution biology as they relate to animal behavior and behavioral ecology with broad coverage of animal groups. Special attention will be paid to the emerging discipline of behavioral ecology.

Rules & Requirements

Prerequisites: Open to all students; designed for those not specializing in biology

Credit Restrictions: Students will receive no credit for Integrative Biology 31 after taking Integrative Biology 144, C144 or Psychology C115B.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture, 1 hour of demonstration, and 1 hour of discussion per week

Summer:

6 weeks - 5 hours of lecture, 5 hours of demonstration, and 5 hours of discussion per week

8 weeks - 4 hours of lecture, 2 hours of demonstration, and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI C32 Bioinspired Design 3 Units

Terms offered: Spring 2023, Spring 2022, Spring 2021

Bioinspired design views the process of how we learn from Nature as an innovation strategy translating principles of function, performance and aesthetics from biology to human technology. The creative design process is driven by interdisciplinary exchange among engineering, biology, art, architecture and business. Diverse teams of students will collaborate on, create, and present original bioinspired design projects. Lectures discuss biomimicry, challenges of extracting principles from Nature, scaling, robustness, and entrepreneurship through case studies highlighting robots that run, fly, and swim, materials like gecko-inspired adhesives, artificial muscles, medical prosthetic devices, and translation to start-ups.

Rules & Requirements

Prerequisites: Open to all students

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Full

Formerly known as: Integrative Biology 32

Also listed as: L & S C30Z

INTEGBI 33 Life During the Age of Dinosaurs 3 Units

Terms offered: Spring 2025, Spring 2023, Spring 2022

This is an introductory course focusing on Mesozoic Earth, the era preceding our current era, the Cenozoic. We will use an easy-to-relate topic (dinosaurs) to learn about the scientific process and how we know what we know in paleontology and evolutionary biology. The range of topics to be covered includes a brief history of paleontology; the geologic timescale; the tree of life; fossil vertebrate diversity; the major lineages of dinosaurs; the first mammals and the K-Pg mass extinction event.

Rules & Requirements

Credit Restrictions: Students will receive no credit for INTEGBI 33 after completing INTEGBI N33, or INTEGBI S33.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer:

6 weeks - 8 hours of lecture per week

8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

INTEGBI N33 Topics in Paleontology: The Age of Dinosaurs 2 Units

Terms offered: Summer 1996 10 Week Session

Open without prerequisite to all students and designed for those not specializing in paleontology. Evolution history, and ecology of the dinosaurs and their world, including the earliest mammals and birds.

Rules & Requirements

Repeat rules: Course may be repeated for credit with instructor consent.

Hours & Format

Summer: 8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI 35AC Human Biological Variation 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

This course addresses modern human biological variation from historical, comparative, evolutionary, biomedical, and cultural perspectives. It is designed to introduce students to the fundamentals of comparative biology, evolutionary theory, and genetics.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Hlusko

INTEGBI 37 Topics in Paleontology: The Antecedents of Man 3 Units

Terms offered: Prior to 2007

. Open without prerequisite to all students and designed for those not specializing in paleontology. Survey the evolution, ecology, and history of the primate order. Special emphasis will be given to primate origins, geographic distribution, and the evolution of the human lineage.

Hours & Format

Summer: 8 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

INTEGBI 38 The Animal In You: Evolutionary Traces In The Human Body 3 Units

Terms offered: Spring 2025

This course invites students to discover the animal within and explore the profound connections that link us humans to the broader tree of life.

Through a multidisciplinary approach, we will examine the vestiges of our evolutionary past, from the structural features inherited from fish to the remnants of primate behaviors still visible in modern humans.

Students will delve into comparative anatomy, genetics, and paleontology to uncover how over time evolution and major environmental changes has shaped the human form and function.

Objectives & Outcomes

Course Objectives: Analyze Deep Time Evolution Through Fossil

Evidence: Interpret fossil evidence and use it to reconstruct the evolutionary history of anatomical traits, including vestigial structures.

Explore Evolutionary Processes: Gain a basic understanding of natural selection, genetic mechanism, and other evolutionary processes that have shaped human and other vertebrates over hundreds of millions of years.

Identify Evolutionary Ancestry: Describe key anatomical features in the human body that trace back to our evolutionary ancestors, including their function and revolutionary roles.

Investigate Animal and Environment Interactions: Investigate adaptations in the vertebrate body corresponding to (major) environmental changes, such as bipedalism, opposable thumbs, and complex brain development.

Understand Evolutionary Variations: Compare and contrast human anatomy with that of other vertebrates, highlighting evolutionary similarities and differences that illustrate the diversity of organ systems and underlying genetic basis.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI 41 Marine Mammals 2 Units

Terms offered: Summer 2024 8 Week Session, Fall 2023, Summer 2023 8 Week Session

A survey of marine mammal evolution, biology, behavior, ecology, and politics with a concentration on those species found in the North Pacific. Coverage would include: origin and evolution of cetaceans, pinnipeds, sirenians, and sea otters; basic biology and anatomy of marine mammal groups, and North Pacific species in particular; ecological interactions and role in nearshore and pelagic marine communities; and interactions between humans and marine mammals.

Rules & Requirements

Prerequisites: Designed for those not specializing in Integrative Biology

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Summer:

6 weeks - 5 hours of lecture per week

8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI 42 Primate Biology 3 Units

Terms offered: Summer 1996 10 Week Session

An introduction to the order of mammals of which we are members. The niches of primates in modern ecosystems, their anatomical and behavioral specialization, and their role as indicator species in conservation. The mechanisms and variety of primate social organization compared with that of other animals.

Rules & Requirements

Credit Restrictions: Open to all students but designed for those not specializing in biology.

Hours & Format

Summer: 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI 43 What Lives Inside Us? Microbiomes and Symbiosis 4 Units

Terms offered: Fall 2022

We live in a microbial world, and the evolution of multicellular organisms has been intimately affected by microbes. Their influences range from mutualistic benefits to disease and represent a fundamental force that shapes plant and animal phenotypes and evolutionary trajectories. Recent advances in genomic methodologies have further increased our appreciation of the role of microbes in host health and fitness by unraveling the commonness of microbial communities in all organisms and their complex interactions with their hosts. This course will consider the broad range of host-microbe interactions and underlying mechanisms – from mutualism to pathogenesis, and from binary host-microbe interactions, to the microbiome.

Rules & Requirements

Credit Restrictions: Students will receive no credit for INTEGBI 43 after completing INTEGBI 118.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Shapira

INTEGBI 51 Origins and Evolution of Food Plants 3 Units

Terms offered: Summer 2024 8 Week Session, Summer 2023 8 Week Session, Summer 2022 8 Week Session

The course will review major groups of food plants from an evolutionary and historical perspective, by examining the origins from wild relatives to current distribution and varieties today. Examples will be reviewed from a diversity of crops from around the world, such as grains, pulses, vegetables, fruits, nuts and others (e.g., caffeine-producing plants). General concepts covered will include plant morphology, evolutionary processes (domestication, hybridization, polyploidy, diversification) and relevant ecology (e.g., pollination biology, pest and pest control). Focus will include California agriculture and crops as illustrated through field trips.

Hours & Format

Summer: 8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Harris

INTEGBI 75 Berkeley Changemaker: BioDiscovery, Community, and Culture 3 Units

Terms offered: Fall 2022

This course will support students in reflecting on personal values, building relationships with community stakeholders, fostering research experiences, and ultimately designing their own DeCal courses and RSOs to develop leadership potential in the field of science and the department of Integrative Biology. We strongly encourage co-enrollment with freshman or sophomore seminars and aim to support students in identifying internship, externship, and public service opportunities.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI 77A Integrative Human Biology 1 Unit

Terms offered: Fall 2024, Fall 2023, Fall 2022

Each week a different Integrative Biology faculty member will give a one hour lecture on how their research field contributes to our understanding of human biology. The integration of the disciplines of evolution, ecology, paleontology, comparative physiology, and comparative anatomy in the study of how humans function in ecosystems illuminates our understanding of human biology. During each presentation, the faculty member will also inform students about IB courses they teach, research in their lab, and which Berkeley Natural History Museum they may be affiliated with. This course gives undergraduates an opportunity to learn about the spectrum of research and courses offered by the different IB faculty.

Rules & Requirements

Credit Restrictions: 77A and 77B may each be taken once for credit. Majors are required to take at least one semester of 77A OR 77B.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Carlson

INTEGBI 77B Integrative Human Biology 1 Unit

Terms offered: Spring 2025, Spring 2024, Spring 2023

Each week a different Integrative Biology faculty member will give a one hour lecture on how their research field contributes to our understanding of human biology. The integration of the disciplines of evolution, ecology, paleontology, comparative physiology, and comparative anatomy in the study of how humans function in ecosystems illuminates our understanding of human biology. During each presentation, the faculty member will also inform students about IB courses they teach, research in their lab, and which Berkeley Natural History Museum they may be affiliated with. This course gives undergraduates an opportunity to learn about the spectrum of research and courses offered by the different IB faculty.

Rules & Requirements

Credit Restrictions: 77A and 77B may each be taken once for credit. Majors are required to take at least one.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Carlson

INTEGBI 82 Introduction to Field Research in Global Change Biology 3 Units

Terms offered: Fall 2024, Spring 2001, Spring 2000

A field-based course with overnight and day trips to natural areas in the Bay Area and coastal California. Field trips and lectures emphasize natural history of California organisms and field research methods to study global climate change as well as preparing students for careers in ecology, evolutionary biology and conservation. There will be four field trips. Two of these field trips are day trips and two of these trips will involve weekends. Vans to transport students to field trips which will be driven by the instructors and the GSI. Camping equipment will be provided.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 2.5 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI 84 Sophomore Seminar 1 or 2 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024

Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.

Rules & Requirements

Prerequisites: At discretion of instructor

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring:

5 weeks - 3-6 hours of seminar per week
10 weeks - 1.5-3 hours of seminar per week
15 weeks - 1-2 hours of seminar per week

Summer:

6 weeks - 2.5-5 hours of seminar per week
8 weeks - 1.5-3.5 hours of seminar and 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final Exam To be decided by the instructor when the class is offered.

INTEGBI 87 Introduction to Research Methods in Biology 2 Units

Terms offered: Summer 2014 8 Week Session, Summer 2013 8 Week Session, Summer 2012 8 Week Session

This course provides a functional understanding of hypothesis/data driven research and exposure to current approaches and methods in biological science. The lectures address foundational concepts of the scientific method, research ethics, scientific communication, and how to understand scientific literature. The labs provide exposure to faculty research and experimental methods. The course is geared to incoming freshmen, sophomores, and transfer students interested in learning more about research.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Summer: 8 weeks - 1 hour of lecture, 1 hour of discussion, and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Instructor: Matsui

INTEGBI 95 Special Research Project in Biology 1B 2 Units

Terms offered: Spring 2017, Fall 2016, Spring 2016

Students enrolled in Biology 1B can participate in special field research in addition to attending regular laboratory sections. Students work independently with minimal supervision. Students will learn how to develop a project, collect and record data, conduct and analyze experiments, write a report, and make an oral presentation. Project may require traveling to off-campus sites, and may include night or weekend work.

Rules & Requirements

Prerequisites: Consent of instructor; selected by interview

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of fieldwork and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI 95B Lawrence Hall of Science Teaching Assistant 1 - 2 Units

Terms offered: Prior to 2007

Enrollment into this course is for students interested in teaching science to children under the guidance of the Lawrence Hall of Science Instructors and Staff. As a LHS Teaching Assistant (TA), you will have the opportunity to assist with workshops serving grade school-aged children and to lead small discussion groups. The workshops consist of organismal biology related materials. You will undergo training in the Hall's Animal Discovery Room to ensure that you are prepared to support school and public programs scheduled in that space. There will also be opportunities to travel to nearby school districts to give presentations on the materials you work with.

Rules & Requirements

Prerequisites: Students must be concurrently enrolled or have completed Biology 1B

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3-6 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI C96 Studying the Biological Sciences 1 Unit

Terms offered: Fall 2024, Fall 2023, Fall 2022

Students will be introduced to the "culture" of the biological sciences, along with an in-depth orientation to the academic life and the culture of the university as they relate to majoring in biology. Students will learn concepts, skills, and information that they can use in their major courses, and as future science professionals.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Matsui

Also listed as: MCELLBI C96/PLANTBI C96

INTEGBI 98 Directed Group Study 1 - 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

Lectures and small group discussions focusing on topics of interest, varying from semester to semester.

Rules & Requirements

Prerequisites: Freshmen and sophomores only

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Summer:

6 weeks - 2.5-10 hours of directed group study per week

8 weeks - 1.5-7.5 hours of directed group study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI 98BC Berkeley Connect 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

Berkeley Connect is a mentoring program, offered through various academic departments, that helps students build intellectual community. Over the course of a semester, enrolled students participate in regular small-group discussions facilitated by a graduate student mentor (following a faculty-directed curriculum), meet with their graduate student mentor for one-on-one academic advising, attend lectures and panel discussions featuring department faculty and alumni, and go on field trips to campus resources. Students are not required to be declared majors in order to participate.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI 99 Supervised Independent Study and Research 1 - 3 Units

Terms offered: Spring 2022, Spring 2015, Spring 2014

Lower division independent study and research intended for the academically superior student. Enrollment only with prior approval of faculty adviser directing the research.

Rules & Requirements

Prerequisites: GPA of 3.4 or greater

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:

6 weeks - 1-3 hours of independent study per week

8 weeks - 1-3 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Formerly known as: Botany 99, Physiology 99, Anatomy 99

INTEGBI C100 Communicating Ocean Science 4 Units

Terms offered: Spring 2020, Spring 2018, Spring 2016, Spring 2015
For undergraduates interested in improving their ability to communicate their scientific knowledge by teaching ocean science in elementary schools or science centers/aquariums. The course will combine instruction in inquiry-based teaching methods and learning pedagogy with six weeks of supervised teaching experience in a local school classroom or the Lawrence Hall of Science with a partner. Thus, students will practice communicating scientific knowledge and receive mentoring on how to improve their presentations.

Rules & Requirements

Prerequisites: One course in introductory biology, geology, chemistry, physics, or marine science required and interest in ocean science; junior, senior, or graduate standing; consent of instructor required for sophomores

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Rhew

Formerly known as: Earth and Planetary Science C100/Geography C146/Integrative Biology C100

Also listed as: EPS C100/GEOG C146

INTEGBI 101 Introduction to Scientific Writing 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
This course will introduce students to concepts and techniques for effective communication of scientific findings, both within the scientific community and to the general public. Students will be exposed to a variety of formats, including systematic observations in field journals, proposals, conference presentations, seminars, journal articles, popular science writing, and interviews. Students can expect to gain a sense of confidence in writing and public speaking about research. Direct language is valued in scientific writing, but creative approaches to style and structure will be emphasized.

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Fine

INTEGBI 102LF Introduction to California Plant Life with Laboratory 4 Units

Terms offered: Spring 2022, Spring 2020, Spring 2018
The relationship of the main plant groups and the plant communities of California to climate, soils, vegetation, geological and recent history, and conservation. Laboratory will also include at least two Saturday field trips and focus on main plant groups and major plant families in California, and use of keys to identify introduced and especially native pteridophytes, conifers, and flowering plants of the state.

Rules & Requirements

Prerequisites: Biology 1B or consent of instructor

Credit Restrictions: Student will receive partial credit for 102LF after taking 102.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 6 hours of laboratory per week

Summer: 8 weeks - 4 hours of lecture and 12 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 102L

INTEGBI 103LF Invertebrate Zoology with Laboratory 5 Units

Terms offered: Fall 2019, Spring 2018, Spring 2016
Introductory survey of the biology of invertebrates, stressing comparative functional morphology, phylogeny, natural history, and aspects of physiology and development. Laboratory study of invertebrate diversity and functional morphology, and field study of the natural history of local marine invertebrates.

Rules & Requirements

Prerequisites: Biology 1A-1B

Credit Restrictions: Students will receive partial credit for 103LF after taking 103.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI 104LF Natural History of the Vertebrates with Laboratory 5 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Biology of the vertebrates, exclusive of fish. Laboratory and field study of local vertebrates exclusive of fish.

Rules & Requirements

Prerequisites: Biology 1A-1B

Credit Restrictions: Students will receive partial credit for 104LF after taking 104.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 4 hours of fieldwork, and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: McGuire, Bowie, Shabel

INTEGBI C105 Natural History Museums and Biodiversity Science 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

(1) survey of museum resources, including strategies for accession, conservation, collecting and acquiring material, administration, and policies; (2) strategies for making collections digitally available (digitization, databasing, georeferencing, mapping); (3) tools and approaches for examining historical specimens (genomics, isotopes, ecology, morphology, etc); and (4) data integration and inference. The final third of the course will involve individual projects within a given museum.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Gillespie, Mishler, Will, Marshall, McGuire

Also listed as: ESPM C105

INTEGBI C107L Principles of Plant Morphology with Laboratory 4 Units

Terms offered: Spring 2019, Fall 2017, Fall 2016
An analysis of the structural diversity of land plants with emphasis on the developmental mechanisms responsible for this variation in morphology and the significance of this diversity in relation to adaptation and evolution.

Rules & Requirements

Prerequisites: Biology 1A-1B

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture, 1 hour of discussion, and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Specht

Also listed as: PLANTBI C107L

INTEGBI 108 Marine Biology 4 Units

Terms offered: Spring 2025, Summer 2022 8 Week Session, Summer 2021 8 Week Session

This course focus on the interactions among marine organisms and on their relationship to the environment. Topics include an overview of marine organisms, functioning of marine ecosystems, anthropogenic impacts, climate change impacts, and conservation. Lectures consist of discussions of primary literature, videos, and student presentations; and discussion sections review and expand on topics covered in lecture. By the end of

the course, you should be able to compare marine ecosystems, identify the major marine organisms and explain their role within a community, explain the main abiotic factors affecting the dynamics and distribution of marine species, and discuss how human communities and marine organisms and ecosystem affect one another.

Objectives & Outcomes

Course Objectives: Describe the physical characteristics of the world's oceans and their basins and region.

Recognize and describe many of the groups of organisms found in marine ecosystems.

Recognize the impact of global change on marine organisms and describe importance of marine life to human societies regionally and across the globe.

Synthesize knowledge of physical and chemical processes to help describe biological adaptations across a diversity of organisms in the context of these organisms' various marine habitats.

Rules & Requirements

Prerequisites: BIOLOGY 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI C109 Evolution and Ecology of Development 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2016

From the seahorse's body to the venus flytrap's jaws to the human brain, nature abounds with amazing adaptations. This interdisciplinary course explores how and why such biodiversity evolves as well as what limits diversity. Lectures and case studies will focus on core concepts, recent advances, and integrative approaches, placing special emphasis on the interplay between gene regulatory networks, the environment, and population genetics.

Objectives & Outcomes

Student Learning Outcomes: • Explain how an interdisciplinary approach involving genetics, development, evolutionary biology, and ecology can be used to understand the processes that generate patterns of biodiversity.

- List and describe major questions, findings, and experimental approaches in the field of ecological and evolutionary developmental biology.
- Discuss biological research using specialized terminology and defend your opinions.
- Critically evaluate and interpret the primary scientific literature.
- Combine factual material with deductive reasoning to propose hypotheses and future research directions

Rules & Requirements

Prerequisites: BIOLOGY 1A and 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Blackman

Also listed as: PLANTBI C109

INTEGBI C110L Biology of Fungi with Laboratory 3 Units

Terms offered: Fall 2024, Fall 2022, Fall 2021

Selected aspects of fungi: their structure, reproduction, physiology, ecology, genetics and evolution; their role in plant disease, human welfare, and industry. Offered even fall semesters.

Rules & Requirements

Prerequisites: Biology 1B

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bruns, Taylor

Also listed as: PLANTBI C110L

INTEGBI 111 Introductory Programming for Biologists 3 Units

Terms offered: Spring 2025

Unlock the power of programming for biological exploration! This beginnerfriendly course introduces biologists to essential programming concepts using C and Python. Dive into hands-on projects tailored for biological applications, equipping you with the skills to analyze data, visualize results, and automate tasks. No prior coding experience required. Embrace the world of programming to elevate your research capabilities in the life sciences!

Objectives & Outcomes

Course Objectives: Develop a matured perspective on how to turn an algorithm into computer code. Improve your understanding of several numerical methods commonly used in computational biology. Learn how to describe the efficiency of computer algorithms. Learn the basics of computer programming, including data types, functions, control statements, and structures/classes. Learn to love computational biology and programming! Understand several of the concepts basic to evolutionary biology and population genetics. Understand that programming is not just a tool for solving problems but an art and science in and of itself.

Rules & Requirements

Credit Restrictions: Students will receive no credit for INTEGBI 111 after completing INTEGBI 111. A deficient grade in INTEGBI 111 may be removed by taking INTEGBI 111.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required, with common exam group.

INTEGBI 112 Horticultural Methods in the Botanical Garden 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

An introduction to horticultural techniques utilizing the diverse collections of the University Botanical Garden.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Instructor: Licht

Formerly known as: 112L

INTEGBI 113L Paleobiological Perspectives on Ecology and Evolution 4 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022

This course will center around answering the following questions: What do the fossil and geologic records have to tell us about the nature of ecological and evolutionary processes? What do they teach us that cannot be learned from the living world alone? In answering these questions, the course will provide an introduction to the analysis of key problems in paleobiology, with an emphasis on how evolutionary and ecological processes operate on geologic timescales.

Rules & Requirements

Prerequisites: Prior biology experience, or consent of instructor. No paleontological or geological background required

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Marshall

Formerly known as: 108

INTEGBI 114 Infectious Disease Dynamics 4 Units

Terms offered: Fall 2024, Summer 2024 8 Week Session, Summer 2023 8 Week Session

Many of the challenges of managing infectious disease are essentially ecological and evolutionary problems. Disease follows the rules of species interactions as it spreads through host populations while resistance to antibiotics occurs through the rules of evolutionary biology. The key aim of the module is to teach ecological and evolutionary principles in the light of infectious diseases affecting human populations and societies as well as agriculture and wildlife. This is applied ecology and applied evolution writ large.

Objectives & Outcomes

- Student Learning Outcomes:**
- Understanding the role of infectious disease in natural populations and communities
 - Understand the role of disease in shaping human agriculture and societies
 - Describe how infectious disease may be important in conservation
 - Discuss when parasite virulence makes sense in the light of evolution
 - Explain how to apply ecological and evolutionary principles to the treatment and control of infectious
 - Present a scientific poster on the evidence for coevolution between a pair of species.

Rules & Requirements

Prerequisites: Bio 1A and Bio 1B or equivalent required, Ecology or Evolution course suggested

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 5 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Boots

INTEGBI 116L Medical Parasitology 4 Units

Terms offered: Summer 2021 First 6 Week Session, Summer 2020 First 6 Week Session, Summer 2019 First 6 Week Session

This course includes the biology, epidemiology, pathogenesis, treatment, and prevention of various medically important parasitic infections. Life cycles of parasitic helminths and protozoa, the biological aspects of the host-parasite relationship, the epidemiology of the infection, and the interplay of social, economical, and ecological factors which contribute to the disease will be covered in both lectures and videos.

Rules & Requirements

Prerequisites: 1A, 1B, or equivalent

Hours & Format

Summer: 6 weeks - 6 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Sakanari

Formerly known as: 116

INTEGBI 117 Medical Ethnobotany 2 Units

Terms offered: Fall 2021, Fall 2020, Fall 2019

Biological diversity and ethno-linguistic diversity sustain traditional botanical medicine systems of the world. Major topics covered in this course include cultural origins of medicinal plant knowledge on plant-derived pharmaceuticals and phytomedicines; field research methods in ethnobotany and ethnopharmacology; examples of how traditional botanical medicines provide safe, effective, affordable, and sustainable primary health care to tropical countries; human physiology, human diseases, and mechanisms of action of plant-derived drugs.

Rules & Requirements

Prerequisites: Bio 1A

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Summer: 6 weeks - 5 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Carlson

INTEGBI 117LF Medical Ethnobotany Laboratory 2 Units

Terms offered: Fall 2021, Fall 2020, Fall 2019

Laboratory will focus on studying medicinal plants from the major ecosystems and geographical regions of the world. Students will learn common names, scientific names, plant families, field identification, habitats, and ethnomedical uses of medicinal plants. How the medicinal plant is prepared, administered, and used as a phytomedicine will also be discussed. There will be reference to the phylogenetic relationships between the plant families and genera represented by the medicinal plants.

Rules & Requirements

Prerequisites: Bio 1B

Hours & Format

Fall and/or spring: 15 weeks - 6 hours of laboratory per week

Summer: 6 weeks - 8 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Carlson

INTEGBI 118 Organismal Microbiomes and Host-Pathogen Interactions 4 Units

Terms offered: Fall 2023, Fall 2021, Fall 2020

We live in a microbial world, and microbes have shaped (and continue to shape) plant and animal physiology and evolution through a myriad of contributions – from mutualistic benefits to disease. Recent advances in genomic methodologies have further increased our appreciation of such contributions by highlighting the prevalence of organismal microbial communities and their complex interactions with their hosts. Through lectures and discussions, IB 118 will consider the broad range of host-microbe interactions – from mutualism to pathogenesis, and from pairwise interactions to the microbiome - learning the principles that shape these interactions, the technologies used to interrogate them and the molecular mechanisms underlying them.

Rules & Requirements

Prerequisites: Biology 1A-1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Shapira

INTEGBI 120 Introduction to Quantitative Methods In Biology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

This course provides a fast-paced introduction to a variety of quantitative methods used in biology and their mathematical underpinnings. While no topic will be covered in depth, the course will provide an overview of several different topics commonly encountered in modern biological research including differential equations and systems of differential equations, a review of basic concepts in linear algebra, an introduction to probability theory, Markov chains, maximum likelihood and Bayesian estimation, measures of statistical confidence, hypothesis testing and model choice, permutation and simulation, and several topics in statistics and machine learning including regression analyses, clustering, and principal component analyses.

Objectives & Outcomes

Student Learning Outcomes: Ability to calculate means and variances for a sample and relate it to expectations and variances of a random variable.

Ability to calculate probabilities of discrete events using simple counting techniques, addition of probabilities of mutually exclusive events, multiplication of probabilities of independent events, the definition of conditional probability, the law of total probability, and Bayes' formula, and familiarity with the use of such calculations to understand biological relationships.

Ability to carry out various procedures for data visualization in R.

Ability to classify states in discrete time Markov chains, and to calculate transition probabilities and stationary distributions for simple discrete time, finite state-space Markov chains, and an understanding of the modeling of evolutionary processes as Markov chains.

Ability to define likelihood functions for simple examples based on standard random variables.

Ability to implement simple statistical models in R and to use simple permutation procedures to quantify uncertainty.

Ability to implement standard and logistic regression models with multiple covariates in R.

Ability to manipulate matrices using multiplication and addition.

Ability to model simple relationships between biological variables using differential equations.

Ability to work in a Unix environment and manipulating files in Unix.

An understanding of basic probability theory including some of the standard univariate random variables, such as the binomial, geometric, exponential, and normal distribution, and how these variables can be used to model biological systems.

An understanding of powers of matrices and the inverse of a matrix.

An understanding of sampling and sampling variance.

An understanding of the principles used for point estimation, hypothesis testing, and the formation of confidence intervals and credible intervals.

Familiarity with ANOVA and ability to implement it in R.

Familiarity with PCA, other methods of clustering, and their implementation in R.

Familiarity with basic differential equations and their solutions.

Familiarity with covariance, correlation, ordinary least squares, and interpretations of slopes and intercepts of a regression line.

Familiarity with functional programming in R and/or Python and ability to define new functions.

Familiarity with one or more methods used in machine learning/statistics such as hidden Markov models, CART, neural networks, and/or graphical models.

Familiarity with python allowing students to understand simple python scripts.

Familiarity with random effects models and ability to implement them in R.

Familiarity with the assumptions of regression and methods for investigating the assumptions using R.

INTEGBI 123AL Exercise and Environmental Physiology with Laboratory 5 Units

Terms offered: Fall 2023, Fall 2021, Fall 2019

Discussion of how chemical energy is captured within cells and how potential chemical energy is converted to muscular work. Energetics, direct and indirect calorimetry, pathways of carbon flow in exercise, ventilation, circulation, skeletal muscle fiber types. Laboratory component of the course is to obtain practical experience in the measurement of physiological parameters and to be able to compile, compare, contrast, and interpret physiological data. Laboratory demonstrations and exercises will explain lecture content.

Rules & Requirements

Prerequisites: Biology 1A, Chemistry 3B and Integrative Biology 132 or Molecular and Cell Biology 136

Credit Restrictions: Student will receive partial credit for 123AL after taking 123A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Brooks

INTEGBI C125L Introduction to the Biomechanical Analysis of Human Movement 4 Units

Terms offered: Fall 2016, Fall 2015, Fall 2014, Fall 2013

Basic biomechanical and anatomical concepts of human movement and their application to fundamental movement patterns, exercise, and sport skills.

Rules & Requirements

Prerequisites: Physical Education 9 and Integrative Biology 131 and 131L

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Scott

Also listed as: PHYS ED C165

INTEGBI 128 Sports Medicine 3 Units

Terms offered: Summer 2024 First 6 Week Session, Summer 2023 First 6 Week Session, Summer 2022 First 6 Week Session

Survey course of sports medicine including topics of athletic injury (cause, evaluation, and treatment options), exercise physiology, exercise and health, fitness testing, issues specific to female athletes, drug abuse in sports, environmental issues (heat, altitude, sun exposure), nutrition, careers in sports medicine, introduction to clinical research.

Rules & Requirements

Prerequisites: Background in anatomy, physiology, or exercise physiology recommended

Hours & Format

Summer:

6 weeks - 5 hours of lecture and 2 hours of discussion per week

8 weeks - 5 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: McLaughlin

INTEGBI C129L Human Physiological Assessment 3 Units

Terms offered: Spring 2022, Spring 2020, Spring 2019

Principles and theories of human physiological assessment in relation to physical activity and conditioning. Performance of laboratory procedures in the measurement and interpretation of physiological fitness (cardiorespiratory endurance, body composition, musculoskeletal fitness).

Rules & Requirements

Prerequisites: Biology 1A, IB 132 (may be taken concurrently); IB 123AL is recommended

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Summer: 6 weeks - 5 hours of lecture and 7.5 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Johannessen

Also listed as: PHYS ED C129

INTEGBI 131 General Human Anatomy 3 Units

Terms offered: Fall 2024, Summer 2024 8 Week Session, Fall 2023

The functional anatomy of the human body as revealed by gross and microscopic examination. Designed to be taken concurrently with 131L.

Rules & Requirements

Prerequisites: Biology 1A-1B or Chemistry 1A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer:

6 weeks - 8 hours of lecture per week

8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Carlson

INTEGBI 131L General Human Anatomy Laboratory 3 Units

Terms offered: Fall 2024, Summer 2024 8 Week Session, Fall 2023

Prepared human dissections, models, and microscopic slides.

Rules & Requirements

Prerequisites: Biology 1A-1B or Chemistry 1A. 131 (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of laboratory and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of laboratory and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI 132 Human Physiology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

Mechanisms by which key physiological priorities are maintained in healthy humans. From a basis in elementary theories of information and control, we develop an understanding of homeostasis of cellular composition, structure, and energy metabolism. We then study neural and endocrine signaling in humans, and develop the key concepts of control and homeostasis in all the major organ and multi-organ systems, including cardiovascular, respiratory, renal, metabolic, reproductive, and immune systems, growth and development, and sensory and motor systems.

Rules & Requirements

Prerequisites: Biology 1A

Credit Restrictions: Students will receive no credit for Integrative Biology 132 after completing Molecular and Cell Biology 136.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI 132L Human Physiology Laboratory 2 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

In the laboratory component of IB132, students gain hands-on experience measuring physiological parameters, interpreting physiological data, designing experiments, and communicating ideas in writing and orally. Guided investigations include measurements of membrane potentials, responses of skeletal muscle to electrical stimulation, electromyography, pulmonary and cardiovascular measurements in humans, contractility and regulation of the frog heart, human electrocardiography, and renal control of body fluids. In two independent investigations, students identify their own questions, develop hypotheses, design and perform experiments, and present their studies in symposia.

Rules & Requirements

Prerequisites: Previous or concurrent enrollment in 132 or equivalent, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of laboratory per week

Summer: 8 weeks - 6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI 134L Practical Genomics 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

Genome sequencing and analyses have transformed biology over the past two decades. This course provides a hands-on introduction to the world of computational biology and bioinformatics. Students will apply state-of-the-art techniques to analyze genome and microbiome data from the UC Berkeley campus fox squirrels and local California ground squirrels each week. Students will master practical bioinformatics skills and then take on their own scientific research projects, all using genomic data collected specifically for this course. We will also explore key advances in the field of genomics over the past two decades of both humans and non-model organisms that have driven the current revolution in genome sciences.

Rules & Requirements

Prerequisites: BIOLOGY 1A and BIOLOGY 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Sudmant, Tarvin

INTEGBI 135 The Mechanics of Organisms 4 Units

Terms offered: Spring 2024, Spring 2016, Fall 2013

Organism design in terms of mechanical principles; basics of fluid and solid mechanics with examples of their biological implications, stressing the dependence of mechanical behavior and locomotion on the structure of molecules, tissues, structural elements, whole organisms, and habitats.

Rules & Requirements

Prerequisites: Introductory physics and biology recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Dudley, Full, Koehl

INTEGBI C135L Laboratory in the Mechanics of Organisms 3 Units

Terms offered: Spring 2015, Spring 2014, Spring 2013, Spring 2012
Introduction to laboratory and field study of the biomechanics of animals and plants using fundamental biomechanical techniques and equipment. Course has a series of rotations involving students in experiments demonstrating how solid and fluid mechanics can be used to discover the way in which diverse organisms move and interact with their physical environment. The laboratories emphasize sampling methodology, experimental design, and statistical interpretation of results. Latter third of course devoted to independent research projects. Written reports and class presentation of project results are required.

Rules & Requirements

Prerequisites: INTEGBI 135 or consent of instructor. For Electrical Engineering and Computer Sciences students: EL ENG 105, EL ENG 120 or COMPSCI 184

Credit Restrictions: Students will receive no credit for C135L after taking 135L.

Hours & Format

Fall and/or spring: 15 weeks - 6 hours of laboratory, 1 hour of discussion, and 1 hour of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: Integrative Biology 135L

Also listed as: BIO ENG C136L/EL ENG C145O

INTEGBI 136 The Biology of Sex 4 Units

Terms offered: Fall 2023, Fall 2021, Fall 2014

The ability to reproduce is a defining characteristic of life, and of great interest to biologists as well as humanity in general. What is sex, and why did it develop? Why do we have sexual reproduction, whereas some animals do not? This course will provide a comprehensive overview on the biology of sex from an evolutionary perspective with an emphasis on humans in comparison to other species. The course will consist of two lectures each week, and a lab where we discuss a paper, watch videos, or have discussion sections on specific topics that were covered in class.

Rules & Requirements

Prerequisites: Biology 1B, introductory genetics (Mendelian genetics, recombination, chromosomes)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Bachtrog

INTEGBI 137 Human Endocrinology 4 Units

Terms offered: Fall 2020, Fall 2019, Fall 2018

Course will address the role of hormones in physiology with a focus on humans. Regulation of hormone secretion and mechanisms of hormone action will be discussed. Physiological processes to be addressed include reproduction, metabolism, water balance, growth, fetal development. Experimental and clinical aspects will be addressed.

Rules & Requirements

Prerequisites: Biology 1A-1B; human physiology (132) strongly recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Hayes

INTEGBI 138 Comparative Endocrinology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

The primary goal of this course is to provide students with a broad understanding of the evolution of hormonal systems. A comparative approach allows us to envisage how the complex mammalian endocrine system presumably evolved from that of more primitive vertebrates. Students will learn about endocrine pathways and endocrine-based behaviors of jawless fishes, fishes, amphibia, reptiles, birds, and mammals. In addition, students will gain an understanding of the experimental methods used in endocrine research. The class teaches students how to read and interpret the primary scientific literature; thus it encourages the critical thinking that is a fundamental skill for any scientist.

Rules & Requirements

Prerequisites: Biology 1A-1B. Organic Chemistry recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Bentley

INTEGBI 139 The Neurobiology of Stress 4 Units

Terms offered: Fall 2022, Fall 2020, Fall 2019

This course is designed to be an interdisciplinary course. It will adopt a broad-based approach to explore the concepts of stress, health, and disease, with a particular focus on current primary literature. The course will cover multiple dimensions in the study of stress, which employ genetic, epigenetic, molecular, cellular, physiological, and cognitive approaches, especially in the context of endocrine and neuroscience research. We will analyze the individual response to stress, how genetic and environmental factors play a role in it, how it translates to physiological and mental health and well-being vs. pathological conditions, and put that in a public health perspective.

Objectives & Outcomes

Course Objectives: This course will emphasize the interconnected and multidirectional relationships between biology, behavior and the social environment. The study of stress is necessarily an interdisciplinary endeavor. This course is designed to explore the role of genes, hormones and experiences as they affect the stress-response and subsequently brain and behavior.

Rules & Requirements

Prerequisites: Biology 1A or Psychology 110. You will need a good understanding of the fundamentals of biology to do well in this class

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Kaufer

INTEGBI 140 Biology of Human Reproduction 4 Units

Terms offered: Spring 2025, Summer 2024 8 Week Session, Spring 2024

Course focuses on biological and cultural aspects of human reproduction including conception, embryology, pregnancy, labor, delivery, lactation, infant/child development, puberty, and reproductive aging. This includes study of factors that diminish and factors that enhance fertility, reproduction, and maternal-child health. We explore evolutionary, ecological, environmental, cultural, ethnobiological, and nutritional determinants of fertility, reproductive rate, infant survival, and population growth.

Rules & Requirements

Prerequisites: Biology 1A or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer:

6 weeks - 8 hours of lecture and 2 hours of discussion per week
8 weeks - 5 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Carlson

INTEGBI 141 Human Genetics 3 Units

Terms offered: Summer 2024 8 Week Session, Summer 2023 8 Week Session, Summer 2022 8 Week Session

Principles of inheritance, especially as applied to human traits, including molecular aspects of genetics, the genetic constitutions of populations, and questions of heredity/environment.

Rules & Requirements

Prerequisites: One course in biological science

Credit Restrictions: Students will receive no credit for 141 after taking Molecular and Cell Biology 142 or C142 and Integrative Biology C163.

Hours & Format

Summer: 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

INTEGBI 142L Brain, Behavior, and Environment: a research approach 5 Units

Terms offered: Fall 2023

How do experiences and exposures get “under the skin” to impact human development? This course takes a research approach to understanding environmental origins of adult behavior. We begin with foundations in endocrinology, neurobiology, reproduction, and development. This sets the stage for studying how experiences influence development, including nutrition, stress, immune challenges, endocrine disruptors, and more. Students will engage in authentic research using seasonal transitions in rodent physiology and behavior to understand adaptation to changing environments.

Rules & Requirements

Prerequisites: Biology 1A or Psychology 110. You will need a good understanding of the fundamentals of biology to do well in this class

Credit Restrictions: Students will receive no credit for INTEGBI 142L after completing INTEGBI 142L. A deficient grade in INTEGBI 142L may be removed by taking INTEGBI 142L.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI C143A Biological Clocks: Physiology and Behavior 3 Units

Terms offered: Fall 2024, Fall 2023, Fall 2020, Fall 2018

A consideration of the biological clocks that generate daily, lunar, seasonal and annual rhythms in various animals including people. Emphasis on neuroendocrine substrates, development and adaptive significance of estrous cycles, feeding rhythms, sleep-wakefulness cycles, reproductive and hibernation cycles, body weight and migratory cycles.

Rules & Requirements

Prerequisites: Completion of biological prerequisites for the major and one of the following: 110 or a course in animal organismal physiology (Integrative Biology 132, 138, 140, 148, or Molecular and Cell Biology 160)

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Kriegsfeld

Also listed as: PSYCH C113

INTEGBI C144 Animal Behavior 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

An introduction to comparative animal behavior and behavioral physiology in an evolutionary context, including but not limited to analysis of behavior, genetics and development, learning, aggression, reproduction, adaptiveness, and physiological substrates.

Rules & Requirements

Prerequisites: Biology 1A, 1B, or Environmental Science, Policy, and Management 140. Molecular and Cell Biology 140 and C160 recommended

Credit Restrictions: Students will receive no credit for 144 after taking C144, 145, 146LF, or Psychology C115B.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Lacey, Caldwell, Bentley, Elias

Also listed as: ESPM C126

INTEGBI C145 Animal Communication 3 Units

Terms offered: Spring 2024, Spring 2022, Spring 2020

Communication is central to the lives of most, if not all animals. How and why animals communicate is thus central to understanding the ecology, behavior, neurobiology, and evolution of animal systems. This course will focus on understanding the basic principles driving the communication system of a species, drawing together topics ranging from the physical properties of the environment, physiology of sensory systems, animal behavior and ecology, using examples from classic and recent publications.

Rules & Requirements

Prerequisites: Biology 1B. Animal Behavior (ESPM C126/IB C144) recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Elias

Formerly known as: Environ Sci, Policy, and Management 156

Also listed as: ESPM C156

INTEGBI 146LF Behavioral Ecology with Laboratory 5 Units

Terms offered: Spring 2019, Spring 2017, Spring 2015

An in-depth examination of the ecological and evolutionary bases for behavioral diversity. Topics covered include behavior as an adaptive response, sexual selection, animal mating systems, group living, and cooperative and competitive interactions. Current conceptual approaches to these topics are explored, with an emphasis upon rigorous testing of hypotheses drawn from primary literature. Hands-on laboratory training in the methods of experimental design, data collection, and data analysis.

Rules & Requirements

Prerequisites: Integrative Biology 144 or Integrative Biology C144/ Environmental Science, Policy and Management C126 or consent of instructor

Credit Restrictions: Students will receive partial credit for Integrative Biology 146LF after taking Integrative Biology 146.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture, 1 hour of discussion, and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Lacey

Formerly known as: 146L

INTEGBI 148 Comparative Animal Physiology 3 Units

Terms offered: Fall 2024, Fall 2022, Fall 2020

Comparative study of physiological systems among animal phyla. General physiological principles will be illustrated by examining variation in neural, muscular, endocrine, cardiovascular, respiratory, digestive, and osmoregulatory systems. Students will read original literature and give a group presentation in a symposium.

Rules & Requirements

Prerequisites: Biology 1A-1B

Credit Restrictions: Students will receive no credit for 148 after taking 100A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Full, Dudley

INTEGBI 150 Evolutionary Environmental Physiology 3 Units

Terms offered: Spring 2022, Spring 2020, Spring 2018

Evolutionary physiology studies how physiological traits arise and are modified during adaptation to the environment. An integrative understanding of the origin and maintenance of physiological traits, encompassing levels of biological hierarchy from molecular to ecological and biogeographic, is essential for improving human health and stewarding the natural world through the current era of rapid environmental change. This course consists of three parts: 1) big questions in evolutionary physiology and how they are addressed; 2) a student-led exploration of how environmental factors have shaped physiological evolution; and 3) predicting responses to global change using evolutionary physiology.

Rules & Requirements

Prerequisites: Biology 1A-1B or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Williams

INTEGBI 151 Plant Physiological Ecology 4 Units

Terms offered: Spring 2024, Spring 2022, Spring 2020

This course focuses on a survey of physiological approaches to understanding plant-environment interactions from the functional perspective. Lectures cover physiological adaptation; limiting factors; resources acquisition/allocation; photosynthesis, carbon, energy balance; water use and relations; nutrient relations; linking physiology; stable isotope applications in ecophysiology; stress physiology; life history and physiology; evolution of physiological performance; physiology population, community, and ecosystem levels.

Rules & Requirements

Prerequisites: Biology 1A,1B, or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Dawson

INTEGBI 151L Plant Physiological Ecology Laboratory 2 Units

Terms offered: Spring 2024, Spring 2022, Spring 2020

The laboratory is focused on instructing you on observational and experimental approaches and methods used in plant physiological ecology. Students are introduced to a wide range of techniques and will make measurements on different plant species growing in the field or greenhouse (weeks 1-7). A group research project is required (weeks 9-12).

Rules & Requirements

Prerequisites: Concurrent enrollment in 151

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Dawson

INTEGBI C153 Ecology 3 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

Ecology is a scientific discipline that focuses on the interactions between organisms and their environment. This class will provide an overview of core concepts and applications, and will also provide practice with writing, small-group work, critical thinking, and data analysis.

The class will specifically cover principles of population ecology, illustrated with examples from marine, freshwater, and terrestrial habitats. It will consider the roles of physical and biological processes in structuring natural communities. Observational, experimental, and theoretical approaches will be discussed. Topics will include quantitative approaches relying on algebra, visual analysis of graphs, and elementary calculus.

Rules & Requirements

Prerequisites: Biology 1B or consent of instructor

Credit Restrictions: Students will receive no credit for INTEGBI C153 after completing ESPM 153, or INTEGBI C153. A deficient grade in INTEGBI C153 may be removed by taking ESPM 153, or INTEGBI C153.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Blonder, Razafindratsima

Formerly known as: Integrative Biology 153

Also listed as: ESPM C153

INTEGBI 154 Plant Ecology 3 Units

Terms offered: Fall 2017, Fall 2015, Fall 2013

An introduction to ecology of plants, covering individuals, populations, communities, and global processes. Topics include: form and function, population ecology, life histories, community structure and dynamics, disturbance and succession, diversity and global change.

Rules & Requirements

Prerequisites: Biology 1B. Enrollment in accompanying lab course 154L is encouraged but not required

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Ackerly

INTEGBI 154L Plant Ecology Laboratory 2 Units

Terms offered: Fall 2015, Fall 2013, Spring 2005

Field and laboratory class in plant ecology. Laboratory exercises covering plant functional morphology, dispersal ecology, spatial dispersion in plant populations, environmental gradients and plant distributions, population dynamics simulations, and restoration ecology. Small-group independent projects, with write-ups and presentations. Concurrent enrollment in Integrative Biology 154 is required.

Rules & Requirements

Prerequisites: Biology 1B. Concurrent enrollment in 154

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Ackerly

INTEGBI C156 Principles of Conservation Biology 4 Units

Terms offered: Fall 2024, Fall 2022, Summer 2022 Second 6 Week Session

A survey of the principles and practices of conservation biology. Factors that affect the creation, destruction, and distribution of biological diversity at the level of the gene, species, and ecosystem are examined. Tools and management options derived from ecology and evolutionary biology that can recover or prevent the loss of biological diversity are explored.

Rules & Requirements

Prerequisites: Biology 1A-1B or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1.5 hours of discussion per week

Summer: 6 weeks - 6.5 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Beissinger

Formerly known as: Integrative Biology C156, Environ Sci, Policy, and Management C103

Also listed as: ESPM C103

INTEGBI 157LF Ecosystems of California 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

The ecosystems of California are studied from both an ecological and historical biogeographical perspective with a focus on terrestrial plant communities. Students learn how to identify about 150 species of native plants (mostly trees, but also other dominant plants from the non-forest biomes). Field trips occur each Friday and over several weekends. Students conduct group projects that involve plant inventories and data collection as well as how to collect plant specimens and use the Herbarium.

Rules & Requirements

Prerequisites: Biology 1B or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 6 hours of fieldwork and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Fine

INTEGBI C158L Biology and Geomorphology of Tropical Islands 15 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

In this class, students study the natural history and evolutionary biology of island terrestrial and freshwater organisms and their communities, and of marine organisms in the coral reef and lagoon systems. The students also learn about the geomorphology of volcanic islands, coral reefs, and reef islands. Features of island biogeography are illustrated with topics linked to subsequent field studies on the island of Mo'orea, French Polynesia. The course trains students as independent scientists, as students develop, conduct, and communicate independent research projects on a topic of their choice.

Rules & Requirements

Credit Restrictions: Students will receive no credit for INTEGBI C158L after completing INTEGBI C158, or INTEGBI 158L. A deficient grade in INTEGBI C158L may be removed by taking INTEGBI 158L.

Hours & Format

Fall and/or spring: 15 weeks - 10 hours of lecture and 14 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Formerly known as: Integrative Biology 158LF/Environ Sci, Policy, and Management C107

Also listed as: ESPM C107

INTEGBI 159 The Living Planet: Impact of the Biosphere on the Earth System 3 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

Earth is a complex dynamic system. Interplay between its components (solid earth, oceans, and atmosphere) governs conditions on the planet's outside that we and other biota inhabit. In turn, life asserts a vast influence on the abiotic components; in fact, the biosphere itself is a crucial system component. We will explore the effect that 3.5 billion years of evolving biosphere had on System Earth and vice versa (e.g., in terms of climate), including the recent human impact on the system.

Rules & Requirements

Prerequisites: Biology 1B or consent of instructor

Credit Restrictions: Students will receive two units of credit after taking Earth and Planetary Science 8, Earth and Planetary Science C141/ Geography C141, or Geography 40.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Looy, Duijnste

INTEGBI C160 Evolution 4 Units

Terms offered: Fall 2024, Fall 2023

An analysis of the patterns and processes of organic evolution. History and philosophy of evolutionary thought; the different lines of evidence and fields of inquiry that bear on the understanding of evolution. The major features and processes of evolution through geologic times; the generation of new forms and new lineages; extinction; population processes of selection, adaptation, and other forces; genetics, genomics, and the molecular basis of evolution; evolutionary developmental biology; sexual selection; behavioral evolution; applications of evolutionary biology to medical, agricultural, conservational, and anthropological research.

Rules & Requirements

Credit Restrictions: Students will receive no credit for INTEGBI 160 after completing ZOOLOGY 109.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Whiteman

Formerly known as: Integrative Biology 160

Also listed as: MCELLBI C144

INTEGBI 161 Population and Evolutionary Genetics 4 Units

Terms offered: Spring 2021, Spring 2019, Spring 2017

Population genetics provides the theoretical foundation for modern evolutionary thinking. It also provides a basis for understanding genetic variation within populations. We will study population genetic theory and use it to illuminate a number of different topics, including the existence of sex, altruism and cooperation, genome evolution speciation, and human genetic variation and evolution.

Rules & Requirements

Prerequisites: Biology 1A/1B, Mathematics 16A or 10A

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Nielson, Slatkin

INTEGBI 162 Ecological Genetics 4 Units

Terms offered: Spring 2020, Fall 2016, Fall 2014

This course integrates ecology, genetics, and evolutionary biology. It presents contemporary approaches to studying evolution in natural populations, including analyzing heritability of ecologically important traits, using molecular techniques to decompose genotypes, documenting and measuring the magnitude of selection in natural systems, and using models to predict evolution in natural populations. Case studies are used to examine evolutionary effects of ecological interactions among organisms, the importance of population size and structure, and interactions among populations through migration and dispersal.

Rules & Requirements

Prerequisites: Biology 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Simms

INTEGBI 164 Human Genetics and Genomics 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

This course will introduce students to basic principles of genetics, including transmissions genetics, gene regulation, pedigree analysis, genetic mapping, population genetics, and the principles of molecular evolution. The course will also introduce students to recent developments in genomics as applied to problems in human genetic diseases, human history, and the relationship between humans and their closest relatives.

Rules & Requirements

Prerequisites: Biology 1A, 1B, and Math 16A, or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bachtrog, Nielsen, Slatkin

INTEGBI C165 Post-Apocalyptic Botany 4 Units

Terms offered: Spring 2025, Fall 2023, Spring 2023

An in-depth study of taxonomy, with a special focus on plants. We will first learn how plants are classified and how they fit into the tree of life, and what practical challenges exist for current practitioners of botany. Next, we will study the history of the ideas underlying classification and their connections to colonial, extractivist empire-building activities since Linnaeus. Finally, we will work to create a new taxonomy that acknowledges and imagines other relationships with plants.

Rules & Requirements

Credit Restrictions: Students will receive no credit for GEOG C154 after completing GEOG 154. A deficient grade in GEOG C154 may be removed by taking GEOG 154.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructors: Kosek, Fine

Also listed as: GEOG C154

INTEGBI C166 Biogeography 4 Units

Terms offered: Fall 2024, Fall 2022, Fall 2021

The course will provide a historical background for the field of biogeography and the ecological foundations needed to understand the distribution and abundance of species and their changes over time. It will also discuss developing technologies (including genomic tools and environmental models) together with the availability of big data and increasingly sophisticated analytical tools to examine the relevance of the field to global change biology, conservation, and invasion biology, as well as sustainable food systems and ecosystem services.

Rules & Requirements

Prerequisites: BIO 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Gillespie

Also listed as: ESPM C125/GEOG C148

INTEGBI 167 Evolution and Earth History: From Genes to Fossils 4 Units

Terms offered: Spring 2018, Spring 2016, Spring 2014

The diversity of life is the product of evolutionary changes. This course will integrate fossil and molecular data to consider some of the outstanding questions in the study of evolution. Major topics covered include the origin and early evolution of life, the expansion of the biosphere through time, the generation of variation and the mechanisms of natural selection, genetics and developmental evolution, and the relationships between microevolution and macroevolution.

Rules & Requirements

Prerequisites: Biology 1A, 1B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Finnegan, Patel

INTEGBI 168L Plants: Diversity and Evolution 4 Units

Terms offered: Spring 2021, Spring 2019, Spring 2017

Plants form the foundation of terrestrial life, are critical for human civilization, and exhibit an extraordinary variety of "behaviours", forms, and functions. This course introduces the global diversity of land plants and their evolution. There are far too many plants to cover in a single course so our goals, instead, are to become familiar with the major groups, to understand their evolution and their importance to human society, and to be familiar with the tools used to study their relationships and classification (systematics).

Rules & Requirements

Prerequisites: Biology 1A-1B

Credit Restrictions: Students will receive partial credit for 168L after taking 168.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Rothfels

INTEGBI 169 Evolutionary Medicine 4 Units

Terms offered: Spring 2025, Spring 2024, Summer 2023 First 6 Week Session

This course explores the ways that evolutionary theory, natural selection, drift, genetics, and epigenetics can illuminate our understanding of human health and disease. The course begins with an overview of primate and hominid evolution and human genetic variation. We then evaluate reproductive biology and maternal/child health through an evolutionary lens. We explore how human ecosystem interactions influence diet, metabolic adaptations, hematological adaptations, human microbiome, and human pathogens. We examine evolutionary concepts related to aging, senescence and development of cancer. Finally we study psychology, behavior, and social/cultural organization through an evolutionary perspective.

Rules & Requirements

Prerequisites: Biology 1B, or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 6 weeks - 8 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Carlson

INTEGBI 170LF Methods in Population and Community Ecology 3 Units

Terms offered: Spring 2019, Spring 2017, Spring 2015

This course is a hands-on introduction to common research methods in population and community ecology. Each method and its application are first presented in a lecture session, illustrated with published examples. The method is then practiced in a subsequent group field exercise, conducted in a local terrestrial, aquatic, or marine habitat. The course focuses on sampling methods, experimental designs, and statistical analyses used to investigate patterns of species distribution and abundance, interspecific associations, and local species diversity. Graded assignments include write-ups of field exercise results, and an in-depth review paper and oral in-class presentation on an ecological method of particular interest to the student.

Objectives & Outcomes

Course Objectives: This course is designed as a hands-on introduction to common research methods in population and community ecology. Students will learn how to quantitatively describe and statistically analyze patterns in (1) the distribution, abundance, and size/age distributions of populations, (2) the diversity and similarity of multi-species assemblages, (3) interspecific association, and (4) habitat preference and selectivity. They will also be taught the fundamentals of experimental design and apply them in a field predator-prey manipulation.

Rules & Requirements

Prerequisites: Integrative Biology 153 or comparable upper-division course in ecology from Integrative Biology or Environmental Science Policy and Management course lists (or by consent of instructor); introductory course in statistics strongly recommended

Credit Restrictions: Students will receive no credit for Integrative Biology 170LF after completing Integrative Biology 153L.

Hours & Format

Fall and/or spring: 15 weeks - 8 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Sousa

Formerly known as: Integrative Biology 153LF

INTEGBI C171 Freshwater Ecology 3 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022

Lakes, rivers, wetlands, and estuaries are biologically rich, dynamic, and among the most vital and the most vulnerable of Earth's ecosystems.

Lectures will introduce general topics including the natural history of freshwater biota and habitats, ecological interactions, and ecosystem linkages and dynamics. Broad principles will be illustrated with results from selected recent research publications. Factors affecting resilience or vulnerability of freshwater ecosystems to change will be examined. Course requirements: two exams and a short synthesis paper projecting the future states of a freshwater or estuarine ecosystem of the student's choice under plausible scenarios of local, regional, or global change.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Ruhi

Formerly known as: Integrative Biology 171

Also listed as: ESPM C115A

INTEGBI 172 Coevolution: From Genes to Ecosystems 4 Units

Terms offered: Spring 2024, Spring 2021, Spring 2020

The biological world is shaped by interactions among species. These inter-specific interactions, such as between predators and prey, plants and pollinators, or hosts and pathogens, have led to an impressive array of adaptations, helping to explain the incredible organismal and genetic diversity on Earth. Our understanding of coevolution (the responses to reciprocal selection acting on two interacting populations) has been greatly facilitated in the last few years by conceptual advancements, new methods allowing direct tests of theory, next generation sequencing technology, and the advance of 'omics' approaches.

Rules & Requirements

Prerequisites: Bio 1A and Bio 1B or equivalent required, Genetics or Evolution course suggested

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Koskella

INTEGBI 173LF Mammalogy with Laboratory 5 Units

Terms offered: Fall 2024, Fall 2022, Fall 2020

An advanced course in the biology of mammals. Topics covered include elements of modern mammalian biology such as morphology, physiology, ecology, and behavior. For all topics, the traits that define mammals are emphasized, as is the variation on these themes evident within modern mammalian lineages. Laboratory and field explore the biology of modern mammals. Laboratories use the extensive collections of the Museum of Vertebrate Zoology to introduce students to mammalian diversity in a phylogenetic context.

Rules & Requirements

Prerequisites: 104LF

Credit Restrictions: Students will receive partial credit for 173LF after taking 173.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Nachman

INTEGBI 174LF Ornithology with Laboratory 4 Units

Terms offered: Spring 2025, Spring 2022, Spring 2019

An advanced course in the biology of birds. Laboratory: an introduction to the diversity, morphology, and general ecology of birds of the world.

Rules & Requirements

Prerequisites: 104LF or consent of instructor

Credit Restrictions: Students will receive partial credit for 174LF after taking 174.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Bowie

INTEGBI 175LF Herpetology with Laboratory 4 Units

Terms offered: Spring 2024, Spring 2022, Spring 2020

Lectures will introduce students to the diversity of amphibians and reptiles on a world-wide basis, with an emphasis on systematics, ecology, morphology, and life history. Laboratories will teach students the diagnostic characteristics and some functional attributes of amphibians and reptiles on a world-wide basis. Field trips will acquaint students with techniques for collecting, preserving, identifying, and studying amphibians and reptiles.

Rules & Requirements

Prerequisites: 104LF

Credit Restrictions: Students will receive partial credit for 175LF after taking 175.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: McGuire

INTEGBI 177LF Ichthyology: An Introduction to the Scientific Process Through Research on Fishes 4 Units

Terms offered: Fall 2023, Fall 2022, Fall 2021

Did you know that our closest living fish relative can build a cocoon and hibernate for three years? Or that some fish make a living by eating scales? This class will conduct publishable research in evolution, ecology, and behavior by doing actual science on fishes. We will attempt to answer unknown questions about the evolution of fascinating adaptations in diverse groups of fishes in both the laboratory and field.

Objectives & Outcomes

Course Objectives: This class is meant to be an introduction to research through ichthyology: students are not expected to have any prior research experience. The primary focus throughout the semester will be on independent group projects conducting laboratory and field experiments testing hypotheses about our focal fish groups: scale-eating pupfish, sponge-eating cichlids, cocoon-building lungfish, Monterey kelp forest communities, and four-eyed fishes. By focusing on these diverse study systems, students will receive a broad perspective on how to investigate and test hypotheses about adaptation in the field and lab. The class will include three field trips, high-speed video of prey capture, and detailed studies of behavior, ecology, and functional morphology.

Student Learning Outcomes: Students will be taught how to generate original hypotheses, collect and analyze data in the R statistical programming language, discuss scientific literature, present their research, and publish their results. Students will ask their own independent research questions and conduct experiments to answer them. Lecture topics will focus on the evolution, ecology, behavior, anatomy, and biodiversity of fishes, with an introduction to concepts including adaptationism, natural selection, convergent evolution, exaptation, tree thinking, evolutionary novelty, behavioral ecology, applications to human health, and conservation.

Rules & Requirements

Prerequisites: Basic background in ecology and evolution (e.g. AP Bio or BIO 1B) or permission of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI 178 Plant-Animal Interactions 3 Units

Terms offered: Fall 2024, Fall 2022

This course will present a broad overview of the diverse interactions between plants and animals, including antagonistic and mutualistic interactions as well as interactions involving multiple species and across trophic levels. It will emphasize macro-level interactions in various ecosystems. We will consider both ecological and evolutionary aspects of the mechanisms and impacts of these interactions, incorporating basic knowledge with advanced and applied approaches. Students will improve their knowledge on how plant-animal interactions shape patterns of biological diversity and influence the functioning of ecosystems as a whole and be able to analyze and predict how current environmental changes affect these interactions.

Rules & Requirements

Prerequisites: Biology 1B or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

INTEGBI 181L Paleobotany - The 500-Million Year History of a Greening Planet 4 Units

Terms offered: Spring 2024, Spring 2022, Spring 2020

Introduction to the evolution of plants and terrestrial ecosystems through time. From the invasion of land to the present, we will follow the evolution of major plant groups through important moments of the Phanerozoic eon (the past 540 million years). By studying fossilized plant assemblages, we will interpret how major environmental changes unfolded across landscapes in the past and how plants have influenced the shaping of our planet. Lectures will be complemented by an interactive laboratory covering paleobotanical research techniques, study of fossil and living plant form and function in the lab and field, and analysis of peer-reviewed literature.

Rules & Requirements

Prerequisites: Courses in botany and geology are recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Looy

Formerly known as: Integrative Biology 181

INTEGBI 184L Morphology of the Vertebrate Skeleton with Laboratory 4 Units

Terms offered: Fall 2023, Fall 2021, Fall 2019

Lectures on comparative osteology of vertebrates, with emphasis on selected groups of terrestrial vertebrates considered in paleoecological, paleoclimatological, and biostratigraphic analyses. Laboratory: comparative osteology of vertebrates, with emphasis on selected groups of vertebrates. Structure, anatomy, morphology, function, and development of the vertebrate skeleton.

Rules & Requirements

Prerequisites: Biology 1B or introductory courses in Earth Sciences or Anthropology

Credit Restrictions: Students will receive partial credit for 184L after taking 184.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture, 1 hour of discussion, and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Barnosky

INTEGBI 190 Seminar for Integrative Biology Majors 1 - 3 Units

Terms offered: Spring 2016, Spring 2015, Spring 2014

This upper-division undergraduate course will allow students to pursue specialized topics in biology in a seminar format. The specific content of the course will vary based on the topic and the instructor. In general, weekly meetings will provide a forum for extended discussion of selected aspects of evolutionary biology. Supplementary readings and assignments will provide critical background information and keep students engaged in relevant topics between weekly meetings.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of seminar per week

Summer:

6 weeks - 2.5-7.5 hours of seminar per week

8 weeks - 1.5-5.5 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

INTEGBI 191 Directed Undergraduate Research 3 Units

Terms offered: Spring 2020, Spring 2017, Fall 2016

This course is intended for advanced undergraduates wishing to pursue independent research projects under the mentorship of an IB faculty member. Research projects will be rigorous and will provide significant training in the methods of evolutionary research. A project proposal is required to enroll and students are expected to produce a substantial written summary of their work.

Rules & Requirements

Prerequisites: Consent of instructor and departmental adviser

Repeat rules: Course may be repeated for credit up to a total of 2 times.

Hours & Format

Fall and/or spring: 15 weeks - 9 hours of independent study per week

Summer:

8 weeks - 17 hours of independent study per week

10 weeks - 13.5 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

INTEGBI 192 Applied Pedagogy in Integrative Biology 2 - 3 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024

This course provides undergraduate students with direct, hands-on experience with pedagogical practices in a laboratory course setting. Many students seek opportunities to continue participating in laboratory courses that they have already completed due to an interest in the topic and a desire to engage in the process of biological instruction. This course allows qualified undergraduates to gain direct experience with instruction of lab courses in a structured, mentored, and pedagogically informed setting. Each student in the course will be paired with a Graduate Student Instructor who will provide near-peer mentoring regarding classroom practices and development of pedagogical practices.

Rules & Requirements

Prerequisites: This course must initially be taken concurrently with IB 193 (Practical Pedagogy: Becoming an Effective Instructor in Biology). Subsequently, IB 192 can be taken in additional semesters without also enrolling in IB 193

Repeat rules: Course may be repeated for credit with instructor consent.

Hours & Format

Fall and/or spring: 15 weeks - 2-3 hours of laboratory per week

Summer: 8 weeks - 4-6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.

INTEGBI 193 Practical Pedagogy: Becoming an Effective Instructor in Biology 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

This course provides undergraduates with conceptual and practical expertise in teaching lab-based courses in biology. Through discussion and implementation of diverse pedagogical practices, students will gain competence as instructors while furthering their understanding of select topics in evolutionary biology.

Rules & Requirements

Prerequisites: This course is a pre-requisite to IB 192 (Applied Pedagogy in Integrative Biology) but may be taken concurrently with that course

Repeat rules: Course may be repeated for credit up to a total of 1 time.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.

INTEGBI C195 Introduction to Global Health Disparities Research 2 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018

This course prepares students to conduct a 10-week global health research project in a low or middle-income country (LMIC); provides a background in global health, emphasizing infectious disease research, international research ethics, and the conduct of health research in low-resource settings. Leads students through the process of preparing for, conducting, and completing a short-term research project, with modules focused on cultural communication, the role and pace of research in these other countries, presentation preparation, project development, and troubleshooting skills; gaining perspective into the relationship between global health and health disparities in the USA

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructor: Reingold

Also listed as: PB HLTH C117

INTEGBI H196A Thesis Course 3 Units

Terms offered: Fall 2016, Fall 2013, Fall 2012

Individual study and research for at least one academic year on a special problem to be chosen in consultation with a member of the staff; preparation of the thesis on broader aspects of this work.

Rules & Requirements

Prerequisites: Open only to students in Honors Program

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:

6 weeks - 0 hours of independent study per week

8 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

INTEGBI H196B Thesis Course 3 Units

Terms offered: Spring 2014, Fall 2013, Spring 2013

Individual study and research for at least one academic year on a special problem to be chosen in consultation with a member of the staff; preparation of the thesis on broader aspects of this work.

Rules & Requirements

Prerequisites: Open only to students in Honors Program

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:

6 weeks - 0 hours of independent study per week

8 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

INTEGBI 197 Supervised Internship 1 - 4 Units

Terms offered: Fall 2016, Spring 2015, Spring 2014

Supervised experience relevant to specific topics of biology in off-campus organizations. Written report and evaluation from internship supervisor required.

Rules & Requirements

Prerequisites: Consent of Integrative Biology faculty sponsor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week

Summer:

6 weeks - 1-4 hours of fieldwork per week

8 weeks - 1-4 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI 198 Supervised Group Study and Research By Upper Division Students 1 - 4 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023

Undergraduate research by small groups.

Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Summer:

6 weeks - 2.5-10 hours of directed group study per week

8 weeks - 2-7.5 hours of directed group study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI 198BC Berkeley Connect 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

Berkeley Connect is a mentoring program, offered through various academic departments, that helps students build intellectual community. Over the course of a semester, enrolled students participate in regular small-group discussions facilitated by a graduate student mentor (following a faculty-directed curriculum), meet with their graduate student mentor for one-on-one academic advising, attend lectures and panel discussions featuring department faculty and alumni, and go on field trips to campus resources. Students are not required to be declared majors in order to participate.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Fall 2016, Summer 2016 10 Week Session, Spring 2014

Enrollment restrictions apply; see department.

Rules & Requirements

Prerequisites: Background courses in chosen subjects

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer:

6 weeks - 2.5-10 hours of independent study per week

8 weeks - 2-7.5 hours of independent study per week

10 weeks - 1.5-6 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

INTEGBI C200 Principles of Phylogenetics 4 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2020, Spring 2018, Spring 2016

The core theory and methodology for comparative biology, beginning with issues in building phylogenetic trees, with emphases on both morphology and molecules, and both living and fossil organisms. Also covers the many applications of phylogenetic trees to systematics, biogeography, speciation, conservation, population genetics, ecology, behavior, development, functional morphology, and macroevolution that have revolutionized those fields. Labs are closely integrated with lectures and cover the major algorithms and computer software used to implement these approaches. Requirements include participation in discussions, two exams, and a term project.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructors: Ackerly, Mishler, Will

Also listed as: ESPM C200

INTEGBI C201 Introduction to Quantitative Methods In Biology 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023

This course provides a fast-paced introduction to a variety of quantitative methods used in biology and their mathematical underpinnings. While no topic will be covered in depth, the course will provide an overview of several different topics commonly encountered in modern biological research including differential equations and systems of differential equations, a review of basic concepts in linear algebra, an introduction to probability theory, Markov chains, maximum likelihood and Bayesian estimation, measures of statistical confidence, hypothesis testing and model choice, permutation and simulation, and several topics in statistics and machine learning including regression analyses, clustering, and principal component analyses.

Objectives & Outcomes

Student Learning Outcomes: Ability to calculate means and variances for a sample and relate it to expectations and variances of a random variable.

Ability to calculate probabilities of discrete events using simple counting techniques, addition of probabilities of mutually exclusive events, multiplication of probabilities of independent events, the definition of conditional probability, the law of total probability, and Bayes' formula, and familiarity with the use of such calculations to understand biological relationships.

Ability to carry out various procedures for data visualization in R.

Ability to classify states in discrete time Markov chains, and to calculate transition probabilities and stationary distributions for simple discrete time, finite state-space Markov chains, and an understanding of the modeling of evolutionary processes as Markov chains.

Ability to define likelihood functions for simple examples based on standard random variables.

Ability to implement simple statistical models in R and to use simple permutation procedures to quantify uncertainty.

Ability to implement standard and logistic regression models with multiple covariates in R.

Ability to manipulate matrices using multiplication and addition.

Ability to model simple relationships between biological variables using differential equations.

Ability to work in a Unix environment and manipulating files in Unix.

An understanding of basic probability theory including some of the standard univariate random variables, such as the binomial, geometric, exponential, and normal distribution, and how these variables can be used to model biological systems.

An understanding of powers of matrices and the inverse of a matrix.

An understanding of sampling and sampling variance.

An understanding of the principles used for point estimation, hypothesis testing, and the formation of confidence intervals and credible intervals.

Familiarity with ANOVA and ability to implement it in R.

Familiarity with PCA, other methods of clustering, and their implementation in R.

Familiarity with basic differential equations and their solutions.

Familiarity with covariance, correlation, ordinary least squares, and interpretations of slopes and intercepts of a regression line.

Familiarity with functional programming in R and/or Python and ability to define new functions.

Familiarity with one or more methods used in machine learning/statistics such as hidden Markov models, CART, neural networks, and/or graphical models.

Familiarity with python allowing students to understand simple python scripts.

Familiarity with random effects models and ability to implement them in R.

Familiarity with the assumptions of regression and methods for investigating the assumptions using R.

INTEGBI C204 Research Reviews in Animal Behavior: Behavior Review 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023

This course will provide a rigorous, critical review of current research in animal behavior. Emphases will include hypothesis testing and experimental design, as well as methods of data collection and analysis. Each week, a student in the course will present original research in the form of a seminar presentation, grant proposal, or manuscript. Through discussion with seminar participants, presenters will gain critical feedback regarding their research.

Rules & Requirements

Prerequisites: Graduate standing, basic course in animal behavior. Instructor approval required

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructors: Lacey, Caldwell, Bentley, Elias

Formerly known as: Psychology C204, Integrative Biology C204

Also listed as: ESPM C204

INTEGBI C205 Quantitative Methods for Ecological and Environmental Modeling 3 Units

Terms offered: Fall 2015, Fall 2013, Fall 2012, Fall 2011, Fall 2009

This course will review the background mathematical and statistical tools necessary for students interested in pursuing ecological and environmental modeling. Topics include linear algebra; difference equation, ordinary differential equation, and partial differential equation models; stochastic processes; parameter estimation; and a number of statistical techniques. This course will be recommended as a prerequisite for advanced modeling courses in Integrative Biology, Energy and Resources Group, and Environmental Science, Policy, and Management.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Also listed as: ENE,RES C205/ESPM C205

INTEGBI 206 Statistical Phylogenetics 3 Units

Terms offered: Fall 2024, Fall 2022, Fall 2020

This course is aimed at students who wish to understand the evolutionary models and methods for estimating phylogenies (which are trees representing how organisms are related to one another). Topics include continuous-time Markov chains as applied in phylogenetics; maximum likelihood estimation; Bayesian estimation; the combinatorics of evolutionary trees; Markov chain Monte Carlo; distance and parsimony methods for estimating trees; optimization strategies for finding best trees. Students will learn to write computer programs that implement many of the methods discussed in class, and apply their knowledge in a research project.

Rules & Requirements

Prerequisites: College level course in calculus

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructor: Huelsenbeck

INTEGBI C215 Communicating Ocean Science 4 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019, Spring 2015, Fall 2014, Spring 2014, Spring 2013

For graduate students interested in improving their ability to communicate their scientific knowledge by teaching ocean science in elementary schools or science centers/aquariums. The course will combine instruction in inquiry-based teaching methods and learning pedagogy with six weeks of supervised teaching experience in a local school classroom or the Lawrence Hall of Science with a partner. Thus, students will practice communicating scientific knowledge and receive mentoring on how to improve their presentations.

Rules & Requirements

Prerequisites: One course in introductory biology, geology, chemistry, physics, or marine science required and interest in ocean science, junior, senior, or graduate standing; consent of instructor required for sophomores

Hours & Format

Fall and/or spring: 15 weeks - 2.5 hours of lecture, 1 hour of discussion, and 2 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Professional course for teachers or prospective teachers

Grading: Letter grade.

Instructor: Ingram

Also listed as: EPS C301/GEOG C301

INTEGBI C216 Freshwater Ecology 3 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020, Spring 2015, Spring 2014, Spring 2013

This graduate course will combine formal lectures and discussion, with the overall goal of exposing students to general concepts in freshwater ecology. We will discuss a broad range of topics including freshwater environments and biota, natural selection and adaptive evolution, food webs and trophic cascades, cross-ecosystem linkages, and social-ecological resilience of freshwater ecosystems under global change. Upper division undergraduates are welcome, with permission of the instructors.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructors: Carlson, Power

Also listed as: ESPM C216

INTEGBI C217 Biomimetic Engineering -- Engineering from Biology 3 Units

Terms offered: Fall 2017, Spring 2014, Fall 2010

Study of nature's solutions to specific problems with the aim of determining appropriate engineering analogs. Morphology, scaling, and design in organisms applied to engineering structures. Mechanical principles in nature and their application to engineering devices. Mechanical behavior of biological materials as governed by underlying microstructure, with the potential for synthesis into engineered materials. Trade-offs between redundancy and efficiency. Students will work in teams on projects where they will take examples of designs, concepts, and models from biology and determine their potential in specific engineering applications.

Rules & Requirements

Prerequisites: Graduate standing in engineering or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructor: Dharan

Also listed as: BIO ENG C217/MEC ENG C217

INTEGBI 222 Seminar in Physiological Energetics and Biomechanics 2 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021

Discussion and critique of scientific literature and current topics in physiological energetics and biomechanics. Emphasis is on metabolic energetics. Topics include efficiency, energy-saving mechanisms, muscle function, oxidative stress, development in metabolic physiology and biochemistry and comparative aspects.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 223 Seminar on Bioenergetics and Metabolism 2 Units

Terms offered: Fall 2023, Fall 2021, Fall 2020

Immediate and long-range adaptations of the body to exercise. Physiological limits and work capacities in relation to age, sex, diet, environmental factors, and nature of activity.

Rules & Requirements

Prerequisites: 123A, 123AL

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructor: Brooks

INTEGBI C226 Isotopics 2 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

This seminar will explore current topics that employ the use of stable isotopes. Discussion topics include the areas of biology, paleontology, biogeochemistry, soil science, and atmospheric science. Students will be required to lead at least one discussion of relevant literature in the topic area.

Hours & Format

Fall and/or spring: 10 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Amundson, Dawson, Mambelli

Also listed as: ESPM C225

INTEGBI C227 Stable Isotope Ecology 5 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021, Spring 2020, Spring 2019, Spring 2016

Course focuses on principles and applications of stable isotope chemistry as applied to the broad science of ecology. Lecture topics include principles of isotope behavior and chemistry, and isotope measurements in the context of terrestrial, aquatic, and marine ecological processes and problems. Students participate in a set of laboratory exercises involving preparation of samples of choice for isotopic analyses, the use of the mass spectrometer and optical analysis systems, and the analysis of data.

Rules & Requirements

Prerequisites: Graduate standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructors: Amundson, Dawson, Mambelli

Also listed as: EPS C241/ESPM C220

INTEGBI 230 Marine Ecosystems and Global Change 1 Unit

Terms offered: Spring 2022, Fall 2018, Spring 2018

The purpose of this course is to discuss recent advances in the effects of global change (inclusive of climate change, pollution, overfishing, introduced species, etc.) on any aspect of coastal marine or estuarine ecosystems. This class is aimed at graduate students or advanced undergraduate students ready to read the primary literature and engage in active discussions of the findings and implications. Students interested in learning about cutting edge research on the effects of climate change and other anthropogenic stressors on coastal marine and estuarine ecosystems will find this class to be worthwhile.

Rules & Requirements

Prerequisites: Graduate student status or permission of instructor for undergraduate students

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Stillman

INTEGBI 232 Seminar in Biomechanics 2 Units

Terms offered: Fall 2019, Fall 2017, Spring 2017

Presentation, discussion, and critique of current literature in scientific research and current topics in comparative biomechanics which include solid and fluid mechanics, locomotion, and energetics.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 234 Seminar on Biology of Amphibians and Reptiles 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

Review of current research activity and literature concerning the biology of amphibians and reptiles.

Rules & Requirements

Prerequisites: Graduate standing and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 8 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 241 Advanced Topics in Endocrine-Regulated Development 3 Units

Terms offered: Spring 2019, Spring 2018, Spring 2015

This course will examine intentional endocrine disruption, such as the use of pharmaceuticals to regulate hormones in humans, livestock, and wildlife. We will also evaluate endocrine disrupting pollutants and their impacts on wildlife and humans, including their potential role in cancer.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructor: Hayes

INTEGBI C242 CTEG Evolution, Genetics, and Genomics Seminar 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

This graduate seminar consists of weekly presentations from Berkeley graduate students as well as outside speakers on topics surrounding evolution, genetics, and genomics. Many labs spread across different departments have research programs focused on evolution, genetics, and genomics. However, it can be challenging to keep abreast of this research and to identify potential collaborations due to the dispersion of labs across different departments and specialties. The Center for Theoretical and Evolutionary Genetics (CTEG) is an informal group of labs that collectively work on genetics and genomics. The seminar seeks to provide a common space for graduate students to present their research and learn about the research of their colleagues.

Rules & Requirements

Prerequisites: Graduate standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Sudmant, Moorjani

Also listed as: MCELLBI C242

INTEGBI 246 Seminars in Systems Biology 2 Units

Terms offered: Spring 2015, Spring 2014, Spring 2013

This course discusses seminal papers in the field of systems biology with particular emphasis on gene regulation and cell biology. The course covers the critical analysis of primary research data, computational modeling, and important theoretical concepts in systems biology. Topics vary from year to year.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructor: Lim

INTEGBI 248 Comparative Physiology and Endocrinology Seminar 1 Unit

Terms offered: Spring 2024, Spring 2023, Spring 2022
Reviews and reports of current research in vertebrate endocrinology and physiology.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Firestone

INTEGBI 249 Seminar on Evolutionary Genetics 1 Unit

Terms offered: Fall 2020, Spring 2009, Spring 2008
Recent developments in evolutionary genetics will be discussed in a seminar format.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 250 Seminar in Ecology 2 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019
Readings and discussion of current topics.

Rules & Requirements

Prerequisites: 153

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

INTEGBI 251 Ecological Research Reviews 1 Unit

Terms offered: Spring 2021, Fall 2020, Fall 2019
Reports and discussions of original research.

Rules & Requirements

Prerequisites: Graduate standing and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Formerly known as: 254

INTEGBI 257 Current Topics in Behavioral Physiology 2 Units

Terms offered: Spring 2010, Spring 2009, Fall 1999
Topics to vary. Report and discussion of current literature.

Rules & Requirements

Prerequisites: C144 or consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

INTEGBI 259 Advanced Paleoecology 2 Units

Terms offered: Fall 2013, Spring 2011, Spring 2009
Topics vary from year to year but will include paleoecology of major groups of organisms or major environments from population, community evolutionary, or taxonomic perspectives.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

INTEGBI 262 Seminar in Computational Biology 1 Unit

Terms offered: Spring 2009, Fall 2008

Students will discuss original papers in the general area of computational biology and will discuss new research presented by instructors in the course and by invited speakers from other departments at UC Berkeley and from other universities and research groups.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: Huelsenbeck, Nielsen, Slatkin

INTEGBI 263 Genetics and the Evolution of the Skeleton 2 Units

Terms offered: Spring 2016, Spring 2015, Spring 2012

In this seminar, we will explore the genetic underpinnings of vertebrate skeletal variation and review how such information is being incorporated into evolutionary and paleontological studies. Topics include quantitative genetic analyses of cranial variation and developmental genetics of the limb and dentition. This course will be tailored each semester to cover new research; therefore, students may enroll in this course multiple semesters.

Rules & Requirements

Prerequisites: A graduate-level course in biology or consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructor: Hlusko

INTEGBI 264 Seminar in Evolutionary Biology of the Vertebrates 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024

Presentation of results of original research by students, faculty, and visitors.

Rules & Requirements

Prerequisites: Graduate standing; consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 265 Advanced Studies in Hominid Paleobiology 2 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019

This is a graduate level course that focuses on special topics within hominid evolutionary studies. The topic for each semester will be decided upon during the first class meeting. Previous advanced training in biology, human evolutionary studies, and evolutionary theory is required.

Rules & Requirements

Prerequisites: Students need to have advanced undergraduate/graduate courses in biology, primate evolution, evolutionary theory, and/or geology. Enrollment is by consent of instructor only

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructors: Hlusko, White

INTEGBI 268 Seminar in Evolution above the Species Level 2 Units

Terms offered: Fall 2009, Fall 2006, Fall 2004

Current issues in macroevolution and paleobiology, using both neontological and paleontological data.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

INTEGBI 281 Seminar in Evolution 2 Units

Terms offered: Spring 2023, Spring 2022, Spring 2021
Advanced study and current literature in various fields of evolution.
Topics vary from year to year.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Padian

INTEGBI 283 Seminar in Vertebrate Evolution and Paleontology 1 Unit

Terms offered: Fall 2017, Fall 2016, Spring 2016
Presentations and discussions of original research and new literature in vertebrate evolution and paleontology. Syllabus and reading list will vary as topics change from semester to semester. Open to Undergraduate students with permission. Enrollment limit: 20.

Rules & Requirements

Prerequisites: 183, 183L or consent of instructor

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Instructor: Padian

INTEGBI 286 Seminars in Paleontology 2 Units

Terms offered: Fall 2024, Spring 2024, Spring 2023
Advanced study and current literature in various fields of paleontology.
Topics vary from year to year.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 287 Paleontology Seminar Series 1 Unit

Terms offered: Spring 2025, Fall 2024, Spring 2024
Seminar series based on recently published and in-progress research relevant to the mission of the University of California Museum of Paleontology.

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 290 Research Seminar 1 - 2 Units

Terms offered: Fall 2024, Spring 2024, Fall 2023
Advanced study in various fields of Integrative Biology. Topics will be announced in advance of each semester. Enrollment in more than one section permitted.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

INTEGBI 291 Research Seminar 1 Unit

Terms offered: Fall 2018, Fall 2017, Fall 2016
Review and discussion of topics of current interest. Topics to vary.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 7.5 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 292 Integrative Biology Colloquium 0.0 Units

Terms offered: Spring 2024, Spring 2023, Spring 2022
Meetings for the presentation of original work by faculty, visiting lecturers, and graduate students.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of colloquium per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

INTEGBI 296 Special Study for Graduate Students 1 - 4 Units

Terms offered: Spring 2016, Fall 2015, Spring 2015
Reading or other advanced study by arrangement with a staff member.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:

6 weeks - 1-4 hours of independent study per week

8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

Formerly known as: Zoology 296

INTEGBI 297 Directed Field Studies 1 - 8 Units

Terms offered: Fall 2024, Spring 2017, Fall 2016
Open to qualified students directly engaged in field studies.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 298 Special Study in Integrative Biology 1 - 12 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024
Graduate research by small groups.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Letter grade.

INTEGBI 299 Graduate Research 1 - 12 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024
Credit awarded according to work planned and accomplished.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI N299 Graduate Research 1 - 6 Units

Terms offered: Summer 2015 Second 6 Week Session, Summer 2010 10
Week Session, Summer 2007 10 Week Session
Graduate student research.

Rules & Requirements

Prerequisites: Graduate standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Summer:

6 weeks - 2.5-15 hours of independent study per week

8 weeks - 1-6 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 304 Dissemination of Research: Your Interface with the Public 2 Units

Terms offered: Spring 2018, Spring 2017, Fall 2012

This course will consist of lectures and class discussions about mechanisms of communicating about science to the public. We will consider how to convey the issues, process, and findings of scientific research to a variety of audiences using different media (e.g., posters, web pages, newsletters, newspaper and magazine articles, books, television). Projects conducted by teams of students under the direct supervision of the instructors will include preparation of outreach materials (e.g., posters, newsletters, web pages).

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Professional course for teachers or prospective teachers

Grading: Letter grade.

INTEGBI 305 Thriving in Academia 2 Units

Terms offered: Spring 2025, Fall 2024, Fall 2023

Series of lectures and workshops to prepare graduate students for many aspects of academic careers, including grant proposal writing, giving talks at meetings or to academic departments, preparing job applications and having job interviews, advising graduate students and postdocs, reviewing manuscripts and grant proposals, service activities and time management, working at teaching college vs. research universities, alternative careers, etc.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 375 Teaching Colloquium: Graduate Student Instructor Training 2 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022

Series of workshops and seminars involving graduate students and faculty participation. The main objectives of this course are to train graduate students to become effective instructors and to discuss important issues that graduate students face when teaching undergraduate classes.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Integrative Biology/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Formerly known as: Integrative Biology 303

INTEGBI 400 Training in Stable Isotope Methods and Mass Spectrometry 1 Unit

Terms offered: Fall 2023, Fall 2022, Fall 2021

An intensive lecture and laboratory training course on the fundamental principles and practical applications of stable isotope methods in biogeochemistry, ecology, physiology, and environmental science. Topics covered are sample preparation, operating of an isotope ratio mass spectrometer, and analysis of stable isotope data. This course is required for all students interested in using the facilities housed in the Center for Stable Isotope Biogeochemistry for their research.

Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Integrative Biology/Other professional

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Dawson

INTEGBI C407 Introduction to Scientific Diving 3 Units

Terms offered: Spring 2017, Spring 2016, Spring 2015

Diving physics, physiology, medicine, rescue, decompression, theory, navigation, environment, marine life, research methods, equipment, and University regulations. Course leads to University certification to use underwater life support apparatus for study or research under University auspices.

Rules & Requirements

Prerequisites: Advanced scuba certification, swim test, medical exam, and consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Other professional

Grading: Letter grade.

Instructors: Hayward, Scott

Formerly known as: Integrative Biology C407/Physical Education C407

Also listed as: PHYS ED C407

INTEGBI 601 Individual Study for Master's Students 1 - 8 Units

Terms offered: Spring 2016, Fall 2015, Spring 2015

Individual study for the comprehensive requirements in consultation with the major adviser. Units may not be used to meet either unit or residence requirements for a master's degree.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI 602 Individual Study for Doctoral Students 1 - 8 Units

Terms offered: Spring 2016, Fall 2015, Spring 2015

Individual study in consultation with the major adviser. Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required for candidates for the Ph.D.

Rules & Requirements

Credit Restrictions: Course does not satisfy unit or residence requirements for doctoral degree.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

INTEGBI N602 Individual Study for Doctoral Students 1 - 6 Units

Terms offered: Prior to 2007

Formerly < Paleon 602, Zoology 602, Botany 602, Physiol 602, Anatomy 602> Individual study in consultation with the major field adviser.

Intended to provide an opportunity for qualified students to prepare themselves for the various examinations required for candidates for the Ph.D.

Rules & Requirements

Credit Restrictions: Course does not satisfy unit or residence requirements for doctoral degree.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Summer: 8 weeks - 1-6 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.