Tropical Diseases, Environmental Change and Human Health
(*Duke University* - BIO 283A)

Class Meeting
A detailed calendar with topics, instructors, and meeting times is provided in the document "Day by Day TropDi Spring 2017". However, scheduling is subject to change due to unforeseen circumstances typical of a field course (e.g. weather, last-minute cancellations, etc.). Meeting locations will be specified upon arrival at each biological station or field site.

OTS staff and invited faculty:

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Statement of Accessibility
This class represents an environment that is open and welcoming to all students. If you believe you may need accommodations during this class that may not traditionally be available, please contact any of the instructors within the first week of the course to plan a way to meet these needs within the potential logistical restrictions posed by a field course. Please communicate with us openly and recognize that accommodations are collaborative efforts between students and faculty.

Statement of Expectations for Student Conduct
We expect you to conduct yourself in a professional, honest, and ethical manner and adhere to Duke University's academic policies. As such you will be held to the highest standards regarding academic integrity. Academic dishonesty includes: lying (communicating untruths or misrepresentations); cheating (using unauthorized materials, information, or study aids); fabrication (falsifying or inventing information); assisting (helping another commit an act of academic dishonesty); tampering (altering or interfering with evaluation instruments and documents); plagiarism (representing the words or ideas of another person as one's own); and stealing (appropriating the property of another without permission). For additional information about academic dishonesty at Duke University please go to: https://studentaffairs.duke.edu/conduct/z-policies/academic-dishonesty

Course Description
This course emphasizes both the biological nature of tropical diseases and the ecological and human health outcomes resulting from changes to ecosystems. Instruction is based on the strengths and experience of the Organization for Tropical Studies (OTS) and our staff, and focuses on the highly respected OTS method of field-based, experiential learning.

The curriculum will focus on three major themes -the biology of tropical diseases; their impact on global health and social and economic development; effect of environmental changes in human health- which will be addressed through a series of lectures, labs, hands-on field experiences, and faculty-led research projects. As the students are introduced to the biology of a broad array of tropical diseases, pathogens, and vectors, they will also learn of the ecological and social context in which they thrive. For example, when exploring the viral disease dengue, lectures and laboratory exercises will be used to teach students about its biology, epidemiology, and vectors. Through field visits and faculty-led research projects, the students will then explore the socio-economic and environmental determinants of transmission and demography of this emerging infectious disease. Other types of activities include field trips to sugar cane and rice plantations to understand the relationship between local agricultural practices and the development of chronic kidney disease, and to rural health clinics to learn from health professionals and researchers how this disease is prevented and treated.

The program faculty will invite several scientists, health professionals, and other experts in tropical diseases to give students a wide array of perspectives and insights related to both environmental and human health. By the end of the course, students will have a good understanding of how biological, environmental, and socio-economic factors contribute to our understanding of human health issues that affect not only Costa Rica but also other tropical regions around the world.

Specific Goals

1. Examine the biology and epidemiology of tropical diseases (some of which are also part of the neglected diseases group) and how/why emerging diseases are expanding their geographical range and virulence.
2. Analyze how environmental changes in the tropics such as climate change and land conversion are impacting ecosystem and human health including: diseases, cultural medicinal practices, and changes in ecosystem functions.
3. Explore intact and altered ecosystems in and around the three OTS biological field stations to learn about how different landscapes impact human health.
4. Provide participants with a unique opportunity to discover how public health is practiced in an ecologically diverse developing country and challenges that are faced by health professionals.
5. Evaluate current tropical medicine and public health policies in the context of a changing environment.

The topics that will be covered through lectures, labs, field visits, and research projects fall into three primary areas:

1. **Biology of tropical diseases**
    - Overview of tropical diseases and neglected diseases, including geographical distribution, etiological agents, hosts, and vectors.
    - The biology and epidemiology of bacterial, viral, protozoal, and parasitic worm diseases.
    - The biology and epidemiology of non-infectious diseases (e.g. snake bites and envenomation) common in the tropics.
    - The connections between wildlife, domestic animals, and infectious diseases (e.g. rabies); the emerging field of “One Health”.
2. **Tropical disease and human health**
    - Overview of tropical diseases and human health.
    - Epidemiology of human diseases in the tropics.
    - Overview of elimination and control strategies of tropical diseases.

- Introduction to Costa Rica's public health system.
- Health and medical practices across cultures in indigenous and rural communities.

3. Ecosystem health and human health

- Overview of ecosystem health and human health.
- Impacts of environmental change (e.g. climate change, habitat fragmentation, and biodiversity loss) on the emergence and transmission of infectious diseases.
- Climate change impacts on natural and human systems (e.g. temperature and water stress, consequences for ecosystem services and human disease).
- Environmental impacts of agricultural food production (e.g. water contamination) and consequences for nutrition and human health.
- Effects of changes in environmental health for indigenous populations.

Course Evaluation

Type of Evaluation	Grade (%)	Points
Participation	15	150
Midterm exam	20	200
Final exam	30	300
Journal Club	25	250
Written Assignment	10	100
Total	**100**	**1000**

Grading

Course grade (%)	Letter grade
97-100	A+
93-96.99	A
90-92.99	A-
87-89.99	B+
83-86.99	B
80-82.99	B-
77-79.99	C+
73-76.99	C

Course Requirements and Assignments

Participation (15%)

Students are expected to actively participate in all the scheduled activities for this semester abroad experience. This goes from doing things that every researcher does, like **helping to move boxes with research equipment during the different field trips**, but also showing active interest about the lectures by asking questions about the lectures, and being able to verbally express different insights from this study abroad experience during daily wrap up sessions or to answer questions about the main topics learned on any given day. The goal of this activity is to encourage students to reflect about all the different aspects of doing research abroad. The points for this kind of participation will be 50 (5 %).

During the semester, certain community-based activities will take place that will require an exceptional level of participation by students (e.g. activities related to the field trips to Panamá and the OTS stations). These remaining 100 points (10%) will be awarded to reflect the level of

active involvement that the student demonstrates during these special activities. If you are respectful and fully engaged, you will earn all of these points.

Exams (1 midterm and 1 final) (50%)

There will be two exams during the semester. Exams will cover material presented in class, in readings, and during laboratories, activities, and field trips. Exams questions may take a number of formats, including but not limited to: written multiple choice, matching, short answer, or essay prompts. Exams are intended to encourage you to review the information presented and demonstrate to the instructors your understanding of and ability to synthesize course material. In a sense you want a "fact check" of what you learned, so that you can accurately describe what you learned on this study abroad experience. We will make every effort to grade exams within a reasonable time frame. After grading, exams will be handed back to students for 24 hours during which time you may review your answers and request to meet with your instructor if you have specific questions about the grading of your exam. All appeals regarding grading decisions must be made within 24 hours of you getting your exam back.

Journal Club (25%)

All students will be involved with the journal club. In general, readings will be assigned for key topics on the evolution and eco-epidemiology of tropical diseases, but suggestions from students will be welcome in case they fill the goals of the class or are related to their individual projects. Articles will be sent at least three days in advance of the discussion session, and in case a student wants to discuss a special article for any of the topics, should send a copy of the PDF to the faculty five days before the discussion. The students in charge of leading each discussion will need to turn in a brief summary of the discussion, highlighting unexpected questions that arose from peers, or stating hypothesis for further studies. Each student will be expected to formulate questions about the articles discussed, raise and/or answer questions from their peers and/or faculty participating in the session. 10% of the grade will be based on the summary, and the remainder 15% on each student's active participation (asking/answering questions to their peers).

Written Assignment (10%)

Students will write a 1000 words essay on a topic related to "Tropical Diseases". Briefly, each student will need to summarize an article related to a tropical disease of interest. You will need to state the goals, methods, findings, and implications of the research presented in the paper, and then explain why the article is related to course. From the class lectures, you may get ideas about the type of articles and diseases you would like to write about. Articles must come from peer-reviewed scientific journals.

Late Submissions:
No late submissions will be accepted, and papers and other assignments are due by 6 pm on the scheduled days.

Introduction to Field Ethnobiology
(*Duke University* - BIO 282LA)

Class Meeting
A detailed calendar with topics, instructors, and meeting times is provided in the document "Day by Day Trop Di Spring 2017". However, scheduling is subject to change due to unforeseen circumstances typical of a field course (e.g. weather, last-minute cancellations, etc.). Meeting locations will be specified upon arrival at each biological station or field site.

OTS staff

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Statement of Accessibility

This class represents an environment that is open and welcoming to all students. If you believe you may need accommodations during this class that may not traditionally be available, please contact any of the instructors within the first week of the course to plan a way to meet these needs within the potential logistical restrictions posed by a field course. Please communicate with us openly and recognize that accommodations are collaborative efforts between students and faculty.

Course Description

Ethnobiology is the scientific study of dynamic relationships between people, biota, and environments, from the distant past to the immediate present. This course will focus on the relation between different human cultures and their environment. We will learn how to approach other cultures and conduct culturally sensitive research in different cultural settings. Ethnobiology will also delve into how cultural differences affect our environment and health, and how these connections should be taken into account when working outside our own cultures. The course will include visits to places such as Kekoldi Indigenous Reserve and the Boruca community, to increase students' knowledge about the country and the discipline of ethnobiology. The course will examine the use of resources in communities around each of the OTS biological stations we visit. We will review the ethical considerations that need to be taken into account when conducting research with specific human groups (children, adolescents, indigenous populations).

Specific Goals

- Experience, first hand, the multidisciplinary nature of the field of ethnobiology.
- Learn about biological resources such as plants and animals, different cultural beliefs, resource management strategies, and the narratives and visual representations around them.
- Gain insight into the links between tropical diseases and traditional medicine
- Cultivate a culturally-sensitive mind in interactions with local communities
- Understand the role and symbolism of plants, animals and the environment in community health, illness and nutrition.
- Develop a critical understanding of cultural and environmental complexity and the role of biocultural approaches and practices in local development.
- Address the issue of local livelihoods and practices, both rural and urban in the context of globalization.
- Increase awareness about the role of culture as a key element in global health (both human and environmental), and the current questions and challenges ethnobiologists are trying to address.

Course Evaluation

Type of Evaluation	Grade (%)	Points
Participation	15	150
Journal Club	10	100
Written assignment	10	150
Presentation assignment	15	100
Exams (1 Midterm and 1 Final)	50	500
Total	**100**	**1000**

Statement of Expectations for Student Conduct

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Grading

Course grade (%)	Letter grade
97-100	A+
93-96.99	A
90-92.99	A-
87-89.99	B+
83-86.99	B
80-82.99	B-
77-79.99	C+

73-76.99	C

Course Requirements and Assignments

Participation (15%)

Students are expected to actively participate in all the scheduled activities for this semester abroad experience. This goes from doing things that every researcher does, like **helping to move boxes with research equipment during the different field trips**, but also showing active interest about the lectures by asking questions after the lectures, and being able to verbally express different insights from this study abroad experience during daily wrap up sessions or to answer questions about the main topics learned on any given day. The goal of this activity is to encourage students to reflect about all the different aspects of doing research abroad. The points for this kind of participation will be 50 (5 %).

During the semester, certain community-based activities will take place that will require an exceptional level of participation by students (e.g. activities related to the field trips to Panamá and the OTS stations). These remaining 100 points (10%) will be awarded to reflect the level of active involvement that the student demonstrates during these special activities. If you are respectful and fully engaged, you will earn all of these points.

Journal Club (10%) (100 points):
All students will be involved with the journal club. With your assigned group, you will choose one current article in a recognized scientific journal on an important, interesting, or controversial theme regarding the ethical issues in the ethnobiological field. Discussions should last approximately 30 minutes. Articles will be sent at least three days in advance of the discussion session, and in case a student wants to discuss a special article for any of the topics, should send a copy of the PDF to the faculty five days before the discussion The goal of the journal club discussion is to critically yet constructively evaluate the article and place its content in the context of larger local, regional, or global issues. Students may also stimulate the class to discuss the study's methods and the writing style and format of the article they choose, but the majority of the discussion should center on the article's content. Each student will be expected to formulate questions about the articles discussed, raise and/or answer questions from their peers and/or faculty participating in the session.

Written assignment- The Traditional Medicinal Plant or Crop- (10%):

All over the world medicinal plants or local varieties of fruit, vegetables and grain are grown. Many crops are seemingly forgotten or are underutilized despite having outstanding nutritional or taste qualities. Some have good commercial potential and could be an excellent cash crop for a small-scale or family farmer, aimed at the local, regional or international market (FAO, 2015). After several of the field activities and lectures in this class, students will be required to deliver an individual written report on a previously assigned traditional medicinal plant or crop, all the guidelines and rubrics will be provided by the faculty in the course.

Presentation assignment - The Traditional Medicinal Plant or Crop- (15%)

Individually or in pairs, students will present different plants or crops that play an important role in cultures around the world, the same plants as in the written assignment.
Objectives of the presentation:

- Investigation of a given Traditional Plant, synthesis of literature and resources, critical thinking and analysis, oral and visual presentation and discussion.

- Learning about a variety of important but not well known traditionally used plants around the world.
- Reflecting on the importance of plants for some cultures/countries and especially for locals or small scale farmers.

All the guidelines and rubrics will be provided by the faculty.

Exams: (1 Midterm and 1 Final Exam) (50%):

There will be two exams during the semester. Exams will cover material presented in class, in readings, and during laboratories, activities, and field trips. Exam questions may take a number of formats, including but not limited to: written multiple choice, matching, short answer, or essay prompts. Exams are intended to encourage you to review the information presented and demonstrate to the instructors your understanding of and ability to synthesize course material. We will make every effort to grade exams within a reasonable time frame. After grading, exams will be handed back to students for 48 hours during which time you may review your answers and ask questions. All appeals regarding grading decisions must be made within this time frame and in writing to the instructor(s) administering the exam.

Late Submissions:
Late submissions are not accepted.

Field Research Methods in Tropical Diseases
(*Duke University* - BIO 281L)

Class Meeting
Lectures and activities for this course take place mainly in weeks 2-3, 5-6 and 8-14 at La Selva. A detailed calendar with topics, instructors, times, and assignment deadlines is provided in the document "Day by Day Trop Di Spring 2017". However, scheduling is subject to change due to unforeseen circumstances typical of a field course (e.g. weather, last-minute cancellations, etc.). Meeting locations and available work space(s) will be specified upon arrival at each biological station or field site.

OTS Staff and Invited Faculty

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Instructors' Expectations and Philosophy

We believe that education should engage, challenge, and encourage students to question and make meaning of "knowledge" within their own contexts. In doing so, we recognize that students have many experiences that shape their interests and desire to learn. Each student's lens is a unique and valuable addition to the learning community.

We ask that students take part in and ownership of their education as a co-educator, rather than being a "student" in the more traditional and passive sense. While we recognize that this shift

from receiver of knowledge to producer of knowledge can seem unfamiliar and uncomfortable at times, it is the hallmark of critical thinking and a thriving learning community.

It is our expectation that as co-educators and producers of knowledge students will:
- Participate actively and thoughtfully at all times, which includes being free from technological and other distractions during class time.
- Have the conviction to ask and respond to difficult questions, take what may seem to be unpopular positions, and admit when they do not know.
- Be open to constructive criticism from mentors as part of the scientific process. For example, scientific papers are never written one time, but always require multiple re-writings.
- Respect others and have the patience to listen. Allow themselves to be persuaded and be willing to change their mind.
- Think, write, and engage with their peers in a professional and scholarly manner. Foster a professional and collegial learning environment that is purposeful, open, just, disciplined, caring, and celebrative.
- Take responsibility for their own learning.

Statement of Accessibility

This class represents an environment that is open and welcoming to all students. If you believe you may need accommodations during this class that may not traditionally be available, please contact any of the instructors within the first week of the course to plan a way to meet these needs within the potential logistical restrictions posed by a field course. Please communicate with us openly and recognize that accommodations are collaborative efforts between students and faculty.

Course Description

The Field Research Methods in Tropical Diseases is a research and writing-intensive course designed to provide applied, action-oriented, experiential opportunities for undergraduate research. Through structured field and/or laboratory research experiences in Costa Rica, this course is designed for students to gain advanced, practical skills in relevant, community-based research exploring topics in health in the broadest sense (i.e. centering on human, animal, or ecosystem health). Each research project will include the application of theory and methods consistent with students' interests in tropical diseases, environmental change and ethnobiology. This course makes use of select lectures and workshops to introduce students to information and tools necessary to carry out successful scientific investigations (i.e. study and research instrument design, basic data analysis, and scientific writing). However, the majority of the course consists of hands-on work on research project design, data collection, analysis, and written and oral presentations of results. Students are expected to be proactive in developing a project in consultation with their mentor, take the lead in reviewing scientific papers to compare methods employed by different authors, and be open-minded to the fact that often there exists ambivalence in scientific methods. The scientific experience implies a "trial and error" approach, which is very different from a laboratory demonstration during class teachings.

Specific Goals

Upon successful completion of this course, students will demonstrate progress in the following:
1. Understand the labor intensive process of conducting good quality research and the measures that must be taken to ensure ethical conduct in research.
3. Engage in responsible investigation and good data collection practices such as repetitive data sampling reviewing and citing the relevant literature and keeping detailed field notes.

4. Critically and constructively evaluate the scientific literature for the development of a research study.
5. Make observations, ask sound research questions, generate hypotheses, and identify the most appropriate methods according to the specific research context to solve the chosen problem.
6. Design and conduct sound field and/or laboratory health research studies.
7. Learn to incorporate comments and suggestions from peer review and approach research criticism constructively..
8. Collect and manage data, perform basic data analysis, and appropriately interpret findings for discussion and recommendations.
9. Communicate scientific findings in written, visual and oral form, including reviewing, critiquing, and editing others' writing.
10. Adapt to the dynamics of conducting research in interdisciplinary teams and in a foreign context.
11. Develop an appreciation for scientific thinking, creativity, and problem-solving.

Course Evaluation

Type of Evaluation	**Grade (%)**	**Points**
Participation	5	50
Journal entries	15	150
Blog entries	10	100
FLP group report outline	10	100
FLP group oral presentation	10	100
FLP group report final	10	100
IRB for IP group protocol	5	50
IP independent research proposal	10	100
IP independent report final	15	150
IP group poster	10	100
Total	**100**	**1000**

Grading

Course grade (%)	**Letter grade**
97-100	A+
93-96.99	A
90-92.99	A-
87-89.99	B+
83-86.99	B
80-82.99	B-
77-79.99	C+
73-76.99	C

Course Requirements and Assignments

<u>Participation (5%)</u>

Students are expected to actively participate in all the scheduled activities for this semester abroad experience. This goes from doing things that every researcher does, like helping to move boxes with research equipment during the different field trips, but also showing active interest about the lectures by asking questions after the lectures, and being able to verbally express different insights from this study abroad experience during daily wrap up sessions or to answer questions about the main topics learned on any given day. The goal of this activity is to encourage students to reflect about all the different aspects of doing research abroad.

Journal entries (15%)

Great naturalists like Charles Darwin and Alexander Von Humboldt took notes about what they observed and experienced when in the field. Those notes were fundamental for their intellectual contributions to biology. After each field trip, students are expected to reflect on their experiences in the form of short (0.5 - 1 page), written journal entries. Each entry will contain the date and location of the field trip, a very brief summary of the activity, and a record of your thoughts, impressions, reactions, problems you identify, proposed solutions to said problems, or responses to or questions about the activities. Journal entries should be a personal account of your learning experience (rather than a "listing of events"). Similarly, you are expected to write your thoughts about any article from the journal club when you participate as a member of the audience, and a more comprehensive summary when you lead a discussion (see above the section on journal club). You may write your entries in any style you are comfortable with, as long as it is easily legible, clearly written and sensible, and you will not be graded on poor writing or grammar (as long as it is understandable). You will find that journal entries may serve as useful notes for debriefing discussions scheduled after field trips and for your blog entries (see Research Methods class).

Moreover, you will notice that this exercise is a habit that could help each of you on any kind of professional pathway you follow after college, as a useful exercise to think and reflect on what you see and experience. Basic journaling notebooks will be provided, which you will be required to take with you on field trips. Journals will be collected at random several times during the semester and will be evaluated for completeness (brief record of all field trips and journal clubs, clarity and thoughtfulness of entries).

Blog entries (10%)

A part of good scientific inquiry is learning to communicate your science and connecting to the broader public in a fun and non-traditional way. The goals of this feature of the semester are for you to become familiar with making observations and sharing them through writing. You will learn to develop a journalistic storytelling style of writing that is interesting and understandable to non-scientists, keeps their attention, and communicates your experiences in a professional manner. Blogging will allow you to gain experience with reflective journaling, which requires you to engage in continuous self-appraisal and self-critique. The blog provides a forum for you to document your experiences, examine how they are shaping your learning and research process, and publicize your experiences. **You must submit 4 blog entries throughout the semester** following activities, site visits, or discussions that inspire you. You may write about your experiences, what you learned, what you are taking home from a particular experience, what you liked or disliked and how you could improve an experience, activity, or your own actions if given another opportunity, and how your experience will impact your future life, your thoughts, or your career. Each blog entry is no more than one page long (approximately 500 words). The semester consists of four blocks; **you may only submit one blog entry per block**. After each block, the course instructors will select several entries and post them to the course website. Each student is guaranteed publication of at least one blog post per semester. Submission is 10pm on the due dates.

Blog entries must follow the exact instructions outlined below and must be submitted via e-mail to the following address: tropicaldiseases.ots@gmail.com

Instructions and formatting for blog posts:

1) Title: the first line of your blog must be a descriptive title
2) Location: The first sentence of your blog **MUST include the name of the station or the place** that you are going to talk about, for example: "OTS, La Selva Research Station …."
3) Choice of subjects: You are free to choose your blog topic as long as it is within the academic material and learning experiences (including field trips, student discussions, and other scheduled activities). You may **not** select topics associated with activities outside of the course (for example in your free time).
4) Format: Microsoft Word document; 1-page maximum; Times New Roman; 12 pt font; 1 inch margins; 1.5-line spacing; Left justified; ½ inch indent for first and all subsequent paragraphs
5) Save each blog text as a MS Word document as follows: "your name_Blog #" (e.g. Adriana-Baltodano_Blog 1). Please **do not** submit as .pdf files!
6) Photos: You must include **at least one but no more than two photos**. Ideally photos will be taken by you, but a peer's photos are fine too as long as appropriate credit is given. Photos downloaded from the internet are **not acceptable!** Each photo file size should be **less than 250kb**. Use some type of standard figure format: .jpg, .png, IMG_, DSCF etc. Please **do not** attach figures as .pdf files!
7) Save photos as "your name_Blog #_Pic #" (e.g. Adriana-Baltodano_Blog 1_Pic 1) and submit them as separate attachments in the same e-mail as your written entry. Please **do not** insert the figures into your text.
8) Photo captions: Figure captions are helpful for the reader, but not mandatory at this time. Include figure captions or legends in the same document at the end of your text and use the same format as for the remainder of the document (see above).
9) How to post: Attach your Word document and your picture(s) saved as instructed above to a single e-mail and submit to tropicaldiseases.ots@gmail.com by the deadline.
   The blog administrator(s) will review and publish your blogs.
10) Where to find it online: Blog: http://tropical-diseases-semester.blogspot.com/
    From the OTS webpage: http://education.tropicalstudies.org/en/education/undergraduate-opportunities/programs/tropical-diseases-environmental-change-and-human-health-semester-in-costa-rica.html

At the beginning of the semester, you will be asked to sign the following disclosure and release form regarding the course blog:

"The course staff -Jessica Arias, Mauricio Lascano, and Ina Vandebroek- will make every reasonable effort to monitor ethical conduct on the Tropical Diseases Spring 2017 weblog (aka 'blog') in order to maintain a positive learning community. Please support the same professional and positive approach. Integrity is the cornerstone of credibility.

Material posted will be honest and fair in gathering, reporting and interpreting information, never plagiarized, and where possible include links to internet sources. The content of weblog entries will not misrepresent, take images or statements out of context, or publish information known to be inaccurate or manipulated. If publishing questionable information, make it clear that its quality is in doubt. Cite copyrighted material in postings.

Ethical bloggers treat sources and subjects as human beings deserving of respect in order to minimize potential harm. Material posted should show compassion for those adversely affected by weblog content. In particular, use special sensitivity when dealing with children and inexperienced subjects. Material will be in good taste and inoffensive.

This weblog will be published directly onto the internet, a public domain. You are representing yourself, your family, your university and OTS. Be accountable for your statements, and admit mistakes and correct them promptly.

For our own security, please avoid specific comments about our locations and schedules that would be seen by outsiders. No trash-talk, inappropriate language, personal insults, profanity, spam, racist, sexist or discriminatory remarks or threatening comments will be tolerated. No participant may share their log-in information with people or entities outside of the Trop DI Spring 2017 class. No posting or comment may facilitate or promote illegal activity."

Faculty-Led Projects (FLPs) (30%)

As part of the course, you will engage in three faculty-led research projects (FLPs) throughout the semester. All students will participate in field and/or lab work and data collection associated with each of the three projects. However, one group of students will be assigned to each project and will be responsible for data compilation, analysis, interpretation, as well as written and oral presentation of the project and results.

FLP Report Outline (10%)

During the week of FLP data collection, students will be responsible for working as a group to outline their final, scientific manuscript-style FLP report. The final report will consist of the following elements: Title, Abstract (in English and Spanish), Introduction, Materials and Methods including Ethical Considerations, Results, Discussion, Acknowledgments, Literature Cited (APA format), Tables, Figures, Appendices (if any).

The day before data collection (day 0), students will review the literature associated with their assigned research project and will develop a bibliography consisting of at least six relevant scientific sources. In addition to the full citation (APA format), four sources must be briefly annotated (~25-50 words) and include a description of the main purpose of the article, a summary of its content, any special or unique findings of the study, and its relevance to your project. On this day each group will submit an outline of the FLP. On day 1 of data collection, your group will work an outline of the Introduction (including clearly stated hypothesis and study objectives) and Materials and Methods sections of your FLP report. On day 2, you will outline the Results section, including a list of relevant figures and/or tables that you plan to include in your report. On day 3 you continue working on your project and presentation. On day 4, you will submit the complete draft of your report including the Discussion. The complete FLP report outline is due at 6 pm. The FLP outline will be evaluated for content, quality, completeness and timely submission of each section and will be returned to you with edits and comments before the deadline for your FLP report.

FLP Presentation (10%)

As a group, you will present and discuss the findings of your faculty-led research project. Each person will participate actively and equally in the oral presentation of the project. Presentations are open to the public and should follow a professional meeting presentation format. Students will provide background and context for the research question(s), briefly explain the study design and methods, clearly present and interpret study results and discuss their meaning, and provide recommendations for future work. Each group will have 10 minutes to present with 5 minutes for Q&A.

A few guidelines for project presentations:

The goal of oral presentations is to give you practice in how researchers present their results at scientific meetings. Often, meetings last several days and can include several hundred talks. In any given session of a meeting, 10-15 minute talks are scheduled one after the other frequently starting at 8 am and running until 5 pm. Obviously, in a forum such as this, you need to plan a presentation that captures people's attention and conveys information to talk-weary brains. So you have to be clear, and concise, and enthusiastic.

- Each section (background, objectives, methods, results, discussion, conclusions, recommendation) should be well-organized, logical and with sufficient information. Yet, each section should include only relevant information and be concise.
- Make slide headings informative. Don't label slides as "Methods" or "Results" etc. It will be obvious to everyone that results are results. Instead, use questions or principal findings/messages as slide headings.
- Be able to field questions. This means considering ahead of time what sorts of questions might come up, what kinds of assumptions you are making, and be prepared to address those issues. Read up on your topic!
- Visual aids (graphs, tables, photos) should be just that, namely helpful! Make them clear, concise, and informative, and VISIBLE to your audience. Interact with your graphs and figures. Set up your axes on graphs, explain headers in tables, and lead the audience through diagrams or images. Cover what is in your graphs and figures. If you won't talk about it, leave it out.
- Present the data positively, regardless of whether your hypothesis was supported.
- Regardless of potential limitations (every study has them!), you have the data you collected and need to work with them. These are still results even if they do not show you what you expected or 'wanted'. Be proud of your data and interpret them honestly. In your discussion you can discuss potential improvements that could be made if you were to repeat the same study, but in your results present what you found this time.
- If you feel a method was imprecise, then consider whether it introduced a bias or noise into the data set. In other words, does the method drive a positive result, or does it obscure a pattern that really is there? Discuss such limitations at the end of your presentation and use them to fuel recommendations for future work.
- Present complete statistics, not just the p-value. Indicate which statistical tests were used, either on the slide, or orally. But, don't spend too much time on your data analysis (unless you are presenting a modeling or math study). Your analysis is a tool, not the main point of your study.
- Speak clearly, audibly, and face the audience. Don't mumble. Don't talk to the screen, the floor, or your fellow project presenters. Don't bounce around or fidget.
- Know who in your group is going to cover what section/slides, and plan what will be said.
- Practice!! Don't speak extemporaneously. But, don't overload your slides with text. Text on slides should be used to emphasize points, not to provide all the information that you want to convey. You can have discrete notes on what you want to say, but don't read off a written text, your tablet, computer, or class notebook, and don't read off a slide. This is a scientific presentation, not a class lecture.
- Don't interrupt each other while presenting, and don't jump in with additional information. This can wait until the Q&A at the end.
- Timing: 10 min presentation, 5 min for questions. Be concise, stay within the time limit. We will time you, just as in a scientific meeting. Practice, practice, and practice your talk!
- During the Q&A, repeat/rephrase each question before answering! This will help everyone in the audience understand what is being asked, but will also make sure you are understanding the question correctly.
- Important: Acknowledge the people and organizations who helped you with the project and/or funded the work.

<u>FLP Research Paper (20%)</u>

In order to demonstrate and develop your ability to work in a collaborative research environment, each student will contribute to one of the three FLP written reports (one paper per group project). In your group, you will write a professional journal manuscript-style report summarizing your project. The format adheres to the guidelines set forth in "How to write a paper for USAP OTS" (Appendix 1). The score awarded for this paper is divided between work on a first draft (10%) due March,5 2017 at 11:30 pm and a revised final version (10%), due April 1, 2017 before 6 pm.

Individual Projects (IPs).

During the second half of the course, you will develop and carry out a final individual research project using the skills you have acquired during the FLP. During block 3, from March 5 to March 10, the class will be presented with several potential study topics in tropical diseases and ethnobiology. As a class, you will then select 3-4 topics and divide into groups based on individual research interests thereby assigning yourself to a project. As a group, with the guidance from your instructors, you will develop your specific research questions for these final research projects in form of a formal research proposal. Due to logistical constraints, the research methods used (i.e. study design, data collection instrument, data analysis plan), completing the Duke University Institutional Review Board (IRB) application (March 8), as well as data collection and analysis, the final report (April 28) and the final poster presentation (April 26) are a group effort. However, writing of research proposals and final reports are individual tasks, although peer review and group discussion are encouraged.

IP Research Proposal (10%)

Prior to beginning your independent research project, each student will produce a written research proposal. The written proposal will serve as the basis for your final IP report (see details below). You will develop your methods and your data collection instrument(s) as a group (your IP group), but you will write your abstracts, introduction, expected results, implications, and final literature cited sections on your own. The required format and content is that of a formal research proposal and is outlined in the rubric below. The proposal should include a budget with a detailed supplies list and logistics plan for your work in the community and/or the field, and it should follow procedures for conducting research with human or animal subjects. All methods that include data that require local permits and prior approval by the Institutional Review Board (IRB) at Duke. All groups will complete a Duke IRB form (see assignment description below). The IP research proposal is due March, 10 2016 at 10 pm.

IRB protocol (5%)

Any research requires prior approval by the Institutional Review Board (IRB) at Duke University. Before developing your IP proposal, each student will complete online modules in ethics to attain necessary certification for work with human subjects. Each IP group will also complete an undergraduate IRB protocol that includes a project rationale, methodology, all survey tools and instructions for implementation, oral or written consent scripts, and any other necessary documents. One IRB protocol will be developed per IP group and will be submitted for approval by the Institutional Review Board at Duke University. The IRB protocol will be graded for completeness and timely submission and is due on March 8 at 10 pm.

IP Research Paper (15%)

After collecting data as an IP group, each student will be responsible for writing their own manuscript in journal format that presents the results of their IP project as per the “How to write a paper for USAP OTS” guidelines (Appendix 1). Each student will submit an individual paper. The abstract (English and Spanish), introduction, results, discussion, acknowledgments, and literature cited sections will be written by each student individually. The methods sections (including all data collection tools) will be the same within each group. Deadlines for the IP final report and final edits on this report are April 28 at 10 pm.

IP Research Poster Presentation (10%)

After completing your Individual Project you will design and create a poster and hold a symposium for the members of the biological station (including scientists, workers, and visitors). The poster should be delivered in a professional, interactive way, similar to a poster presentation at a scientific meeting, but considering carefully the target audience of your findings. Posters will be designed and constructed by students and presented in English. More information on the required format and the poster session will be provided closer to the date.

The Spring 2017 poster session will take place on April 26

Late Submissions:
Late submissions will not be accepted.

Culture and Language in Costa Rica: Intermediate and Advanced
(with additional introduction to technical and colloquial medical terms)
(*Duke University SP92A*)

This course is intended for students that already possess an intermediate background of the Spanish language. The chief goals of this course are to expand vocabulary and conversational skills with emphasis in technical and colloquial terms that will increase understanding of medical and biological information. The course, taught entirely in Spanish, introduces new vocabulary and emphasizes grammatical rules within the context of specific themes chosen to enhance students' familiarity with Central American customs and cultural institutions that shape daily life and affect human health. Emphasis will be given to classroom discussions supplemented by writing and reading exercises. Relevant works by Costa Rican and other Latin American writers will be introduced. Students will be tested early at the start of the program to be placed in Spanish classes at the appropriate level for them.

The course begins with a series of introductory lectures and exercises. After that, a two-week program, which includes a homestay with a Costa Rican family, will take place in San Jose, providing ample opportunity to improve Spanish skills and to gain insights into contemporary Costa Rica. During this period, classes meet daily for five hours per day (mornings). The afternoons are used for cultural activities such as cooking, music and dance, and occasional site visits, which are also an integral feature of the course. An introduction to medical, biological, and environmental terminology will provide the tools necessary to interview persons and patients, and explain or discuss health- and disease-related issues. In addition, students will engage in Spanish-language activities at the OTS field stations throughout the semester.

At the end of the semester, students are expected to have gained sufficient fluency to participate in Spanish components (lectures, readings, interviews, etc.) of other courses in the semester program. Students will have ample opportunities to use these skills throughout the semester.

Specific goals (Intermediate Spanish)
1. Learn to tell and write a story in the present and past tenses
2. Be able to express reactions to different situations
3. Be able to communicate using the indicative forms in the correct way
4. Learn medical technical vocabulary and colloquial medical terms
5. Learn basic biological and environmental terminology.
6. Conduct some interviews related to medical, biological, and environmental issues

Specific goals (Advanced Spanish)
1. Learn to express hypotheses in relation to past and present events
2. Learn to use the subjunctive present with precision

3. Handle complex grammatical structures
4. Learn medical technical vocabulary and colloquial medical terms
5. Learn basic biological and environmental terminology.
6. Conduct some interviews related to medical, biological, and environmental issues

Grading

Grades are based on homework, an oral presentation, participation and class work, and a final exam.

Type of Evaluation	**Grade (%)**
Homework (5% each one)	25
Research project (10% oral report, 10% written report)	20
Participation and class work	30
Final exam	25

Additional Policies & Procedures

The Organization for Tropical Studies and Duke University comply with and will comply with all applicable federal, state, and local laws, regulations and guidelines in addition to policies and procedures outlines in the Duke University Undergraduate Catalog.

American with Disabilities Act

"Duke University does not discriminate on the basis of an individual's disability and complies with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act in its admission, accessibility, treatment and employment of individuals in its programs and activities. The University provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law, who are otherwise qualified to meet the institutions academic and employment requirements. For more information, visit or call the Center for Students with DisABILITIES. For more information on University policies and services to students with disabilities, see the Undergraduate Catalog."

Additional Notes on Academic Dishonesty

Academic dishonesty (i.e. plagiarism, cheating) will not be tolerated. Any person suspected of academic dishonesty will be subject to the policies and procedures set forth by Duke University as outlined in the Undergraduate Catalog.

Statement on Plagiarism

Plagiarism is defined as taking the words or ideas of another person and using them without citation as though they were your own. As such, acts of plagiarism include using song lyrics, words from an interview, words or ideas from a conversation or in-class discussion, words from a lecture by a professor, jokes from a comedian, or lines from a movie or dramatic play, in addition to more traditional sources such as articles from peer-reviewed journals, news sources, books, or magazines, in a scholarly work of your own without crediting their place or person of origin. In this class, students will be expected to properly cite all sources from which words, information, and ideas in their papers come, including quotation marks for precise wording and in-text citations for all ideas, as well as a full bibliography at the end of the paper. As we will be using APA style, please consult the APA website, http://www.apastyle.org/, for specific instructions on proper citation.

According to the Duke University policy on plagiarism, students found to have plagiarized in classwork or written assignments will be given a grade of "F" for the paper on which they have been found to have plagiarized and may be subject to an official investigation of their academic honesty by the University. This investigation, even if the student is found to have been innocent, will be **permanently documented** on the student's academic transcript. If you are uncertain about the citation criteria for an idea in your paper, please see the instructor and ask before submitting. Your honesty is greatly appreciated, and will serve you in all of life! For more on University policies regarding plagiarism please see the handbook.

Class Attendance & Authorized/Religious Absences

Regular and punctual attendance is expected. Attendance begins on the first day of class. Attendance is taken every class period. Class attendance is essential for participation, performance, and intellectual progress. Attendance is generally an indication of how serious of a student one is, and will most likely account for the success, or lack of success, of a student. In this class, attendance is a symbol of participation, which represents part of your grade. Notes taken during class will enhance that physical presence by allowing you to capture essential information, meaning, and details of the course. University authorized absences and religious absences are provided in accordance with Duke University policy and state law.

Acting Responsibly

Any acts of misconduct as defined by the Student Code of Conduct, which is available from the Dean of Students Office, will be referred to the University and may be subject to the university Code of Conduct and Discipline.

Please remain respectful of others' and our (i.e. your instructors) time. Turn off cell phones, let others speak, and be on time to class, field trips, and activities. Tardiness is inconsiderate and unacceptable. Please let us know if you will not be able to make it to class. It is your responsibility to obtain notes from a classmate for any missed time.

Also, please mind your food and drinks; avoid creating disruptions related to eating/drinking during class or other activities, avoid spills, crumbs, etc. and clean up after yourself immediately. Remove any trash you or others create.

Finally, an essential element to successful class meetings is your preparation. Please read and complete assignments on time, and be prepared for class participation and discussion. We will do everything in our power to provide you with a positive and inclusive learning environment and will guide and assist you in your learning experience. But, ultimately, your education is your responsibility. Please take this responsibility seriously.