

Environmental Research Methods and Ethics

ENVI-3500 (3 credits)

Panama: Tropical Ecology, Marine Ecosystems, and Biodiversity Conservation

This syllabus is representative of a typical semester. Because courses develop and change over time to take advantage of unique learning opportunities, actual course content varies from term to term.

Course Description

The Environmental Research Methods and Ethics course is an introduction to field research and research methods in ecology and conservation. Emphasis is placed on learning about and understanding the investigation of ecological processes and ecological responses to human impacts, including recording, interpreting, and analyzing data from primary sources. Discussions, field exercises, and assignments focus on ecological methodologies that engage students in different forms of research and methods of data collection. Assignments require investigation, data collection, and analysis of data from natural environments and impacted ecosystems using a variety of field techniques and methods. Special emphasis is placed on research ethics. In addition, students learn and engage in formulation and elaboration of research proposals. The course facilitates students' subsequent development of an in-depth independent field research project.

Learning Outcomes

By the end of the course, students will have had the opportunity to develop:

- Competence in a minimum of 20 field research methods that can be applied in the field for natural resource data collection.
- The capacity to identify appropriate field methods and methods of analyses for data collection.
- The know-how to design and conduct field research in Panama
- The ability to analyze and discuss the ethical implications of proposed research.

Language of Instruction

This course is taught in English and students will be exposed to Spanish vocabulary related to course content through in-country lectures and field visits.

Instructional Methods

SIT's teaching and learning philosophy is grounded in the experiential learning theory developed by Kolb (1984; 2015) and informed by various scholars, such as Dewey, Piaget, Lewin, among others. Experiential learning theory recognizes that learning is an active process that is not confined to the formal curriculum; "knowledge is created through the transformation of experience" (Kolb, 2015, p. 49). Learning involves both content and process. Learning is holistic and happens through various life experiences upon which students draw to generate new ways

of knowing and being. Learning involves a community and is a lifelong endeavor. Learning is transformational. The suggested four step-cycle of a *concrete experience, reflective observation, abstract conceptualization, and active experimentation* embedded in the experiential learning model is not linear and might not always happen in that specific order, as any learning is highly context dependent. These stages of taking part in a shared experience; reflecting on that experience by describing and interpreting it; challenging their own assumptions and beliefs to generate new knowledge; and ultimately applying new knowledge, awareness, skills, and attitudes in a variety of situations and contexts are important for students to engage in to become empowered lifelong learners.

Evaluation and Grading Criteria

Description of Assignments:

Section 1 assignment

During the semester students will maintain a journal of the field research methods learned during the modules. For each method, include the following:

1. Name of the method
2. Description of the method
3. What the method is used for
4. How the data generated are analyzed (statistical or other means)
5. Two examples of experimental scenarios (that were not practiced in the course), including:
 - a. Brief research objective
 - b. How the method would be applied (experimental scenarios)
 - c. How you would analyze the data
 - d. Conclusions that can be drawn

Possible methods to be included are botanical taxonomic keys, canopy density, forest transect, forest quadrat, seedling density, DBH, herbivory, bird mist netting and bird processing, camera trapping, mud traps, amphibians methods, coral reef methods, mangrove methods, seagrass methods. However, depending on extenuating circumstances and/or potentially interesting opportunities, methods to be included may vary. Please do not initiate the journal entries until the methods to be included have been practiced in each module and decided upon for write-up. All journal entries should be in narrative form. This assignment is due in pdf format via email **by _____**. It is vital that students keep up with this assignment during the semester. Given that this is the final assignment for the course, it will not be possible to return the journals with feedback. However, you can consult with Aly during the semester for feedback at any time.

Section II assignments

Research Question – Submit your research question in a format that allows for giving feedback.

Articles and Contacts – Provide ten articles and three contacts for your ISP research (field practitioners, NGOs, community members, professors, professionals, etc.). Full pdf articles should be submitted in a zipped file with the list of contacts and a bibliography in APA format.

Research Outline – You will be given a series of questions to answer. Responses should be short and concise. Please submit your responses in Word in the same file as the Articles and contacts assignment.

Mini Literature Review – Using the articles you compiled for the previous assignment and additional references, write a very brief, introductory literature review (one-page, single-spaced) on your ISP topic. Provide a separate works cited page. All sources should be peer-reviewed publications. You will lose points for including non-peer reviewed sources. Include a minimum of 10 sources. Use APA format for your works cited page. Use in-text citation format as requested in the document provided.

Section III assignment

IRB/LRB – Please fill out all of the IRB/LRB forms for your ISP research proposal.

Assessment:

Section 1 assignment (journal)	50%
Research outline, Articles, Contacts	10%
Mini Literature Review	20%
Section III - IRB/LRB	10%
Contribution during field work	10%

Grading Scale

94-100%	A	Excellent
90-93%	A-	
87-89%	B+	
84-86%	B	Above Average
80-83%	B-	
77-79%	C+	
74-76%	C	Average
70-73%	C-	
67-69%	D+	
64-66%	D	Below Average
< 64	F	Fail

Program Expectations

Please...

- Come prepared. Be on time, have your readings completed and points in mind for discussion or clarification.
- Complete assignments on schedule. This will help you keep up with your classwork and ensure you don't fall behind.
- Ask questions in class. Engage the lecturer. The speakers and professors you will meet are leaders in their fields in Panama. Take advantage of the opportunity.
- Respect differences of opinion (classmates, lecturers, local constituents engaged with on the visits). You are not expected to agree with everything you hear, but you are expected to listen across difference and consider other perspectives with respect.
- Consider your place and position in all dimensions. Demonstrate culturally appropriate behavior and expression always.

Research: If the research has been funded by a U.S. government agency, or if the student plans to take this research back to the home school or community for further dissemination,

then the student may be required to follow standards from their home institutions in addition to the Local Review Board and those of the Office for Human Research Protections, with which SIT is registered. For applications that require a full review, the academic director will forward any questions or concerns that cannot be resolved at the program level (through the Local Review Board) to SIT's Institutional Review Board.

SIT Policies and Resources

Please refer to the [SIT Study Abroad Handbook](#) and the [Policies](#) section of the SIT website for all academic and student affairs policies. Students are accountable for complying with all published policies. Of particular relevance to this course are the policies regarding: academic integrity, Family Educational Rights and Privacy Act (FERPA), research and ethics in field study and internships, late assignments, academic status, academic appeals, diversity and disability, sexual harassment and misconduct, and the student code of conduct.

Please refer to the SIT Study Abroad Handbook and SIT website for information on important resources and services provided through our central administration in Vermont, such as [Library resources and research support](#), [Disability Services](#), [Counseling Services](#), [Title IX information](#), and [Equity, Diversity, and Inclusion](#) resources.

Course Schedule

The course is divided into three sections. These include Section 1 Field Techniques and Methods, Section 2 Research Preparation, and Section 3 Ethics.

Section 1 – Field Techniques

Section I Objectives

Section 1 learning objectives include introducing students to:

- a. The fundamentals of ecological fieldwork in the tropics
- b. Hands-on opportunities to learn and practice field techniques that students can apply to their research
- c. The basic principles of field sampling
- d. The application of basic methodologies for statistical analysis.
- e. Ecological methods used in measuring forest health, biodiversity, avian diversity and health, coral reefs, seagrass productivity, mangrove structure, amphibian diversity, and mammal identification.

Methods and Techniques

The following methods and techniques are taught during six program modules. All methods and techniques are taught, applied, and practiced in the field.

Introduction to Tropical Forests

- a. Use of taxonomic keys for flora identification. Taxonomic keys are based on simple morphological features (see Gentry 1996 "A field guide to the Families and Genera of Woody plants of Northwest South America"). This methodology is useful for the identification of plants up to the family and genera levels which will enable the student to become familiar with the more common botanical families in Panama.

- b. Use of densitometers, DBH tapes, belt transects, quadrats, and range finders. Students learn to measure seedling density, herbivory, canopy density, forest strata, and other forest parameters.
- c. Use of PAST3 for statistical analyses; introduction to Shannon-Weiner, Janzen-Connell, Simpson indices. Students learn to calculate biodiversity using different techniques and theories.

Birds of the Neotropics

- a. Set up, use, and breakdown of mist nets. Students learn to capture and sample birds for monitoring and research.
- b. Point count sampling for avian research.
- c. Processing captured birds including learning to test for parasites, sex, age, health, condition, and reproductive status.

Coral Reef Ecology

- a. Establishment of aquatic transects to research coral health and species diversity.
- b. Construction, threading, and establishment of aquatic quadrats
- c. Neutral floating for marine organism observation
- d. Marine organism identification

Mangrove Ecology

- a. Students will learn to identify mangrove species and evaluate the relationship between species abundance and salinity using transects and analysis of variation.
- b. Sampling of mangrove roots, and organism identification to appraise and calculate underwater mangrove biodiversity.
- c. Radial sampling for measuring mangrove abundance, growth, and succession.

Seagrass Beds

- a. Using ocean floor corers, students will sample seagrass beds belowground to measure biomass distribution.
- b. Students will learn to mark and puncture sheaths to monitor and measure seagrass growth and productivity.
- c. Students learn to measure and compare ocean water turbidity at different impact sites.

Mammals and Amphibians

- a. Students learn to set mud traps, identify markings, and make cast moldings of animal tracks.
- b. Using weatherproof motion sensor cameras, students learn to set, position, mount, and test cameras. During the module students monitor the cameras, and review photos taken for animal identification.
- c. Students learn to mark cameras and mud traps using GPS.

Section II – Research Preparation

ISP Introduction - Orientation

Scientific method and hypothesis testing

Your Research Topic and Forming Your Research Question

Research Question

Articles, Contacts, Research Outline

Mini Literature Review

Field Methods Log

Section III – Ethics

IRB/LRB