CONSERVATION BIOLOGY

Course Content:

Review of the drivers of global environmental change (human population growth and consumption of resources), resulting environmental degradation, and tools to slow down or reverse environmental damage. Topics range from global to local in scale, and connections between different scales are emphasized. Examples from Chile and other parts of South America are used throughout the course and related to similar challenges elsewhere.

Course Objectives:

Instructional Goals

- To teach students how human population growth and consumption of resources drive environmental problems. To teach students what those environmental problems are and how they often interact synergistically.
- To teach students tools for assessing and addressing environmental degradation. Students learn these tools both in class and on field exercises.
- To teach students to analyze conservation problems in a multidisciplinary manner with consideration of economics, law and policy alongside biological principles such as conservation genetics, environmental chemistry and population demography.
- To teach students about the scientific method and have them repeatedly apply that method in the field to understand local conservation problems. Students learn to interpret data and modify study designs.

Student Outcomes

1. The student will be able to explain environmental problems at two separate levels of analysis: drivers (human population growth and resource consumption) and consequences (the full suite of environmental problems).
2. The student will understand the major environmental problems the Earth now faces, such as climate change, eutrophication, acid rain, stratospheric ozone depletion, pesticides and endocrine disruption, habitat modification and conversion, biological invasions, and global declines of amphibians, reptiles, and primates. The student will understand how many of these problems interact in a synergistic fashion, and therefore the student will improve complex thinking skills. The student will understand major tools for solving environmental problems, such as legislative tools (e.g., CITES, national regulations), tools in conservation genetics, island biogeography and its application to reserve design, and economic tools (e.g., debt for nature swaps, analysis of lost opportunity costs).
3. The student will be able to formulate and test hypotheses and interpret data. The student will be able to carry out research projects from initial hypothesis formulation through data collection and statistical analysis to writing a coherent and concise report in standard scientific format (Abstract, Introduction, Methods, Results, Discussion, References).

Instructional Methodology:

This course will include lectures that are illustrated with photographs, short video clips, and computer modeling exercises. Questions and discussion will be encouraged. Students will be trained to think deeply about topics and to make relationships between environmental problems across spatial and time scales. Field excursions will be taught in an "ecological mystery" fashion, where students are presented with a conservation problem (such as impaired water quality), given the tools to analyze the problem, and assisted with the development and testing of hypotheses to explain the problem. In this way, students will be empowered by learning and applying the scientific method to real-world environmental problems.

Method of Evaluation/Grading:

The course will have three exams, each worth 20% of the grade. Exams will cover material from lectures and reading. Exercises from field excursions will comprise the remaining 40% of the grade, and students will be responsible for presenting their field exercises in scientific format (Abstract, Introduction, Methods, Results, Discussion, References).

Schedule:

Diversity of life 1: species richness, taxonomy & conservation
Diversity of life 2: levels of biodiversity and species richness
Diversity of life 3: how many species are there?
Conservation of running waters
Water Quality & applied conservation: physical, chemical & biological habitat assessment
Population growth and decline
Competition, predation, and conservation
Environmental problems: drivers & consequences
Demographic processes
EXAM 1
Climate change
Eutrophication
Acid Rain
Stratospheric ozone depletion
Endocrine disruption 1
Endocrine disruption 2
Endocrine disruption 3
Biodiversity and human health
Trade in threatened species

Biological invasions 1
Biological invasions 2
EXAM 2
Global declines: Amphibians & reptiles
Global declines: Primates
Conservation genetics 1
Conservation genetics 2
Island biogeography 1
Island biogeography 2
Island biogeography 3
Succession and ephemeral islands
Biodiversity revisited
EXAM 3