Integrative Biology

Bachelor of Arts (BA)

Students who major in Integrative Biology (IB) will gain both a broad and deep knowledge in the biological sciences, which provides an excellent foundation for those interested in the biology of organisms, populations, and communities, particularly students who might wish to pursue graduate studies in any of the subdisciplines listed above or related emerging research areas. It also provides superb training for students interested in health-related professions (medicine, dentistry, veterinary medicine, physical therapy, nursing, pharmacy, optometry, etc.) or allied careers in biology (e.g., psychology, sociobiology, forestry, wildlife conservation, environmental and resource management, law, etc.).

The Department's broad range of expertise includes behaviorists, ecologists, evolutionary biologists, geneticists, morphologists, paleontologists, physiologists, and systematists.

Course of Study Overview

Students majoring in Integrative Biology choose one of two tracks: Ecology, Evolution and Organismal Biology (Track 1) or Human Biology and Health Sciences (Track 2). The lower-division requirements are the same for all IB majors, regardless of the track. The upper-division requirements differ for the two areas of concentration. For detailed information, please see the Major Requirements tab on this page.

Declaring the Major

In order to declare Integrative Biology as a major, students must have completed the prerequisites. For information regarding these courses, please see the Major Requirements tab on this page. At the time of declaration, students must be enrolled in or have completed CHEM 3B or the 2nd biology course and be passing at the mid-term status point. The grade point average (GPA) in courses for the major must be at least 2.0.

For transfer students, it is recommended that the lower-division courses be completed before arriving at Berkeley. Before declaring, transfer students should have completed at least one semester at Berkeley, with a GPA of at least 2.0 in all courses taken for the major, and they should have completed all lower-division courses except the Physics series.

For detailed instructions on the process for declaring the major, please see the Department's website (http://ib.berkeley.edu/undergrad/major/declaring.php) .

Honors Program

Students with a minimum UC grade point average (GPA) of 3.3 overall and in the major should consider participating in the Honors program. They must identify an appropriate faculty sponsor who agrees to advise them on an original research project they wish to do and enroll in two semesters (six units) of the honors thesis course (INTEGBI H196A and INTEGBI H196B). These students must present the results of that work in the form of a written report, the honors thesis, and a poster presentation at Cal Day. In order to graduate with Honors, students must maintain a minimum 3.3 GPA overall and in the major.

Minor Program

There is no minor program in Integrative Biology.

In addition to the University, campus, and college requirements, listed on the College Requirements tab, students must fulfill the below requirements specific to their major program.

General Guidelines

1. All courses taken to fulfill the major requirements below must be taken for graded credit, other than courses listed which are offered on a *Pass/No Pass* basis only. Other exceptions to this requirement are noted as applicable.
2. No more than one upper-division course may be used to simultaneously fulfill requirements for a student's major and minor programs, with the exception of minors offered outside of the College of Letters and Science.
3. A minimum grade point average (GPA) of 2.0 must be maintained in both upper- and lower-division courses used to fulfill the major requirements.

For information regarding residence requirements and unit requirements, please see the College Requirements tab.

Please note that AP credit cannot be used to satisfy any of the below major requirements.

Lower-division Requirements: Both Tracks

MATH 10A & MATH 10B	Methods of Mathematics: Calculus, Statistics, and Combinatorics and Methods of Mathematics: Calculus, Statistics, and Combinatorics	8
CHEM 1A & 1AL	General Chemistry and General Chemistry Laboratory	4
CHEM 3A & 3AL	Chemical Structure and Reactivity and Organic Chemistry Laboratory	5
CHEM 3B & 3BL	Chemical Structure and Reactivity and Organic Chemistry Laboratory	5
BIOLOGY 1A & 1AL	General Biology Lecture and General Biology Laboratory	5
BIOLOGY 1B	General Biology Lecture and Laboratory	4
PHYSICS 8A & PHYSICS 8B	Introductory Physics and Introductory Physics [1]	8

[1] PHYSICS 7A Physics for Scientists and Engineers and PHYSICS 7B Physics for Scientists and Engineers can be substituted for these courses.

Upper-division Requirements, Track 1: Ecology, Evolution and Organismal Biology (24 units minimum)

Select one course from Requirement Group A: Evolution & Genetics (see below)
Select two courses from Requirement Group B: Ecology, Behavior & Diversity (see below)
Select one course from Requirement Group C: Structure, Function & Human Health (see below)

Select two upper-division lab courses; one must be field-based (see below)	
Research or Honors:	
Select one of the following:	
Up to 3 units of research based INTEGBI H196A and INTEGBI H196B	
INTEGBI 191	Directed Undergraduate Research
Electives: [1]	
Select additional units to bring the student's upper-division total to 24	

[1] A maximum of two elective courses may be taken outside of the Department of Integrative Biology. This includes EAP courses as well as non-IB courses, even if they are on the approved electives list.

Upper-division Requirements, Track 2: Human Biology and Health Sciences

Select one course from Requirement Group A: Evolution & Genetics (see below)	
Select one course from Requirement Group B: Ecology, Behavior & Diversity (see below)	
Select two courses from Requirement Group C: Streucture, Function & Human Health (see below)	
Select two upper-division lab courses (see below)	
Research or Honors:	
Select one of the following:	
Up to 3 units of research based INTEGBI H196A and INTEGBI H196B	
INTEGBI 191	Directed Undergraduate Research
Electives: [1]	
Select additional units to bring the student's upper-division total to 24	

[1] A maximum of two elective courses may be taken outside of the Department of Integrative Biology. This includes EAP courses as well as non-IB courses, even if they are on the approved electives list.

Requirement Group A: Evolution and Genetics

INTEGBI 141	Human Genetics	3
INTEGBI 160	Evolution	4
INTEGBI 161	Population and Evolutionary Genetics	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 163	Molecular and Genomic Evolution	3
INTEGBI 164	Human Genetics and Genomics	4
INTEGBI 167	Evolution and Earth History: From Genes to Fossils	4
INTEGBI 169	Evolutionary Medicine	4

Requirement Group B: Ecology, Behavior & Diversity

INTEGBI C101L/ PLANTBI C102	Course Not Available	
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI 106A	Physical and Chemical Environment of the Ocean	4
INTEGBI/ PLANTBI C107L	Principles of Plant Morphology with Laboratory	3
INTEGBI/ PLANTBI C110L	Biology of Fungi with Laboratory	4
INTEGBI 113L	Paleobiological Perspectives on Ecology and Evolution	4
INTEGBI C144	Animal Behavior	4
INTEGBI 146LF	Behavioral Ecology with Laboratory	5
INTEGBI/ESPM C149	Molecular Ecology	4
INTEGBI 151	Plant Physiological Ecology	4
INTEGBI 152	Environmental Toxicology	4
INTEGBI 153	Ecology	3
INTEGBI 154	Plant Ecology	3
INTEGBI C155/ ANTHRO C129D	Holocene Paleoecology: How Humans Changed the Earth	3
INTEGBI C156/ ESPM C103	Principles of Conservation Biology	4
INTEGBI 157LF	Ecosystems of California	4
INTEGBI 158LF/ ESPM C107	Biology and Geomorphology of Tropical Islands	13
INTEGBI 159	The Living Planet: Impact of the Biosphere on the Earth System	3
INTEGBI 160	Evolution	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 166	Evolutionary Biogeography	4
INTEGBI 167	Evolution and Earth History: From Genes to Fossils	4
INTEGBI 168L	Systematics of Vascular Plants with Laboratory	4
INTEGBI 173LF	Mammalogy with Laboratory	5
INTEGBI 174LF	Ornithology with Laboratory	4
INTEGBI 175LF	Herpetology with Laboratory	4
INTEGBI 181L	Paleobotany - The 500-Million Year History of a Greening Planet	4
INTEGBI 183L	Evolution of the Vertebrates with Laboratory	4
INTEGBI C185L/ ANTHRO C100	Human Paleontology	5
INTEGBI C187	Human Biogeography of the Pacific	3

Requirement Group C: Structure, Function & Human Health

INTEGBI 115	Introduction to Systems in Biology and Medicine	4
INTEGBI 116L	Medical Parasitology	4
INTEGBI 117 & 117LF	Medical Ethnobotany and Medical Ethnobotany Laboratory	4
INTEGBI 118	Host-Pathogen Interactions: A Trans-Discipline Outlook	4
INTEGBI 119	Evaluating Scientific Evidence in Medicine	3
INTEGBI 123AL	Exercise Physiology with Laboratory	5
INTEGBI C125L/ PHYS ED C165	Introduction to the Biomechanical Analysis of Human Movement	4

INTEGBI C130	Course Not Available	4
INTEGBI 131 & 131L	General Human Anatomy and General Human Anatomy Laboratory	5
INTEGBI 132 & 132L	Survey of Human Physiology and Mammalian Physiology Laboratory	6
INTEGBI 135 & INTEGBI C135L	The Mechanics of Organisms and Laboratory in the Mechanics of Organisms	7
INTEGBI 136	The Biology of Sex	4
INTEGBI 137	Human Endocrinology	4
INTEGBI 138	Comparative Endocrinology	4
INTEGBI 139	The Neurobiology of Stress	4
INTEGBI 140	Biology of Human Reproduction	4
INTEGBI C142L/ ANTHRO C103	Introduction to Human Osteology	6
INTEGBI C143A/ PSYCH C113	Biological Clocks: Physiology and Behavior	3
INTEGBI C143B/ PSYCH C116	Hormones and Behavior	3
INTEGBI 148	Comparative Animal Physiology	3
INTEGBI 151 & 151L	Plant Physiological Ecology and Plant Physiological Ecology Laboratory	6
INTEGBI 184L	Morphology of the Vertebrate Skeleton with Laboratory	4

Approved Lab/Field courses

INTEGBI C101L/ PLANTBI C102L	Course Not Available	4
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI/ PLANTBI C107L	Principles of Plant Morphology with Laboratory	3
INTEGBI 113L	Paleobiological Perspectives on Ecology and Evolution	4
INTEGBI 116L	Medical Parasitology	4
INTEGBI 117LF	Medical Ethnobotany Laboratory	2
INTEGBI 123AL	Exercise Physiology with Laboratory	5
INTEGBI C125L/ PHYS ED C165	Introduction to the Biomechanical Analysis of Human Movement	4
INTEGBI C129L/ PHYS ED C129	Human Physiological Assessment	3
INTEGBI 131L	General Human Anatomy Laboratory	2
INTEGBI 127L	Motor Control with Laboratory	3
INTEGBI 132L	Mammalian Physiology Laboratory	2
INTEGBI C135L/ EL ENG C145O	Laboratory in the Mechanics of Organisms	3
BIO ENG C136L	Laboratory in the Mechanics of Organisms	3
INTEGBI C142L/ ANTHRO C103	Introduction to Human Osteology	6
INTEGBI 146LF	Behavioral Ecology with Laboratory	5
INTEGBI/ESPM C149L	Course Not Available	4
INTEGBI 151L	Plant Physiological Ecology Laboratory	2
INTEGBI 153LF	Course Not Available	3
INTEGBI 154L	Plant Ecology Laboratory	2
INTEGBI 157LF	Ecosystems of California	4
INTEGBI 158LF/ ESPM C107	Biology and Geomorphology of Tropical Islands	13
INTEGBI 168L	Systematics of Vascular Plants with Laboratory	4
INTEGBI 173LF/ ESPM C107	Mammalogy with Laboratory	5
INTEGBI 174LF	Ornithology with Laboratory	4
INTEGBI 175LF	Herpetology with Laboratory	4
INTEGBI 181	Course Not Available	4
INTEGBI 183L	Evolution of the Vertebrates with Laboratory	4
INTEGBI 184L	Morphology of the Vertebrate Skeleton with Laboratory	4
INTEGBI C185L/ ANTHRO C100	Human Paleontology	5

Undergraduate students in the College of Letters and Science must fulfill the following requirements in addition to those required by their major program.

For detailed lists of courses that fulfill college requirements, please see the College of Letters and Sciences (http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/letters-science) page in this bulletin.

Entry Level Writing

All students who will enter the University of California as freshmen must demonstrate their command of the English language by fulfilling the Entry Level Writing Requirement. Fulfillment of this requirement is also a prerequisite to enrollment in all reading and composition courses at UC Berkeley.

American History and American Institutions

The American History and Institutions requirements are based on the principle that a U.S. resident graduated from an American university should have an understanding of the history and governmental institutions of the United States.

American Cultures

American Cultures is the one requirement that all undergraduate students at Cal need to take and pass in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity and culture of the United States. AC courses offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

Quantitative Reasoning

The Quantitative Reasoning requirement is designed to ensure that students graduate with basic understanding and competency in math, statistics, or computer science. The requirement may be satisfied by exam or by taking an approved course.

Foreign Language

The Foreign Language requirement may be satisfied by demonstrating proficiency in reading comprehension, writing, and conversation in a foreign language equivalent to the second semester college level, either by passing an exam or by completing approved course work.

Reading and Composition

In order to provide a solid foundation in reading, writing and critical thinking the College requires two semesters of lower division work in composition. Students must complete a first-level reading and composition course by the end of their second semester and a second-level course by the end of their fourth semester.

Breadth Requirements

The undergraduate breadth requirements provide Berkeley students with a rich and varied educational experience outside of their major program. As the foundation of a liberal arts education, breadth courses give students a view into the intellectual life of the University while introducing them to a multitude of perspectives and approaches to research and scholarship. Engaging students in new disciplines and with peers from other majors, the breadth experience strengthens interdisciplinary connections and context that prepares Berkeley graduates to understand and solve the complex issues of their day.

Unit Requirements

- 120 total units, including at least 60 L&S units
- Of the 120 units, 36 must be upper division units
- Of the 36 upper division units, 6 must be taken in courses offered outside your major department

Residence Requirements

For units to be considered in "residence," you must be registered in courses on the Berkeley campus as a student in the College of Letters and Science. Most students automatically fulfill the residence requirement by attending classes here for four years. In general, there is no need to be concerned about this requirement, unless you go abroad for a semester or year or want to take courses at another institution or through University Extension during your senior year. In these cases, you should make an appointment to see an adviser to determine how you can meet the Senior Residence Requirement.

Note: Courses taken through UC Extension do not count toward residence.

Senior Residence Requirement

After you become a senior (with 90 semester units earned toward your B.A. degree), you must complete at least 24 of the remaining 30 units in residence in at least two semesters. To count as residence, a semester must consist of at least 6 passed units. Intercampus Visitor, EAP, and UC Berkeley-Washington Program (UCDC) units are excluded.

You may use a Berkeley summer session to satisfy one semester of the Senior Residence Requirement, provided that you successfully complete 6 units of course work in the Summer Session and that you have been enrolled previously in the College.

Modified Senior Residence Requirement

Participants in the UC Education Abroad Program (EAP) or the UC Berkeley-Washington Program (UCDC) may meet a Modified Senior Residence Requirement by completing 24 (excluding EAP) of their final 60 semester units in residence. At least 12 of these 24 units must be completed after you have completed 90 units.

Upper Division Residence Requirement

You must complete in residence a minimum of 18 units of upper division courses (excluding EAP units), 12 of which must satisfy the requirements for your major.

Learning goals for the Major

1. Describe the principles of evolution and genetics that underlie all biology
2. Demonstrate a broad and integrated understanding of species origins, biological and organismal diversity, how to characterize, understand and protect this diversity, and interactions with the environment
3. Demonstrate a fundamental understanding of the relationships between structure and function in animal (human) health
4. Describe the basic principles of scientific inquiry and the importance of scientific study in integrative biology
5. Illustrate the process of data collection, statistical analysis, and graphing including basic principles of experimental and sampling design
6. Critically evaluate data, develop hypotheses, and interpret biological experiments
7. Communicate effectively in the written presentation of scientific results

Advising Staff and Hours

Marie Dutton, Elinor Gregorio
ibusso@berkeley.edu
3060 Valley Life Sciences Building
Monday-Thursday: 9:00am-12:00pm and 1:00pm-4:00pm
Friday: 9:00am-12:00pm and 1:00pm-3:00pm

Peer Advisers

Changes yearly (only available during Fall and Spring semesters)
ibpeeradvising@berkeley.edu
3060 Valley Life Sciences Building
Monday-Thursday: 10:00am-12:00pm and 1:00pm-4:00pm
Friday: 10:00am-12:00pm and 1:00pm-3:00pm

Integrative Biology

INTEGBI C13 Origins: from the Big Bang to the Emergence of Humans 4 Units
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
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 as topic varies. 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 required.

INTEGBI 31 The Ecology and Evolution of Animal Behavior 3 Units
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

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Instructor: Caldwell

INTEGBI 32 Bioinspired Design 3 Units
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. Final exam required.

Instructor: Full

INTEGBI N33 Topics in Paleontology: The Age of Dinosaurs 2 Units
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: More than one course in this series may be taken for credit with consent of instructor. Course may be repeated for credit when topic changes.

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
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

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Instructor: Hlusko

INTEGBI 37 Topics in Paleontology: The Antecedents of Man 3 Units
. Open without prerequisite toall 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 39C Topics in Integrative Biology 2 Units
Reading and discussion of the literature on particular topics in the field of integrative biology. Term paper and oral presentation. Section topics will vary from semester to semester. Students should check with department secretary for each semester's offerings.
Rules & Requirements

Prerequisites: Preferentially open to freshmen; consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 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 required.

INTEGBI 41 Marine Mammals 2 Units
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

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

INTEGBI 42 Primate Biology 3 Units
An introduction to the order of mammals of which we are members. The niches of primates in modern ecosystems, their anatomical and behavorial 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 C82 Oceans 3 Units
This course offers multidisciplinary approach to begin answering the question "Why are oceans important to us?" Upon a physical, chemical, and geologic base, we introduce the alien world of sea life, the importance of the ocean to the global carbon cycle, and the principles of ecology with a focus on the important concept of energy flow through food webs. Lectures expand beyond science to include current topics as diverse as music, movies, mythology, biomechanics, policy, and trade.
Rules & Requirements

Credit Restrictions: Students will receive no credit for Earth and Planetary Science C82/Geography C82/Integrative Biology C82 after completing Integrative Biology 82 or Earth and Planetary Science N82.

Hours & Format

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

Summer:
6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week
8 weeks - 5.5 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Also listed as: EPS C82/GEOG C82

INTEGBI 84 Sophomore Seminar 1 or 2 Units
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 as topic varies. 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 required.

INTEGBI 87 Introduction to Research Methods in Biology 2 Units
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 88 Leadership Communications for Biology Scholars 1 Unit
Leadership skills and abilities such as communication, collaboration, critical thinking, and resourcefulness are critical to academic, professional, and personal success. The need for enlightened leaders is evident in every aspect of health and science such as designing innovative health programs, obtaining funding, conducting cutting-edge research, developing and gaining support to implement policy solutions. This course provides an understanding of the principles of leadership and communications for students in the Biology Scholars Program. Students will nurture those traits in themselves and apply those principles in situations specifically related to the health and science sectors.
Rules & Requirements

Prerequisites: Acceptance into Biology Scholars Program

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. Final exam required.

Instructors: Hayes, Kim, Myrick

INTEGBI 95 Special Research Project in Biology 1B 1 Unit
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. Students are required to attend at least three department seminars and write a short critique of each.
Rules & Requirements

Prerequisites: Consent of instructor; selected by interview

Hours & Format

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

Summer: 8 weeks - 6 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.

INTEGBI C96 Studying the Biological Sciences 1 Unit
Freshmen 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 course, and as future science professionals. Restricted to freshmen in the biology scholars program.
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
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. Course may be repeated for credit when topic changes.

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 99 Supervised Independent Study and Research 1 - 3 Units
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. Course may be repeated for credit when topic changes.

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 100B Principles of Biodiversity 3 Units
Biogeographic, temporal, and historical patterns of change in biological diversity; phylogenetics and systematics; processes involved in origin and extinction of taxa and floras/faunas; population structure and demography (including human populations); community processes and maintenance of diversity; ecosystem function; global change; human uses of and effects on biodiversity; conservation biology.
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.

INTEGBI C100 Communicating Ocean Science 4 Units
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 - 2.5 hours of lecture, 1 hour of discussion, 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: Ingram

Also listed as: EPS C100/GEOG C146

INTEGBI 102LF Introduction to California Plant Life with Laboratory 4 Units
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
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
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
(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 106A Physical and Chemical Environment of the Ocean 4 Units
The biological implications of marine physics and chemistry. History and properties of seawater. Geophysical fluids. Currents and circulations. Deep sea. Waves, tides, and bottom boundary layers. The coastal ocean; estuaries. Air/sea interaction. Mixing. Formation of water masses. Modeling biological and geochemical processes. Ocean and climate change.
Rules & Requirements

Prerequisites: BIOLOGY 1B; Chemistry 1A or 4A; Mathematics 1A or 16A; PHYSICS 7A or 8A. Recommended: Integrative Biology 82

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.

INTEGBI C107L Principles of Plant Morphology with Laboratory 4 Units
An analysis of the structural diversity of land plants 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 C110L Biology of Fungi with Laboratory 4 Units
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 - 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.

Instructors: Bruns, Taylor

Also listed as: PLANTBI C110L

INTEGBI 112 Horticultural Methods in the Botanical Garden 1 Unit
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 required.

Instructor: Licht

Formerly known as: 112L

INTEGBI 113L Paleobiological Perspectives on Ecology and Evolution 4 Units
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 115 Introduction to Systems in Biology and Medicine 4 Units
This course is aimed at students wishing to understand the general principles of how biological systems operate. Topics include feedback regulation; competition and cooperation; genetic switches and circuits; random processes; chaos; mechanisms for error correction; and the properties of networks. Examples are selected from many fields including medicine, physiology, ecology, biochemistry, cell biology, and genetics. Students will learn to conceptualize and quantify interactions within biological systems using simple mathematical models and computer programs. No previous experience in programming is required.
Rules & Requirements

Prerequisites: BIOLOGY 1A, Mathematics 1A or 16B

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: Lim

INTEGBI 116L Medical Parasitology 4 Units
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
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.
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
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.
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

Formerly known as: 117L

INTEGBI 118 Host-Pathogen Interactions: A Trans-Discipline Outlook 4 Units
The second half of the 20th century is marked by great strides in the battle against infectious diseases. However, the forces that drive pathogen evolution continue to pose new challenges for science and medicine. In this course we will cover various aspects relating to host-pathogen interactions, focusing on animals and their bacterial pathogens. We will address the ecology of host-pathogen interactions, their shaping by co-evolution, examine prominent molecular mechanisms taking part in this warfare and learn how ancient mechanisms are used and reused through millions of years of evolution. The course will examine how better understanding of host-pathogen interactions can suggest new strategies for fighting infectious diseases.
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 119 Evaluating Scientific Evidence in Medicine 3 Units
A course in critical analysis of medical reports and studies using recent controversial topics in medicine. Course will focus on information gathering, hypothesis testing, evaluating study design, methodological problems, mechanisms of bias, interpretation of results, statistics, and attribution of causation. Students participate in a mock trial as a way to demonstrate their abilities to gather, critically analyze, and present scientific and medical evidence.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B

Hours & Format

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

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Instructor: G. Caldwell

INTEGBI 123AL Exercise Physiology with Laboratory 5 Units
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
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 127L Motor Control with Laboratory 3 Units
Neural control of movement in humans and other animals. Lectures introduce basic theories of information and control, analyze motor control at the spinal level, survey anatomy and physiology of motor systems of the brain, and synthesize theory and physiology to understand control systems that regulate posture, locomotion, and voluntary movements. In laboratories, students learn theory and motor physiology hands-on, and design and perform independent investigations.
Rules & Requirements

Prerequisites: 132 or Molecular and Cell Biology 136

Credit Restrictions: Students will receive partial credit for 127L after taking 127.

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: Lehman

INTEGBI C129L Human Physiological Assessment 3 Units
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 130 Human Fertility - The Big History of our Species' Reproductive Journey 4 Units
This course explores human reproduction through the lenses of evolutionary biology, population statistics, and culture. Throughout, we organize the course in terms of major transitions and the question of choice. How do evolved biology and inherited culture make some choices more accessible and others less so? What happened to human fertility—and to the possibility of making choices about fertility—at such moments of change as the emergence of pair bonding in hominids, the advent of agriculture, the industrial revolution, and the development of both contraceptive and proceptive technologies in the 20th consequences do these histories on different time-scales have for young people today contemplating their own reproductive choices?
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.

Instructors: Hlusko, Johnson-Hanks

INTEGBI 131 General Human Anatomy 3 Units
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 131A Applied Anatomy 1 Unit
A series of 15 lectures by former students of 131 who have become successful physicians and surgeons. The purpose is to provide the practical applications of anatomy, e.g., plastic surgeons, neurosurgeons, vascular surgeons, pathologists, etc.
Rules & Requirements

Repeat rules: Course may be repeated once for credit.Course may be repeated for a maximum of 2 units.

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 required.

INTEGBI 131L General Human Anatomy Laboratory 2 Units
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 - 4 hours of laboratory per week

Summer:
6 weeks - 10 hours of laboratory per week
8 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 132 Survey of Human Physiology 4 Units
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: Integrative Biology 131, BIOLOGY 1A

Credit Restrictions: Students will receive no credit for Integrative Biology 132 after taking Physiology 100 or 101 or Molecular and Cell Biology 32, 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.

Instructors: Brooks, Kaufer, Lehman

INTEGBI 132L Mammalian Physiology Laboratory 2 Units
In the laboratory component of Integrative Biology 132, 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. Background in elementary statistics, data analysis and oral presentation are also provided.
Rules & Requirements

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

Credit Restrictions: Students will receive no credit for 132L after taking Molecular and Cell Biology 32L or 136L, or if currently enrolled in similar courses.

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. Final exam required.

Instructors: Brooks, Kaufer, Lehman

INTEGBI 133 Anatomy Enrichment Program 2 Units
The purpose of the course is for University students to teach human anatomy to grades K-7 in the public schools. The UCB students work in groups of 2-3 to plan their presentations of the systems of the body and then enter the school rooms to teach what they have learned in 131.
Rules & Requirements

Prerequisites: 131 with a grade of A or B

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

Hours & Format

Fall and/or spring: 15 weeks - 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 required.

INTEGBI 135 The Mechanics of Organisms 4 Units
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
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: Integrative Biology 135 or consent of instructor; for Electrical Engineering and Computer Science students, Electrical Engineering 105, 120 or Computer Science 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
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
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
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
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
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

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
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 C142L Introduction to Human Osteology 6 Units
An intensive study of the human skeleton, reconstruction of individual and population characteristics, emphasizing methodology and analysis of human populations from archaeological and paleontological contexts, taphonomy, and paleopathology.
Rules & Requirements

Prerequisites: Anthropology 1, BIOLOGY 1B

Hours & Format

Fall and/or spring: 15 weeks - 6 hours of lecture and 14 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Instructor: White

Also listed as: ANTHRO C103

INTEGBI C143A Biological Clocks: Physiology and Behavior 3 Units
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 C143B Hormones and Behavior 3 Units
This course provides a comprehensive overview of behavorial endocrinology beginning with hormone production and actions on target issues and continuing with an exploration of a variety of behaviors and their hormonal regulation/consequences. The course uses a comparative approach to examine the reciprocal interactions between the neuroendocrine system and behavior, considering the effects of hormone on development and adult behavior in addition to how behavior regulates endocrine physiology. While much of the course focuses on non-human vertebrate species, the relevance to humans is explored where appropriate. Topics include sexual differentiation and sex differences in behavior, reproductive, parental, and aggressive behaviors, and hormonal and behavioral homeostatic regulation.
Rules & Requirements

Prerequisites: Completion of biological prerequisites for the major and consent of instructor; a course in mammalian physiology recommended

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 C116

INTEGBI C144 Animal Behavior 4 Units
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 146LF Behavioral Ecology with Laboratory 5 Units
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: 144 or C144 or consent of instructor

Credit Restrictions: Students will receive partial credit for 146LF after taking 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 147 Biology of Aging 3 Units
This course will focus on studying the molecular mechanisms of aging and the age-related changes that take place in cells and tissues. It introduces animal models used for the study of the genetics and biochemistry of aging as well as discusses the similarities and differences in aging mechanisms across species. Students will learn the age-related changes taking place in the major physiological systems in humans. Special attention will be given to differentiating normal aging processes from diseases that normally affect the elderly.
Rules & Requirements

Prerequisites: BIOLOGY 1A

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: Shapira, Caporale

INTEGBI 148 Comparative Animal Physiology 3 Units
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 C149 Molecular Ecology 4 Units
This course focuses on the use of molecular genetic information in ecology. Applications and techniques covered range from analysis of parentage and relatedness (DNA fingerprinting and multilocus genetic analysis) through gene flow, biogeographic history and community composition (comparative DNA sequencing) to analysis of diet and trophic interactions (biological isotopes). Grades are based on one final exam, problem sheets, and a critique of a recent research paper.
Rules & Requirements

Prerequisites: C163, 161, or Molecular and Cell Biology C142 (may be taken concurrently), or consent of instructor

Credit Restrictions: Students will receive no credit for C149 if they took 149 prior to spring 2003.

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.

Formerly known as: 149

Also listed as: ESPM C149

INTEGBI 150 Evolutionary Environmental Physiology 3 Units
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
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
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 152 Environmental Toxicology 4 Units
The environmental fate and effect of toxic substances from human activities, with emphasis on aquatic systems, including their biological effects from the molecular to the community level. Course will review pollutant types, principal sources, impacts on aquatic organisms, monitoring approaches, and regulatory issues.
Rules & Requirements

Prerequisites: Background in biology or chemistry is 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: Weston

INTEGBI 153 Ecology 3 Units
Principles of microbial, animal, and plant population ecology, illustrated with examples from marine, freshwater, and terrestrial habitats. Consideration of the roles of physical and biological processes in structuring natural communities. Observational, experimental, and theoretical approaches to population and community ecology will be discussed. Topics will include quantitative approaches relying on algebra, graph analysis, and elementary calculus. Discussion section will review recent literature in ecology.
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. Final exam required.

Instructor: Ackerly

INTEGBI 154 Plant Ecology 3 Units
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 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
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 independents 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 C155 Holocene Paleoecology: How Humans Changed the Earth 3 Units
Since the end of the Pleistocene and especially with the development of agriculturally based societies humans have had cumulative and often irreversible impacts on natural landscapes and biotic resources worldwide. Thus "global change" and the biodiversity crisis are not exclusively developments of the industrial and post-industrial world. This course uses a multi-disciplinary approach, drawing upon methods and data from archaeology, palynology, geomorphology, paleontology, and historical ecology to unravel the broad trends of human ecodynamics over the past 10,000 years.
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: Kirch

Also listed as: ANTHRO C129D

INTEGBI C156 Principles of Conservation Biology 4 Units
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

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Instructor: Beissinger

Also listed as: ESPM C103

INTEGBI 157LF Ecosystems of California 4 Units
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 per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Instructor: Fine

Formerly known as: 157L

INTEGBI 158LF Biology and Geomorphology of Tropical Islands 13 Units
Natural history and evolutionary biology of island terrestrial and freshwater organisms, and of marine organisms in the coral reef and lagoon systems will be studied, and the geomorphology of volcanic islands, coral reefs, and reef islands will be discussed. Features of island biogeography will be illustrated with topics linked to subsequent field studies on the island of Moorea (French Polynesia).
Hours & Format

Fall and/or spring: 15 weeks - 12 hours of lecture and 6 hours of fieldwork per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Also listed as: ESPM C107

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

INTEGBI 160 Evolution 4 Units
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; behavorial evolution; applications of evolutionary biology to medical, agricultural, conservational, and anthropological research.
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.

Instructors: Padian, Specht

INTEGBI 161 Population and Evolutionary Genetics 4 Units
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. Course may be repeated for credit when topic changes.

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
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 163 Molecular and Genomic Evolution 3 Units
This course will introduce undergraduates to the study of evolution using molecular and genomic methods. Topics included will be rates of evolution, evolution of sex chromosomes, insertions and deletions of DNA sequences, evolution of regulatory genetic elements, methods of phylogenetic inference, gene duplication, multigene families, transposons, genome organization, gene transfer, and DNA polymorphism within species.
Rules & Requirements

Prerequisites: BIOLOGY 1A-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. Final exam required.

Instructors: Bachtrog, Slatkin

INTEGBI 164 Human Genetics and Genomics 4 Units
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 166 Evolutionary Biogeography 4 Units
The goals of the course are to (a) examine how geographically-linked characteristics of species influence their potential for evolution and extinction; (b) provide an overview of approaches for studying the interplay between geographic ranges, environment, evolution, and extinction; and (c) examine how human impacts over-ride the biogeographic processes and patterns that prevailed before people dominated the planet.
Rules & Requirements

Prerequisites: BIOLOGY 1B, 11, Geography 148 or Earth and Planetary Science 50

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: Barnosky

INTEGBI 167 Evolution and Earth History: From Genes to Fossils 4 Units
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 168 Systematics of Vascular Plants 2 Units
A discussion of the philosophy, principles, techniques, and history of botanical systemics. An outline of the major group of vascular plants and their evolution.
Rules & Requirements

Prerequisites: BIOLOGY 1A-1B. Must be taken concurrently with 168L

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. Final exam required.

Instructor: Baldwin

INTEGBI 168L Systematics of Vascular Plants with Laboratory 4 Units
A discussion of the philosophy, principles, techniques, and history of botanical systemics. An outline of the major group of vascular plant and their evolution. Laboratory course devoted to a survey on a world-wide basis of the diversity of vascular plant families.
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 6 hours of laboratory per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

Instructor: Baldwin

INTEGBI 169 Evolutionary Medicine 4 Units
This course explores the ways that evolutionary theory can illuminate our understanding of human health and disease. The integration of evolutionary concepts into health sciences can deepen our understanding of the origins of diseases and how human populations evolve in response to these ailments. The course begins with an introduction to evolutionary medicine (two hours of lecture) followed by an overview of human genetic variation and natural selection (six hours of lecture). With this foundation, we study the evolution of human diet and the evolution of human ecological relationships with the environment (six hours of lecture). We then explore the fascinating topic of infectious disease ecology from the perspective of both microbial and human evolutionary responses (nine hours of lecture). Next, we evaluate the fields of reproductive biology, gynecology, and infant/child health through an evolutionary lens (twelve hours of lecture). Finally, we examine evolutionary concepts in chronic metabolic and degenerative diseases associated with aging and lifestyle (ten hours of lecture).
Rules & Requirements

Prerequisites: BIOLOGY 1B, or equivalent

Credit Restrictions: Restricted to Integrative Biology graduating seniors.

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: Carlson

Formerly known as: 163

INTEGBI 170LF Methods in Population and Community Ecology 3 Units
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 173LF Mammalogy with Laboratory 5 Units
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
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
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 C176L Fish Ecology 3 Units
Introduction to fish ecology, with particular emphasis on the identification and ecology of California's inland fishes. This course will expose students to the diversity of fishes found in California, emphasizing the physical (e.g., temperature, flow), biotic (e.g., predation, competition), and human-related (e.g., dams, fisheries) factors that affect the distribution, diversity, and abundance of these fishes.
Rules & Requirements

Prerequisites: Introductory course in biological science; upper division or graduate standing

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: Carlson

Also listed as: ESPM C115C

INTEGBI 181L Paleobotany - The 500-Million Year History of a Greening Planet 4 Units
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 183L Evolution of the Vertebrates with Laboratory 4 Units
Introduction to vertebrate paleontology, focusing on the history and phylogeny of vertebrates ranging from fishes to humans. Emphasis: evolution, taxonomy, functional morphology, faunas through time, problems in vertebrate history, including diversity through time and extinction. Laboratory: vertebrate fossils, focusing on demonstration and study of problems related to taxonomy, evolution, functional morphology, structures, preservation of fossil vertebrates, and their faunas through time.
Rules & Requirements

Prerequisites: BIOLOGY 1B; introductory courses in earth history and zoology are recommended

Credit Restrictions: Students will receive partial credit for 183L after taking 183.

Hours & Format

Fall and/or spring: 15 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 required.

Instructor: Padian

INTEGBI 184L Morphology of the Vertebrate Skeleton with Laboratory 4 Units
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 C185L Human Paleontology 5 Units
Origin and relationships of the extinct forms of mankind.
Rules & Requirements

Prerequisites: Anthropology 1, BIOLOGY 1A-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: White

Also listed as: ANTHRO C100

INTEGBI C187 Human Biogeography of the Pacific 3 Units
This course examines the history of human dispersal across Oceania from the perspectives of biogeography and evolutionary ecology. H. sapiens faced problems of dispersal, colonization, and extinction, and adapted in a variety of ways to the diversity of insular ecosystems. A dual evolutionary model takes into account cultural evolution and transmission, as well as biological evolution of human populations. This course also explores the impacts of human populations on isolated and fragile insular ecosystems, and the reciprocal effects of anthropogenic change on human cultures.
Rules & Requirements

Prerequisites: BIOLOGY 1B strongly recommended, or evidence the student has mastered an equivalent set of basic concepts in evolution and ecology

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: Kirch

Also listed as: ANTHRO C124C

INTEGBI 190 Seminar for Integrative Biology Majors 1 - 3 Units
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. Course may be repeated for credit when topic changes.

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
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 evoluntionary research. A project proposal is required to enroll and students are expected to porduce a substantial written summary of their work.
Rules & Requirements

Prerequisites: Consent of instructor and departmental adviser

Hours & Format

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

Summer: 10 weeks - 13.5 hours of independent study per week

Additional Details

Subject/Course Level: Integrative Biology/Undergraduate

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

INTEGBI 194 Undergraduate Student Instructor for Integrative Biology Courses 1 - 3 Units
UGSI will work under supervision of instructor and/or GSI. The UGSI will attend any mandatory preparatory and review meetings, be available in the classroom (discussion or laboratory) to respond to student questions, facilitate lesson plans, perform other tasks as assigned. UGSIs do not evaluate students' work or assign grades.
Rules & Requirements

Prerequisites: Must have completed course applying to UGSI with a grade of B or better; or consent of instructor

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

Hours & Format

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

Summer:
6 weeks - 8-10 hours of lecture per week
8 weeks - 6-8 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 not required.

INTEGBI C195 Introduction to Global Health Disparities Research 2 Units
This course is designed to prepare trainees in the UC Berkeley "Minority Health/Global Health" (MH/GH) program to conduct a ten-week infectious disease research project in a disease-endemic country. The course provides a background in neglected tropical disease research, international research ethics, and the conduct of health research in low-resource settings.
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/Undergraduate

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

Instructor: Reingold

Also listed as: PB HLTH C117

INTEGBI H196A Thesis Course 3 Units
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. Course may be repeated for credit when topic changes.

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
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. Course may be repeated for credit when topic changes.

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
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. Course may be repeated for credit when topic changes.

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
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. Course may be repeated for credit when topic changes.

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 199 Supervised Independent Study and Research 1 - 4 Units
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. Course may be repeated for credit when topic changes.

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.