

IB 82: Introduction to Field Research in Global Change Biology, 3 units
Instructors: Paul Fine, Seth Finnegan

Course description: A field-based course with overnight and day trips to natural areas in the Bay Area and coastal California. Field trips and lectures emphasize natural history of California organisms and field research methods to study global climate change as well as preparing students for careers in ecology, evolutionary biology and conservation.

Meeting Pattern: Thursday 11am-1230pm, 2 Saturday day trips, 2 Friday-Sunday overnight trips

Goals of the Course:

1. Exposure to the Natural History of Bay Area natural communities. Understanding and implementation of the scientific process from formulating and testing hypothesis, sampling methods of flora and fauna, data collection, compilation and presentation of the data both written and oral.
2. Exposure to specific research and/or conservation related management projects conducted at the different reserves (e.g. endangered species research, invasive species management, long term monitoring, etc.). Discussions with researchers and land managers about implementation of field research, career paths taken, etc.
3. Students will gain experience with descriptive and scientific writing by recording their field observations and hypotheses. Completion of writing activities focused on observation, hypothesizing, and experimentation (e.g. summarizing observed patterns in nature, generating hypotheses, and discussing experimental design [general] that might be employed to test their hypotheses).
4. Students will write a cover letter and a C.V. This will help students be prepared for applying for internships and jobs.

Research Methods—Topics and learning outcomes

The proposed course is designed to introduce the scientific method and topics in field ecology to lower division students by providing them with essential background information and experiences that will expose them to hands-on field research and ultimately enhance their success in upper division courses in IB. Specifically, students will learn the following introductory field methods:

- Posing testable hypotheses and study design.
- Flora and fauna sampling methods (e.g. transects, quadrats, visual surveys).
- Data collection, compilation, and summary (e.g. graphing, chi-square tests, etc.).
- Presentation and summary of data (written and oral) in the form of research posters.

Conducting work in a field setting—Topics and learning outcomes

To facilitate immersive field-based teaching, the course will be held on multiple weekends and include two overnight trips and two one-day trips. During these trips, students will be exposed to

coastal and inland ecological communities in and near the Bay Area. Specifically, students will have:

- Exposure to natural communities and specific research and/or global change biology and conservation related management projects conducted at each site (e.g. endangered species research, invasive species management, sea otter conservation, etc.).
- Discussions with researchers and land managers about implementation of field research, career paths taken, etc.
- Implementing a field research project (e.g. observation, hypothesizing, data collection, data summary/analysis, presentation of results via posters and oral presentations).

Field journals—Topics and learning outcomes

- Students will gain experience with descriptive and scientific writing by recording their field observations and hypotheses.
- Completion of writing activities focused on observation, hypothesizing, and experimentation (e.g. summarizing observed patterns in nature, generating hypotheses, and discussing experimental design [general] that might be employed to test their hypotheses).

Discussion with local professionals, graduate students, staff, and upper division undergraduates—Topics and learning outcomes

- Throughout the course students will meet local professionals, graduate students, past UCB graduates, faculty, and upper classman undergraduates (in the field and as part of an end of the year panel). During these opportunities guests will provide a brief background on what they do and how they got to where they are at. The objective will be to highlight specific activities (e.g. working in a lab, volunteering, internships, etc.) that had a direct impact on their education and/or careers (individuals will be from a wide range of disciplines).
- Lectures will discuss various topics related to field trips, background information on local flora and fauna, research methods, presentation skills, implementing the scientific method, and academic and professional opportunities at UCB (e.g. internships, volunteer opportunities, working with graduate students, etc.).

Field Trips

There will be four field trips included in IB 82. Two of these field trips are day trips (Saturdays) and two of these trips will involve weekends (Friday afternoon until Sunday afternoon). We will provide vans to transport the students to the field trips which will be driven by the instructors and the GSI. Camping equipment will also be provided. The instructors have already raised funds to support field trip expenses.

Course Outline

Exact outline for the course will vary depending upon the time of year it is taught; a draft syllabus is included here.

Week	Lecture	Field	Reading/Assignment
1	Importance of Natural History in Studying Global Change Biology		
2	Principles of Flora and Fauna identification	Day trip to Strawberry Canyon	Field Notebook #1
3	Bay Area natural history, conservation, and environmental challenges		
4	Oak Woodland Ecology	Day trip to Blue Oak Ranch Reserve	Field Notebook #2
5	Coastal California, intertidal communities		
6	Study design and basic statistical analysis	Overnight weekend trip to Point Reyes Field Station	
7	National Park Service opportunities and careers		Field Notebook #3
8	Plant-Animal Interactions		Group Research project #1
9	Animal behavior: acorn woodpeckers case studies	Overnight weekend trip to Hastings Natural History Reserve	Draft CV and cover letter
10	Urban Ecology, Inequality and Global Climate Change		Field Notebook #4
11	Components of a Research Project: Introduction		Group Research project #2
12	Methods		
13	Results		
14	Visuals and Presentations		Final Project

1. Systemwide Senate Regulation 760 specifies that 1 academic credit corresponds to 3 hours of work per week for the student in a 10-week quarter. Please briefly explain how the course will lead to sufficient work with reference to e.g., lectures, sections, amount of homework, field trips, etc. [Please note that if significant changes are proposed to the format of the

course after its initial approval, you will need to submit new course approval paperwork to answer this question in light of the new course format.]

This is **3-unit** course. Details regarding work hours are included below.

Lectures

Lectures will consist of 14 1.5-hr classes (21 hrs total) throughout the semester. Students will be expected to read supplemental materials as well as present to the class. Total of lectures: 21hours.

Field Trips

Two overnight weekend Field trips will be a required component of the course (this will be the emphasis of the course). Dates will be advertised on a course webpage in advance of registration. Each overnight trip will consist of 16 contact hours (32 hrs). Two day trips will be required (10 hrs). Total of field trips: 42 hours

Outside of Class Activities

Students will likely spend an average of 2 hrs/week working on journal activities, group research projects, and assigned readings. Total out of class time: 28 hours.

Readings

Selected readings from field guides, published papers, and study guides will be assigned. Readings will vary depending upon where class field trips will occur and specific topics covered; however, examples are included below and in the syllabus above:

Readings

Bakker, E., 1985. An Island Called California: An Ecological Introduction to its Natural Communities (Second Edition). University of California Press.

Carson, R. 1998. The Edge of the Sea (reprint). Mariner Books

Evens, J. (2008). Natural History of the Point Reyes Peninsula: Fully Revised and Expanded Edition (No. 94). University of California Press.

Handelman, C. and J. Kohn. 2014. Hummingbird color preference within a natural hybrid population of *Mimulus aurantiacus* (Phrymaceae). *Plant Species Biology* 29: 65-72.

Hughes et al. 2013. Recovery of a top predator mediates negative eutrophic effects on seagrass. PNAS 110:15313-15318.

Koenig, W. D. and E. L. Walters. 2014. What we don't know, and what needs to be known, about the cooperatively breeding acorn woodpecker *Melanerpes formicivorus*. *Acta Ornithologica* 49: 221-232.

Leopold, A. 1949. Thinking like a mountain. A Sand County Almanac and Sketches Here and There. New York, New York, Oxford University Press.

Norris, K. 2010. Chapter 5. The Canyon. Mountain Time – Reflections on the wild world and our place in it. University of California Press.

Ricketts, E.F. and Calvin, J. 1985. Between Pacific Tides (5th Edition). Stanford University Press
Schell, C. J., Dyson, K., Fuentes, T. L., Des Roches, S., Harris, N. C., Miller, D. S., et al. (2020). The ecological and evolutionary consequences of systemic racism in urban environments. Science (80-.). 369, eaay4497. doi:10.1126/science.aay4497.

Tomašových Adam and Kidwell Susan M. 2017. Nineteenth-century collapse of a benthic marine ecosystem on the open continental shelf. Proc. R. Soc.
B. <https://doi.org/10.1098/rspb.2014.1533>

Van Dyke and Holl. 2001. Maritime chaparral community transition in the absence of fire. *Madroño*. 48:221-229.

Wall Kimmerer, R. 2013. Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teaching of Plants (chapters 1-3). Milkweed Editions.

Weber. 1981. Physical environment of Año Nuevo. Chapter 3. The Natural History of Año Nuevo. Pacific Grove, CA. Boxwood Press.

Whitaker, D. (2019). *As long as grass grows: The Indigenous fight for environmental justice, from colonization to Standing Rock*. Beacon Press.

Grading

Reading summaries: 10%

Participation in Field Trips: 10%

Field Notebook assignments: 20%

1st Group Research Assignment: 20%

2nd Group Research Assignment: 20%

Final Project: 20%

Missed field trips and assignments: We will handle this on a case-by-case basis, depending on the reason for absence.

Late Work Policy: Late work will be accepted at any time after due date, but score will be 10% lower than maximum possible.

Disability accommodation: We will do our best to accommodate **all** students who wish to take this class. Please contact the instructors.

Field Notebooks:

In keeping a field journal, your objective is to create a permanent, accurate, written record of your field activities, methods and observations, augmented by sketches and specimens as appropriate. The description of patterns is a fundamental component of ecological studies and science in general. Patterns motivate the questions and hypotheses that ecologists propose and the studies/experiments they design to address them. The goal here is to learn how ecologists describe patterns, and in particular to describe a pattern that will motivate your research proposal for this course.

Group Research Projects: In small groups of 4-6 students you will design and carry out a research project the last day of our overnight trips. There will be a 10-minute group presentation of your research.

Final Project: with feedback from the instructors you will select a research question related to the natural history of the Bay Area and global change biology, design a set of observations to address your question, and write up a short report in an abbreviated scientific format presenting and interpreting your results.

Reading Summaries: For each of the reading assignments you will write a quick summary in a word document. A proper citation will begin your summaries. This is a great habit to get into as an undergraduate. You will read many papers and having a quick reference will help you be able to quote a wide body of knowledge in future classes.

Sexual Violence and Sexual Harassment:

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive support and advocacy at the Office for the Prevention of Harassment and Discrimination by calling 510-643-7985. The Urgent SVSH 24/7 Support Care Line is: 510-643-2005. Also, Counseling and Psychological Services (CAPS) for Students.

Phone: (510) 642-9494 For after-hours support, please call the 24/7 line at (855) 817-5667.

Faculty and Teaching Assistants are required under the [UC Policy on Sexual Violence and Sexual Harassment](#) to inform the Title IX Office should they become aware that you or any other student has experienced sexual violence or sexual harassment.

Group Agreements:

In our class we will adhere to some basic principles of community, these are my suggestions, we will discuss this at our first meeting:

- Mutual respect, respect each other and yourselves, let others speak, treat others how you would want to be treated and make sure everyone is able to contribute
- Create an inclusive space for everyone to learn through our words and actions
- Be kind & communicate honestly, assume positive intent, take what is learned, leave what was said
- Be present and participate, leave distractions at the door as much as possible

-Individual Responsibility, you are responsible for your own learning. Speak up and seek help when needed

Cell Phones & Social Media: You may use your cell phone cameras but please refrain from using social media during trips. We also ask you to NOT use your cell phones on the trip except for emergency or logistical coordination reasons. We understand that you might want to have some means to contact family while in the field, but please restrict your use. Do not listen to music or use social media on any of the field trips. Our experience has been that it just tunes you out from what you are trying to experience. You will survive and chances are you will get to know the environment and your classmates better without them.

Alcohol & Drugs: Alcohol and drugs are not permitted on field trips.

Research Equipment: We will be using a wide range of research equipment – from transect tapes to binoculars to computers. This only works if we all take responsibility for caring for it and making sure it gets put back so that others can use it. Be conscientious. Also, it is common that equipment breaks or needs maintenance. We won't charge you for breaking or losing research equipment. Don't put away a damaged or non-functional piece of equipment. Let us know so that we can fix it or replace it

Things to Bring: Notebook with pens and pencils, Backpack- sunscreen, sunglasses, warm hat, sun hat, extra layers of cloths, rain gear, food and water

Watch: weatherproof and digital. Stopwatch function is also useful.

Binoculars: used for LOTS of things and highly recommended (some pairs will be supplied by the course).

Field Safety

We take field safety very seriously and will create a safety plan for each field trip that lists closest medical facilities and solicits emergency contact info and emergency medical directives from each student and GSI and instructor. First aid kits will be brought on all field trips.

Poison Oak: First, be able to identify it. Second, wear long pants and a long sleeve shirt if you are sensitive. Third, get it off yourself as soon as possible if exposed. Your first line of defense is to rinse off with COLD water as soon as possible. This may mean washing the affected area off in a creek or the ocean. When you get back home, follow the Tecnu instructions followed by a COLD shower. After your field trips it's a good idea to wash your field clothes – separately if you can – to get the oil out of your clothing.

Rattlesnakes: If you are bitten by a rattlesnake, remain calm and move away from the snake. Do not raise the bitten area above your heart. Stay as still as possible. Remove tight cloths or jewelry. Let the wound bleed. Do not wash wound. Do not suck the venom out of the wound. Call the hospital so they are prepared with anti-venom. Drive bite victim to the hospital.

Dressing for the Field: A key to being able to assimilate information outdoors is comfort. Study in the field often requires that you be still for long periods of time, either quietly viewing the subject at hand, or quietly waiting for your subject to come into closer view.

- Eat well before and during field trips. Don't hesitate to carry snacks with you. A quart-sized container of water is essential.
- Dress in layers, so garments can be added or subtracted as necessary to maintain body temperature in cold, windy weather. A t-shirt, long sleeve shirt and outer sweater (preferably wool or fleece), along with a windbreaker, make a good combination. Wear sturdy pants (shorts are often a disaster in the field) and closed shoes with socks and some traction, such as tennis shoes. Carry both a warm hat and a sun hat (e.g. baseball cap).
- Our labs happen rain or shine. If there's any question, bring rain gear – a rain jacket and pants (Gore-Tex, rubberized plastic, etc.), and a wide-brimmed or baseball cap to keep the rain out of your eyes. Pack your field notebook and other non-waterproof items in Ziploc bags inside your pack. For rainy days, pencil is often easier to manage than pen, and if the wind isn't blowing an umbrella can help keep data recording dry.
- For bird-study, gloves, not mittens, are a better choice, since it's easier to adjust the focus of your binoculars while wearing gloves.
- Consider lip protection and sunscreen. Sunglasses add to comfort on bright, sunny days.

Catalogue Preview: 82. Integrative Biology – Introduction to Field Research in Global Change Biology. (2.0). A field-based course with overnight and day trips to natural areas in the Bay Area and coastal California. Field trips and lectures emphasize natural history of California organisms and field research methods to study global climate change as well as preparing students for careers in ecology, evolutionary biology and conservation.