

EBIO 3780: Tropical Field Biology & Conservation

Instructors

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Community Partners

Fundacion Conservacion de los Andes Tropicales (FCAT)

Ms. Monica Gonzalez

Executive Director, Education Specialist

Mr. Jorge Olivo

Field Biologist, Conservation Activist

Mr. Domingo Cabrera

Field Biologist, Conservation Activist

Course Overview: This is an intensive, immersive study abroad course with a strong focus on experiential learning, design thinking, and engaged scholarship. The course will be primarily based in Ecuador, with expectations for additional work before and after the international experience. Students will expand their understanding and technical abilities via lectures and readings; development, implementation, and presentation of independent research projects; journal entries and reflective essays; and close interaction with local residents and practitioners. The course serves as a 3000-level elective in the Department of Ecology and Evolutionary Biology, and as an elective for the Social Innovation and Social Entrepreneurship (SISE) minor. It includes a mandatory, zero-credit Service Learning component, which will satisfy the second tier SL requirement for sophomores, juniors, and seniors. Students will receive 3 total credit hours for completing this course. An overview of core course activities is as follows:

Pre-Ecuador (March 1 – May 15, 2015)

1. 3 hr of lecture and workshops to develop project ideas;
2. 10 hr of reading to provide baseline knowledge and refine project ideas;
3. A short (2 – 3 pg.) proposal for research in Ecuador

Ecuador (May 17 – 31, 2015)

1. 36 hr classroom lecture (approx. 2.5 hr/day)
2. 24 hr of student-professor contact re: project design; data analysis and interpretation; presentation of results (approx. 2 hr/day)
3. 36 hr field research (approx. 2.5 hr/day)
4. 48 hr of reading, studying, and report preparation; daily journal entry and two examinations (approx. 4 hr/day)

Post-Ecuador (June 1 - 30, 2015)

1. 10 pg. (double-space) scientific report on independent research conducted in Ecuador, with > 20 references
2. 5 pg. reflective essay to satisfy service learning reflection requirements

Course Description: *Tropical Field Biology and Conservation* gives students the opportunity to increase their understanding and appreciation of tropical biology, and to apply the theory and knowledge they have acquired in the classroom to the real world. Students will travel with Dr. Karubian and Dr. Durães Ribeiro to Ecuador for a 15-day intensive field course. While on the course, students will receive regular lectures on tropical biology and conservation and will implement, and write up, field-based research projects related to the lecture material. Students will increase their knowledge base about tropical ecology and conservation, and will experience first hand the challenges and rewards of conducting field research and implementing conservation activities in tropical environments. These activities will take place within a context of community engagement based on active collaboration and interaction with Ecuadorian local residents in a variety of contexts. An average day will be as follows:

7am – 8am:	Breakfast (1 hr)
8am - 10am:	Lecture (2 hr)
10am - 12pm:	Study design / analysis (2 hr)
12pm - 3pm:	Lunch / study / reading / work on reports (3 hr)
3pm - 6pm:	Field-based research (3 hr)
6pm – 7pm:	Dinner (1 hr)
7pm – 8pm:	Lecture (1 hr)
8pm - 11pm:	Journal entry / study / reading / work on reports (3 hr)

Classroom learning: Students will receive ten, two-hour lectures and ten, one-hour lectures on tropical biology and conservation, with two examinations. These lectures are designed to provide a strong foundation of expertise in tropical ecology and conservation, which will be enhanced by the experiential learning, design thinking, and community engagement components of the class. Lecture topics for the two hour lectures are as follows: (1) Overview of biology and conservation in the tropics / (2) Why are there so many species in the tropics? / (3) Competition, co-evolution and tropical community ecology / (4) Seed dispersal in the tropics / (5) Pollination biology in the tropics / (6) Animal behavior in the tropics / (7) Tropical forest dynamics and regeneration / (8) Tropical ecosystem ecology / (9) Human impacts and species extinction / (10) Prospects for sustainable development and conservation of biodiversity in the tropics. The one-hour lectures will be provided by practitioners in the field of tropical ecology and conservation that visit or travel with the course (see details below).

Each of the two-hour lectures will have one or more readings associated with it. Readings for lectures 1 - 8 will be selected from contemporary primary literature (i.e., peer-reviewed publications) and/or the text '*Foundations of Tropical Ecology: Classic papers with commentaries*' edited by Robin Chazdon and T.C. Whitmore (2002). Readings for lectures 9 and 10 will be sourced from the AAAS 'Atlas of Population and Environment' (<http://atlas.aaas.org/index.php?sub=intro>). In addition to these core readings, students will be expected to read a select number of technical articles relevant to the 'hands-on' research projects they conduct, as described below. To this end, we will travel with an electronic library of > 500 scientific and/or sustainable development articles which students will access in order to support research reports.

Experiential Learning: Students will implement a 'hands-on' research projects with close instructor guidance and supervision. Student research will be conducted at two different sites in Ecuador, at high and low (1,500 m. and 300 m. above sea level, respectively) on the western slope of the Andes. Projects will address how anthropogenic activities may impact species diversity (e.g., birds, insects, mammals) and ecological processes (e.g.,

pollination, seed dispersal, predation), topics that are relevant to both tropical ecology and applied conservation biology. Students taking the course to satisfy the SISE minor will be able to develop projects using design thinking to address socio-ecological themes in the sites we visit. Prior to departure, Dr. Karubian and Dr. Durães Ribeiro will meet with students on three occasions to identify viable projects and guide project development. In this pre-departure component of the course, students will conduct literature review and prepare a short (2 – 3 pg) research proposal. In Ecuador, Karubian and Durães Ribeiro will provide at least 25 contact hours to assist students with project design and implementation, and analysis and presentation of results. Students will spend 36 hours in the field collecting data in close collaboration with our in-country counterparts from *Fundacion Conservacion de los Andes*. With instructor supervision, students will formulate hypotheses, collect data from the field, analyze data, and write up preliminary reports on their findings. Research findings will also be presented orally in an informal seminar on the final day of the Ecuador component of the course. After completion of the course, students will be expected to continue working on their reports, including additional analyses (if appropriate), more extensive literature review, improving writing quality. Instructors will interact with students via email during this phase, and students will electronically submit a final report one month after returning from Ecuador.

Community Engagement / Service Learning: The zero-credit Service Learning component of this course is obligatory, and will consist of 36 hours of directed ecology/conservation field research (plus near-constant interaction with local residents). Student research projects will be designed and implemented in close collaboration with local Ecuadorian residents trained as field biologists and/or environmental education specialists. These individuals – Miss Monica Gonzalez, Mr. Jorge Olivo, and Mr. Domingo Cabrera – are all founding members of the Ecuadorian non-governmental organization *Fundacion Conservacion de los Andes Tropicales*, with over 50 years of tropical ecology and conservation experience between them. They are the community partners on this course, and they will accompany the students in all phases of the course, and collaborate in the research projects. In this sense, Tulane students will directly incorporate ‘engaged scholarship’ approaches into their scientific research in a fundamental way.

In addition to this intensive collaboration with our core community partners, students will visit a series of local communities and conservation and research projects. During these visits, students will interact with local residents and conservation practitioners to gain a first-hand sense of the conditions shaping the land use decisions in biodiversity hotspots. Students taking the course to satisfy the SISE minor will be able to develop research projects using design thinking to address socio-ecological themes in the sites we visit. Students are expected to make daily entries into a course journal in which they document their interactions with local community members and discuss the ways in which this experience has shaped their perception of ecological research and conservation biology. Within two weeks of completing the course, students will be expected to turn in a 5 page, reflective essay summarizing the ways in which community engagement has shaped their thinking on tropical ecology and conservation. In addition, students will be asked to fill questionnaires at the beginning and end of the course, which instructors will use to quantify any changes in students perception or thinking during the course.

Learning Outcomes: Students in this course are expected to demonstrate that they have attained the following capabilities, consistent with the learning outcomes for the major: 1) to demonstrate basic factual knowledge of tropical ecology and conservation;

2) to demonstrate competence in collection, organization and analysis of data; 3) to demonstrate skills in written and public presentation of one's own work and in critiquing the work of peers; and, (4) to demonstrate an understanding of, and ability to write and speak about, engaged approaches to scholarship in tropical ecology and conservation.

Specific Aims: The specific aims of this course are to enable students: 1) to successfully design and conduct an independent research project in tropical rainforest habitat; 2) to synthesize results and write a report in the format of a scientific publication summarizing the aims, methods and results of the research project; 3) to make an effective publication presentation on the research; and, 4) to gain a first-hand understanding of what is involved in successfully conducting tropical ecology and conservation work.

Co-requisite or Prerequisite: Consent of instructor. Ecology & Evolutionary Biology 2200 and Spanish are recommended, but not required.

Structure of Course: See below

Reading: Reading materials will be made available online at the course website.

Description of Assignments:

Research Proposal: Students are expected to submit a 2 – 3 page research proposal modeled after a NSF Graduate Research Fellowship proposal in early May, prior to the field component of the course. The proposal should contain > 15 relevant references, and should clearly lay out hypotheses to be tested, methods, expected results and interpretation. Students will develop this proposal in conjunction with the instructors

Exams: Two essay and short answer exams will be administered during the course to assess understanding of core concepts and information from classroom lectures. Exams will be given on Day 6 and Day 13 of the course.

Journal Entries: Students will maintain a daily journal throughout the course period. This journal will be used to record student thinking about the role of community engagement in the process of conducting tropical ecology and conservation, and students should have at least one entry per day that addresses this topic. Additionally, this journal should document biological and social / community context for each area we visit. The goal is for students to have a record of our journey through Ecuador that could easily be recreated on a map by looking at your entries, as well as to reflect on personal observations about the biological and cultural diversity that you will experience throughout the trip. Journals will be reviewed by instructors periodically throughout the course.

Essay on Engagement: Students will synthesize their journal entries and any other relevant ideas into a single, five-page paper on the role of community engagement in tropical ecology and conservation. Students will also be encouraged to speak informally about this topic in a round-table discussion near the end of the course. The essay will be due two weeks after the completion of the course.

Research Report: Students will work with instructors and community partners to design and implement research projects at the two main field sites we visit, resulting in a single

report at the conclusion of the course. Students are expected to present a thorough introduction with appropriate references; coherent hypotheses; detailed methods; results; and discussion. Instructors will meet on a daily basis with students during the course to assist with project and report development, including statistical analyses. Students will have basic statistical results and a working draft of the final report in hand by the completion of the Ecuador component of the course. Upon returning home, students will have one month to complete the final report. During this time, they are expected to refine the writing style, complete literature review and any outstanding analyses, and format the report properly. The final report should be approximately 10 pages of text, not including figures or references. Specific guidelines for the written and oral presentations are provided below.

Oral Presentation: Students will prepare 12-minute presentations summarizing their research, to be presented in a mini-symposium on the final day of the Ecuador component of the course. Presentations will follow the same general outline as the research reports (above), and will be made in Powerpoint or Prezzi. Students will work with instructors to ensure background information, hypotheses, methods, results and discussion are all adequately included in the presentations.

Schedule

Grading:

<u>Research Proposal</u>	10%
<u>Exams</u>	30%
<u>Service Learning journal & essay</u>	10%
<u>Research project II</u>	40%
<u>Oral presentation</u>	10%

A+ = 98-100	B+ = 88-89.9	C+ = 78-79.9	D+ = 68-69.9	F = <60
A = 92-97.9	B = 82-87.9	C = 72-77.9	D = 62-67.9	
A - = 90-91.9	B - = 80-81.9	C - = 70-71.9	D - = 60-61.9	

Detailed Course Itinerary

May 17th: Travel day to Finca Murr-aiy, Ecuador

We will meet in the Quito International Airport and be transported by bus to Finca Murr-aiy, about a 2 hr drive from Quito.

May 18th – 23rd: Finca Murr-aiy (6 full days)

Finca Murr-aiy is located on the western slope of the Andes at 1,500 m elevation. The 500 ha property contains a mixture of shade-grown, organic coffee of various ages, pasture, and primary rainforest. This provides a suitable venue for students to directly investigate how different types of anthropogenic land use impact patterns of diversity and ecological process. Students will receive lectures in the mornings and evenings, and will spend the days studying, reading, and designing, implementing, analyzing, and writing up research projects that sample the different habitat types at Finca Murr-aiy. Students will have an exam, and submit a draft written report on their research on the final day. Guest lecturers include Murray Cooper (owner and director of Finca Murr-aiy), Monica Gonzalez (Founder and Director of Fundacion para la Conservacion de los Andes Tropicales), Domingo Cabrera (local resident and biologist), and Luis Carrasco (biologist for the Ecuadorian Ministry of the Environment). Facilities at the station include running water, hot showers, shared dormitory style rooms, and prepared meals.

May 24th : Travel day (bus): Finca Murr-aiy to Mashpi Lodge to La Laguna

We will travel by bus from Finca Murr-aiy to Mashpi Lodge. Mashpi Lodge caters to high end tourists, and contains a reserve of 1,200 ha (500 – 1,200 m elevation). Mashpi Lodge has staff biologists, with whom the instructors are actively collaborating. Students will tour the lodge and forest and receive lectures from the staff biologist and hotel manager about on-going research on the site and the eco-tourism approach to conservation that the lodge employs. In the late afternoon, we will continue on to La Laguna, where we will spend the night.

May 25th – 30th: La Laguna (6 full days)

La Laguna is located in western lowland rainforests, in the province of Esmeraldas, about 4 hr drive from Finca Murr-aiy. Facilities include running water, hot showers, shared dormitory style rooms, and prepared meals. It is surrounded by several large forest fragments, cacao plantations and pasture, and the Laguna de Cube, a large, fresh-water lake that is a focus of regional conservation efforts. Students will conduct research on patterns of diversity and ecological function in these different habitat types, and will also have the opportunity to apply a design-thinking approach to sustainable management and ecotourism of the Laguna de Cube. As at Finca Murr-aiy, students will engage in research and lectures, take an exam, and work on their research and written report. Students will also work on preparing a powerpoint presentation of their project goals and results. They will also have the opportunity to make a day trip to Bilsa Biological Reserve, the leading field research station in Western Ecuador. Guest speakers will include Rosario Teneres (Director of the Mache Chindul Reserve), Ramon

Loor (Director of Fundacion Kaiman); Jacqueline Cabrera (park guard for the Ministry of the Environment); and Jorge Olivo (local resident and biologist).

May 31st: Travel Day

We will travel from La Laguna to Finca Murr-aiy for a mini-symposium and final course banquet. At this time, students will make powerpoint presentations on their research. We will then carry on to Mariscal Sucre airport for a late evening flight to the United States. We will arrive in New Orleans on the morning of June 1st.

SCIENTIFIC WRITING GUIDELINES

There is no single formula for a well-written scientific report. Please be sure to follow the formatting guidelines provided above. The following tips should also help:

Introduction.

When it comes to writing a scientific paper, shorter is usually better. The final draft of the Introduction should be 3-4 paragraphs long.

Think of the Introduction section of a paper as a cone: wide at the top but gradually tapering to a point. Your Introduction should begin as broadly as possible and gradually narrow to focus on your particular study. Begin with the general question you will be addressing, then focus to your specific study system and the specific types of data you will collect. By the time you tell us the specifics, it should be clear how they related to the broader question introduced at the beginning of the Introduction.

Introduction: Beginning. You should begin by introducing the general thematic area(s) you plan to address in your research (e.g., habitat change, pollination biology, patterns of diversity, seed dispersal). You should introduce the salient points(s) in this field relevant to your research and highlight question(s) that need work and that will be addressed by your research. These first paragraph(s) should not mention your study organism or any details about your specific study.

Introduction: Middle. The middle section of your Introduction is a bridge linking the broad thematic coverage of the beginning to the specific questions with which you close. Here, you introduce your study system and relevant aspects of its' basic biology. Only include information that is relevant to your research question: make sure that the information you provide here is directly tied to the broad information you presented above, and the specific questions you present below.

Introduction: End. Close your introduction by presenting the specific questions you will address with your pilot research. You should provide specific hypothesis or hypotheses and predicted results. You should not have to motivate / justify the broad importance questions at this point – you already did that in the first paragraphs above – but you should specify how & why your study system is particularly well suited to answer the questions, and how the research will advance the field.

Methods

The Methods section should be 2 - 3 paragraphs long, though it may be longer if needed

Active vs. Passive voice: Some people use the active voice when writing scientific papers, while others use the passive voice. Personally, I prefer the active voice (i.e., “we sampled behavior”) rather than the passive voice (i.e., “behavior was sampled”). Either style is acceptable, but be sure to consistently use whichever voice you elect (i.e., do not switch back and forth).

The Methods section should provide the following information at a minimum:

- The location and the duration of the study;
- Detailed information on animals ***that is relevant to your study*** (do not include information that has nothing to do with your study, even if it is cool)
- The specific times of day when is collected, the sampling methods used, how data collection is portioned among partner (if relevant).

-- Planned or completed statistical analyses. We will help you to calculate basic descriptive statistics such as means (with a measure of variance such as Standard Error) and proportions, as well as more complicated statistical comparisons (i.e., t-tests, chi-sq, etc) when indicated.

Results.

The text of the Results section should be short (1-2 para). Here, you provide results but **not interpretation** (that is for the Discussion).

Results can be presented in the text, in figures (such as graphs), and in tables. Figures and tables should have legends following the style in *Biological Conservation* and should come at the end of the document.

Do not duplicate data in two places. For example, do not say in the text: “the male spent more time in the tree than on the ground ($22.5 \pm 3\%$ vs. $10.1 \pm 1\%$)” and then have a figure or table showing the same exact data. It would be acceptable to say: “the male spent more time in the tree than on the ground (Fig. 1)” or “the male spent more time in the tree than on the ground (Table 1)” and provide the raw data there.

Discussion

The Discussion section should be the longest section of the report. As above, shorter is probably better early on when you have less to say, but the length should increase as you gain more understanding of the research and your results.

The Discussion is like the Introduction in reverse. You should start by summarizing your main findings in 1 or 2 sentences, and then broaden your discussion as you go. After summarizing your results, you should include the following:

- Discuss your work in the context of other studies conducted in this thematic area. At this point, you can return to studies that you referenced in the Introduction and mention how your findings are similar to or different from these other studies.
- Highlight what in your work is new or expands our knowledge about either your particular study organism or the general thematic area of your research.
- Discuss any practical applications or management suggestions that follow from your findings. For example, you might provide a list of suggestions for the park on how to better manage the exhibit
- Discuss how your research could have been improved. What shortcomings did you perceive in your project and data collection, and how could these be addressed in future research?
- Discuss next steps in this research – what interesting questions still remain and how could they be addressed.

Acknowledgements

The Acknowledgements section comes between the Discussion and References. In this section you should acknowledge any funding sources and support you received. You may want to thank your project partner, park staff, and students in the class who provided feedback on earlier drafts of the paper.

References

You should plan to have at least 10 references, following the citation style found in *Biological Conservation*.

Tables, Figure Legends, Figures

Here you should provide the Figures and Tables (and corresponding Legends) in the order in which they are cited in the text. These pages do not count toward page limits.

ORAL PRESENTATION

The ability to communicate your science in the spoken word, as well as in writing, is another necessary skill in science.

Presentations will be jointly presented by both members of a research team. Generally, one member will take the Intro & Methods and the other will take the Results & Discussion.

Presentations should be 12 min in length, with 5 min for Q&A.

Presentations should follow the same general format as the paper, including an Acknowledgements slide at the end and references peppered through out the presentation where relevant.

Useful tips:

- Practice your presentation several times (preferably in front of friends) before you get up and give it to the group. Make sure you are coming in at the right time without talking too fast or too slow.
- Do not cram too much information onto a single slide.
- Do not put all your text on the slides, so that you essentially end up reading directly from the slide.
- Face the audience, rather than the screen, when talking. Make eye contact.
- If nervous, memorize your first 5 or 6 sentences. The adrenaline fight or flight rush usually subsides after the first couple of minutes and once you get past it you will feel more comfortable.