Environmental Research Methods and Ethics
ENVI3500 (3 Credits / 45 class hours)

SIT Study Abroad Program:
Panama: Tropical Ecology, Marine Ecosystems, and Biodiversity Conservation

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

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.

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 I 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 they can apply to their research
c. The basic principles of field sampling
d. The application of basic methodologies for statistical analysis.
e. Ecological methodologies used in measuring forest health, biodiversity, and plant-insect interactions, coral reef health, and numerous others
f. Introduce students to project formulation, appropriate methodology selection, and data analysis.

Methods and Techniques

Introduction to Tropical Ecology

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 to measure canopy density

Tropical Ecosystems

a. Soil sampling using soil augers to measure soil horizons
b. Comparative insect capture and sampling
c. Water quality
d. Aquifer charge

Cloud Forest Structure and Dynamics

a. Belt transects
b. Seedling density
c. Quadrats
d. Stem diameter (DBH)
e. Canopy density

Mammals and Amphibians

a. Mud traps
b. Tracking
c. Camera traps
d. Audio identification
e. GPS

Birds of the Neotropics

a. Mist netting
b. Processing avian samples including parasites, sex, age, health, condition, reproduction
c. Identification

Coral Reef Ecology
   a. Aquatic transects
   b. Aquatic quadrats
   c. Neutral floating for marine organism observation
   d. Marine organism identification
   e. Analysis of marine data

Mangrove Ecology
   a. Evaluation of the relationship between species abundance and salinity using transects and analysis of variation.
   b. Evaluation of mechanical stability using plant allometry
   c. Carbon measurement

Seagrass Beds
   a. Ocean floor bed sampling
   b. Vegetative productivity
   c. Chemical assay
   d. Turbidity

Section II – Research Preparation

ISP Anatomy - Orientation

Research question, scientific method, and hypothesis testing

Topic and Forming Your Research Question

Research Outline

Articles and Contacts

Mini Literature Review

Section III – Ethics

Research Ethics Discussion

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. What type of data are captured by the method
5. How the data are analyzed (statistical or other means)
6. Two examples of experimental scenarios (that were not practiced in the course), including:
   a. Brief research objective
   b. How the method can be applied (experimental scenarios)
   c. How you would analyze the data
   d. Conclusions that can be drawn

Methods to be included are botanical taxonomic keys, canopy density, soil sampling, water sampling, forest transect, forest quadrat, seedling density, dbh, insect sampling, herbivory, aquatic transect (point-intercept and line), camera trapping, mud traps, mangrove methods, seagrass methods, and bird mist netting, and bird processing. However, depending on extenuating circumstances and/or potentially interesting opportunities, methods to be included may vary.

Section II assignments
Research Outline – You will be given a series of questions to answer. Responses should be short and concise.

Articles and Contacts – Provide five articles and five 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.

Mini Literature Review – Using the articles you compiled for the previous assignment and additional references (min. 5), write a very brief, introductory literature review with the information available (one-page, single-spaced, with 10 references, and works cited page).

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

Assessment:
Section I assignment 50%
ISP Outline 5%
Potential Articles and Contacts 10%
Mini Literature Review 20%
Section III - IRB/LRB 5%
Participation 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

Expectations and Policies
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.

Please refer to the SiT Study Abroad Student Handbook for policies on academic integrity, ethics, warning and probation, diversity and disability, sexual harassment and the academic appeals process.