



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 Trop Di Fall 2016”. 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:

PhD. Mauricio Lascano
E-mail: mlascanoh@gmail.com

Msc. Jéssica Arias Ramírez
E-mail: jessica.arias@tropicalstudies.org

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

This course emphasizes both the biological nature of tropical diseases and the ecological and human health outcomes resulting from changes to ecosystem structure and function. 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 disease, disease and health, ecosystem 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 about the ecological and human context in which they thrive. Through field visits and faculty-led research projects, the students will then explore 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.

The program faculty will invite an array of scientists, professionals, and other experts 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 facing Costa Rica and the tropics today.

Specific Goals

1. Examine the biology, ecology, and evolution of tropical diseases and how and why emerging tropical diseases are expanding their range.
2. Analyze how environmental factors, such as climate and land use change, are impacting ecosystem and human health in the tropics including: diseases 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, including assessing insect disease vectors and conditions for water-borne disease transmission
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. Learn about mandatory procedures to perform ethical sound research involving living subjects, specially the adherence to guidelines and permits by Institutional Review Boards (IRB)

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

1. Biology of tropical diseases

- Fundamentals of disease ecology: anthroponoses, zoonoses, direct and vector mediated transmission
- Overview of tropical diseases in Costa Rica
- The eco-epidemiology of bacterial (e.g. Brucellosis), viral (e.g. Zika, chikungunya and dengue), protozoal (e.g. malaria, Chagas disease and leishmaniasis) and parasitic worm diseases (e.g. taeniasis) and the ecology of their hosts and/or vectors
- The biology and epidemiology of non-infectious diseases (e.g. snakebite envenomations) common in the tropics
- The connections between wildlife, domestic animals, and infectious diseases (e.g. Leptospirosis); the emerging field of “One Health”

2. Tropical disease and human health

- Overview of Costa Rica's public health system
- Overview of elimination and control of tropical diseases in Costa Rica

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 of humans and wildlife
- Climate change impacts on natural and human systems (e.g. temperature and water stress, consequences for human disease)
- Environmental impacts of agricultural food production (e.g. water contamination) and consequences for nutrition and human health

Course Evaluation

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

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>

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.

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 ask questions. All appeals regarding grading decisions must be made within this time frame and in writing to the instructor(s) administering the exams.

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 send 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. Each student will be expected to formulate questions about the articles discussed, raise and answer questions from their peers and/or faculty involved in the class. The students in charge of each discussion will need to turn in a brief summary of the discussion, highlighting unexpected questions that arose from peers reading the questions or stating hypothesis for further studies. 15% of the grade will be based on the summary, and the remainder 10% on each student active participation in the other sections (asking/answering questions by their peers).

Written Assignment (10%)

Students will write a 1000 words essay on a topic related to the “Tropical Disease” invited lectures. Briefly, each student will need to summarize the talk and summarize an article related to the topic of the assigned talk. Regarding the article, you will need to state the goals, methods, findings and implications of the research, and then explain why the article was related to the talk. TIP: If you carefully follow the invited lectures you might get ideas about the articles that might be useful for the topic. Otherwise, you can check the Pubmed and/or the web of science to get an article.

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

Additional Policies & Procedures

The Organization for Tropical Studies and Duke University complies 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.



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 Fall 2016”. 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:

PhD Zsanett Hajdu

E-mail zsanett.hajdu@tropicalstudies.org

PhD Ina Vandebroek

E-mail ivandebroek@nybg.org

PhD Mauricio Lascano

E-mail: mlascanoh@gmail.com

Msc. Jéssica Arias Ramírez

E-mail: jessica.arias@tropicalstudies.org

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 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

1. Experience, first hand, the **multidisciplinary nature** of the field of ethnobiology.
2. Learn about useful plants, fungi, animals and microbes, **different cultural practices, resource management strategies**, and the narratives and visual representations around them.
3. Learn about ethnomedicine and biomedicine and the role and symbolism of plants, animals, microbes and fungi in health, illness, nutrition, politics and history.
4. Develop a critical understanding of cultural and environmental complexity and the role of biocultural approaches and practices in local development.
5. Address **the issue of local livelihoods and practices, both rural and urban in the context of globalization**.
6. Create awareness about the role of culture as a key element in environmental and human health, and the current questions and challenges ethnobiologists are trying to address.

Course evaluation

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

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>

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.

Article presentation (10%)

One article about ethnobiology will be assigned to every student. Then, each student will prepare a 10 minutes long power point presentation about the article which will be followed by a 5 minutes long Q&A. The presentation will be expected to include background information and the goals of the research (i.e., the introduction), methods, results, discussion and conclusions of the research. In the 5 minutes long Q&A section your professors and your peer students will make questions about the topic.

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

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- (10%)

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.

Additional Policies & Procedures

The Organization for Tropical Studies and Duke University complies 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.

**Tropical Diseases, Environmental Change and Human Health:
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 Fall 2016". 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.

Instructors

OTS Staff:

MSc. Jéssica Arias Ramírez

Phone (cell): (506) 8985 6011

E-mail: jessica.arias@tropicalstudies.org

Office Hours: By appointment

PhD Zsanett Hajdu

E-mail: hajdu.zsanett@gmail.com

Office Hours: By appointment

PhD. Mauricio Lascano

E-mail: mlascanoh@gmail.com

Office Hours: By appointment

Invited faculty:

PhD Ina Vandebroek

E-mail: ivandebroek@nybg.org

Office Hours: By appointment

Mario Romero DVM

E-mail: luisma903@gmail.com

Office Hours: By appointment

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.
- 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.

For additional information regarding the Americans with Disabilities Act see also **Additional Policies & Procedures** at the end of this document.

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>.

For additional information regarding academic dishonesty, plagiarism, attendance, and responsible conduct see also **Additional Policies & Procedures** at the end of this document.

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.

Specific Goals

Upon successful completion of this course, students will demonstrate progress in the following:

1. Understanding the importance of conducting ethical research and the measures that must be taken to ensure ethical conduct in research.
2. Practicing ethical approaches to research and adherence to Institutional Review Board (IRB) processes
3. Engaging in standard and responsible investigation and data collection practices such as reviewing and citing the relevant literature and keeping field notes.
4. Critically and constructively evaluating the scientific literature for the development of a research study.
5. Making observations, asking sound research questions, generating hypotheses, and identifying the appropriate methods to solve the chosen problem.
6. Designing and conducting sound field and/or laboratory health research studies. Learning to incorporate comments and suggestions from peer review.
7. Collecting and managing data, performing basic data analysis, and appropriately interpreting findings for discussion and recommendations.
8. Communicating scientific findings in written, visual and oral form, including reviewing, critiquing, and editing others' writing.
9. Adapting to the dynamics of conducting research in interdisciplinary teams and in a foreign context.
10. Developing an appreciation for scientific thinking, creativity, and problem-solving.

Course Evaluation

Type of Evaluation	Grade (%)	Points
Participation	5	50
Journal entries	25	250
FLP group report outline	10	100
FLP group oral presentation	10	100
FLP group report final	10	100
IRB for IP protocol	5	50
IP individual research proposal	10	100
IP individual 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

Participation (5%)

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 (25%)

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 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 general member, and a more comprehensive summary when you lead a discussion (see below 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 need to think this type of exercise is a discipline 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 you 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; 10%), clarity (5%) and thoughtfulness of entries (10%). The two students with the best journal entries (before and after the midterm break) will be invited to write a blog entry and participate for a communications award. The winners will have their blog posted in the OTS website and will receive a certificate.

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 (Sept 22)**, 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 FLP. On **day 1 (Sept 23)** 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 (Sept 24)**, 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 (Sept 25)** you continue working on your project and presentation. On **day 4 (Sept 26)**, you will submit the complete **draft** of your report including the Discussion. **The complete FLP report outline is due at 6 pm on Friday, October 2.** 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%)

In your 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. **The date for the Fall 2016 FLP presentations is: Monday September 26, 8 am.**

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 minutes 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 us 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 don't 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 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.

FLP Research Paper (20%)

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 September 26, 2016 at 5pm and a revised final version (10%), due October 2, 2016 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 **October 9 to October 14**, 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 (**October 14**), as

well as data collection and analysis, the final report (**November 28**) and the final poster presentation (**November 30**) 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 October 14, 2016 at 6 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 October 14 at 6pm.**

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 November 28 at 6pm.**

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 Fall 2016 poster session will take place on November 30 at 9am.**

Late Submissions:

Late submissions will not be accepted.

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 outlined in the Duke University Undergraduate Catalog.

Americans 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 using quotation marks for precise wording and in-text citations for all ideas, as well as a full bibliography at the end of each paper. As we will be using APA style, please consult the APA website, <http://www.apastyle.org/>, for specific instructions on proper citation format.

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!

Appendices

Appendix 1: How to write a paper for USAP OTS TROP DI – Fall 2016

Important general formatting information:

Your papers (FLP report, IP proposal, IP report) should be arranged in the following manner and all sections should be continuous, i.e. no separate title page (see figure below):

Title is centered, not bolded, with only proper nouns capitalized

Category: Faculty-Led Research Project, or Capstone Research Project

Participants: your name first, then other group members' names in alphabetical order by last name

Site: e.g. Coto Brus, Puntarenas, Costa Rica

Keywords: in alphabetical order (try to avoid duplicating words that appear in your title)

Abstract (Spanish version):

Abstract (English version):

Introduction:

Methods:

Subheadings

Ethics statement

Results: (Anticipated Results and Implications for your IP proposal)

Subheadings

Discussion:

Acknowledgements:

Literature cited:

Tables:

Figures:

Appendices: (if applicable)

Please adhere to the following specific formatting instructions for all written assignments unless otherwise specified:

- Use **12-point Calibri body font, 1.0 line spacing (no additional space between paragraphs, etc.)**
- **Margin** settings should be **1.0" on the top and bottom, and 1.25" on both sides.**
- **All text should be left aligned.**
- Paragraphs should be **indented ½ inch** on the first line; no line spaces are included between paragraphs.
- ALWAYS italicize scientific names. (e.g. *Peromyscus maniculatus*; for any additional mention of the species, the genus name can be abbreviated *P. maniculatus*)
- In the text, spell out numbers from 1-9. For numbers ≥ 10 use numerals. Use a zero (0) before the decimal point for number between -1 and +1.
- Do not begin sentences with numerals or abbreviations, rearrange your sentence or write out abbreviations or numbers. (e.g. "Ten percent of our study sample agreed...")
- For abbreviations used more than once, spell out the word or name and place the abbreviation in parentheses at the end of the word the first time you use it in your main text. Do not use abbreviations for names only used once. (e.g. "We collaborated with persons employed by the Caja Costarricense de Seguro Social (CCSS).")
- Italicize P for P-values and the symbols for statistical tests (e.g., *t*, *F*, X^2) or other symbols.
- Use a space before and after equal signs (e.g. $P = 0.001$).

- A brief summary of your **interpretations** and **conclusions** (including relevance and your “challenge” to readers, i.e. the “next step” / your recommendations)

No more than **250 words!!!**

Two options for writing the Abstract:

- Write abstract **last**, after you have written the whole paper/proposal.
- Write abstract **first** (once you have your results) and use it to guide the writing of your paper, modifying it as needed. This provides an outline for the story you are hoping to tell with your paper.

Do not cut and paste text from the document.

Do not include any references or statistics.

Keywords: Include main topics of your paper that might increase people finding your paper when searching for similar or related literature. Try not to duplicate words you used in your title, but rather add different information. (e.g. If your title is “Intensive forest management affects immunocompetence of wild deer mice (*Peromyscus maniculatus*).” Your keywords might include: anthropogenic environmental disturbance, forestry, immunology, rodents, silviculture, wildlife, wildlife health, etc.)

Introduction:

Review literature – BRIEFLY! The introduction starts with some background information about the study. In addition to the background information, the introduction should state the question(s) and/or hypotheses and predictions clearly.

- How does your study fit into what has been done?
- Explain evidence using limited, but appropriate number of references
- Provide context and “build a case” for your research

Discuss the problem/question

- Why is your question important? / Where is the knowledge gap?
- How does your study relate to previous research? / What does it contribute?

State hypothesis and specific study objectives at the end.

Remember:

- Use present tense, be succinct, clearly state objectives, explain important work done. Don't veer off course – stick to your topic

An outline example for the introduction might include the following information:

- What is known about the topic?
- What is missing / what remains unknown?
- Why is your research important / how does it add to what is already known?
- What is / are your research hypotheses?
- What are your specific study objectives?

Research hypothesis example:

- Identify / develop the research problem = very general
Observation: “Students are not always equally focused.”
- Narrow it to include some directionality = more specific, describes type of relationship
“Students’ focus changes over the course of the day.”
- Think about how you can design your study / experiment to test your question = most specific and testable: “We hypothesize that students’ focus is worse in the afternoon than in the morning.”

Study objectives / research aims example:

“To examine the effect of time of day on student focus, we will measure student recall and understanding of material by administering quizzes at the end of all lectures and comparing quiz scores between morning and afternoon classes.”

Methods:

Detailed description of your experiment / study:

- In a proposal: What will you do?
- In a final report / paper: What did you do?

Design:

- Cohort, case-control, cross-sectional, randomized controlled trial, clinical / field trials
- Common garden/transplant experiment
- Randomized complete block design and some others

Describe materials, methods, subjects, areas:

- Include characteristics of your population of interest
- Describe selection / sampling methods, recruitment, participation, withdrawal, etc.

Describe statistical analysis

- Usually the final paragraph (How will you / did you analyze your data?)
- Important to think about when designing the study since will affect data collection.
- Include software used, specific tests, your confidence level, treatment of outliers, data transformations, etc.

Ethical considerations

- Identify any ethical concerns associated with your study.
- Explain how you will / did address each one.
- Mention the official steps you will / did take (CCSS approval, informed consent forms, etc.)
- Include approval numbers if you have them (e.g. IRB, Collection permits, etc.)
Some examples to have an idea:

“Sampling was carried out with permission from property owners (La Selva or Las Cruces Biological Station that belong to the Organization for Tropical Studies), and did not involve endangered or protected species. The OTS Tropical Diseases, Environmental Change, and Human Health 2016 program holds a collecting permit from the Costa Rican Government’s National System of Conservation Areas (SINAC) for sampling insects, plants, fungi, and bacteria (SINAC-SE-GCUS-PI-R-107-2015) valid until July 7th, 2016.”

“Surveys were carried out with permission from property owners. The survey ensured voluntary participation and anonymity.”

“We designed surveys with care and sensitivity to reduce the negative impacts of questions on the participants who may come from a vulnerable population. We formulated questions to affect as little as possible the view of mothers on their ability, or inability, to properly care for their children. Dr. Pablo Ortiz, the Director of the Department of Health in Coto Brus, approved this research in Coto Brus under academic council of the Institutional Review Board (IRB) – Caja Costarricense de Seguro Social (CCSS). The information is covered under the Duke IRB teaching exemption. We omitted all subject names, avoided sensitive topics, took extra care with our study sample, received informed consent from each subject, and do not intend to publish these results.”

Remember:

- Include enough details so others can duplicate the study
- Use past tense for report (future tense for proposal)
- Be clear, direct and precise – omit unnecessary, but include necessary information
- When in doubt, ask for help from a statistician to design your analysis and write up the statistical analysis
- Be systematic, follow a logical order.
- Raw data, results, and their interpretation do not belong in the methods section.
- Do not present any methods for which you will not present results, and vice versa.

An outline example for the methods could be:

- What was the design of your research?
- Who were the subjects of your study?
- What procedure(s) did you follow?
- What materials did you use?
- What variables (exposures / outcomes) did you measure

Results:

Follow your Methods section!

Often, the results mirror your methods exactly. However, you may rearrange your results to present your most most interesting findings up front so that the reader is not required to weed through a bunch of non-significant or uninteresting findings before finally reaching your big discovery and the basis for your discussion (i.e. the ‘meat’ of your story.)

Describe study sample (numbers sampled, demographics of subjects, species, etc.). This is a good place for descriptive statistics! Here, you present data and results of your analyses (but you do not interpret their meaning in the context of your study!).

- Include statistical tests used and statistical significance found (these are your p-values!)
- Use tables and figures when appropriate to support / illustrate your MOST IMPORTANT findings. Do not replicate information presented in the text in figures and tables and vice versa. They should help the reader understand not be repetitive.
- With lots of statistical analyses tables +/- figures might be included in appendices
- Use past tense
- Present in a logical sequence
- Again, follow your Methods as much as possible
- Facts only – no citations or interpretations
- Be conscious of your wording / writing style, i.e. still write readably as opposed to using “significant” in every sentence.
- Describe the directionality and the meaning of your findings. For instance, do not say “A and B are significantly different” but “Community A presents significantly more cases of malaria than community B.” Do not use the word “insignificant.”
- “Data” is the plural of “datum”. So, “our data are interesting” is correct. (But, see comments about the current use of “data” in both the statistics and writing workshop lecture slides and below. Currently, the English language has evolved to accept “data” as a singular form when it refers to information. We leave the choice of whether to use “data” as a plural or singular term up to you, but ask that you be consistent throughout your paper!

From the *American Heritage Dictionary of the English Language (Third Edition)*:

data (used with a sing. or pl. verb)

"Data originated as the plural of Latin *datum*, "something given," and many maintain that it must still be treated as a plural form...But while *data* comes from a Latin plural form,

the practice of treating *data* as a plural in English often does not correspond to its meaning, given an understanding of what counts as data in modern research. We know, for example, what "data on the homeless" would consist of -- surveys, case histories, statistical analyses, and so forth -- but it would be a vain exercise to try to sort all of these out into sets of individual facts, each of them a "datum" on the homeless. Since scientists and researchers think of data as a singular mass entity like information, it is entirely natural that they should have come to talk about it as such and that others should defer to their practice. Sixty percent of the Usage Panel accepts the use of *data* with a singular verb and pronoun in the sentence *Once the data is in, we can begin to analyze it*. A still larger number, 77 percent, accepts the sentence *We have very little data on the efficacy of such programs*, where the singularity of *data* is implicit in the use of the quantifier *very little*."

Discussion:

- Relate major findings to your hypothesis
 - Don't simply restate your results, but state the **meaning / importance** of your results in relation to your hypothesis and specific study objectives. Avoid saying "my hypothesis was supported/rejected" and instead talk about the importance of your results
- Interpret
 - Explain meaning of results and statistical findings
 - Explain importance/relevance
 - Discuss all / several possible explanations for your findings
 - This may include:
 - Why you did / did not find significance
 - Study limitations (e.g. small sample size, dry climate leads to few mosquitos, etc.)
- Include a focused review of literature in relation to results
 - What have other authors found?
 - Do your results support / contradict previous findings?
 - How does your data add? Restate why / how it is novel.
- Discuss possible limitations of study
- Suggest future work that could be done

Remember:

- Use past tense to describe your study and present tense to describe established knowledge for literature.
- Don't criticize other studies. Instead, compare / contrast them with your work.
- Don't draw conclusions not supported by your results (i.e. don't "overstate your inference").
- Stay focused and concise.
- Include key, relevant references.
- Keep in mind that your study didn't "fail" if you find that you reject your hypothesis. "Negative results" are also informative.

The outline of your discussion will depend heavily on your findings, but might look something like this:

- Restate the objective(s) and hypothesis of your study.
- Did you / did you not find support for your hypothesis?
- Why / why not? Provide potential explanations based on the literature both in support of and against your hypothesis.
- Discuss this contrasting literature to flesh out your explanations and back up or contrast your findings with what has already been done.

- Are there any reasons associated with your methods / data collection that might be influencing your results? If so, discuss these limitations BRIEFLY! (Do not spend a page on limitations!!! You used the methods that you did and are presenting your results because you think they're worthwhile. All studies have limitations! But, if you think your methods are not sound, then you would not be writing up this report.)
- Conclude by bringing your discussion back to your objective(s) and stating the relevance, importance, or novelty of your findings and their implications.

Acknowledgments:

In this section you should give credit to people who have helped you with the research or with writing the paper. This includes human study subjects! Authors *always* acknowledge **outside reviewers** of their drafts and any **sources of funding** that supported the research. Although usual style requirements (e.g., 1st person, objectivity) are relaxed somewhat, in a scientific paper, acknowledgments are always brief and never flowery.

Literature cited:

Begin this section on a separate page. This section gives a list of the references that you actually cited in the body of your paper. There are several different citations styles. For our purposes, we will use the American Psychological Association (APA) format for all citations in all written assignment for this course. (See document "APA guidelines" for specific details.)

- **NOTE: Do not** label this section "Bibliography"
- We are using **the APA format (6th edition)** for this section.
- Document in Dropbox called "APA guidelines" for details. A standard journal article takes the following format:
 Last, F. M., & Last, F. M. (Year Published). Article title. *Journal Name*, Volume(Issue), pp. Page numbers.
- BUT, the exact format depends on if the source is a journal article, a book chapter, with/without editors, if the source is online or in print, a government or NGO report, etc. etc.
- So, CONSULT the guidelines carefully!
- Do not insert empty lines between citations.

Tables and figures:

Tables and figures referred to in your text follow the Literature cited section **on separate pages** labeled "Tables" and "Figures" in this order.

- Always refer to your tables and figures in the text.
- Number all tables sequentially as you refer to them in the text (Table 1, Table 2, etc.), likewise for figures (Figure 1, Figure 2, etc.).
- Like the title of the paper itself, each table and figure must have a clear and concise title and explanatory caption that can stand-alone and is understandable without having to refer to the rest of the paper. In each table and figure caption, include sampling location and dates, as well as the information summarized in the table or the main message of the figure or graph.
- Tables:
 - After your Literature Cited section, list all tables on a separate page under the header Tables.
 - Table titles and captions are placed above each table.
- Figures:
 - After your tables, on a separate page, list all figures on a separate page under the header Figures.
 - Figure titles and captions are placed below each figure.
 - For graphs, make sure to include clear axis labels with units where applicable and a legend when needed.

- Do not use figures created in JMP (statistical program) unless absolutely necessary and clearly understandable. Graphs made in Excel should be free of horizontal lines and shading and should be in black and white (no colors please). The font and font size used for the axes, axis labels, and legends (if included) should be identical to the font used in the body of the text. Be consistent with the formatting of your figures.
- *Again, in your FINAL DRAFT ONLY, please* paste figures as 'pictures' using the 'paste special' command option in the Edit menu of Word.
- Again, place tables at the end of the paper, after Literature Cited. All tables should come before all figures, regardless of the order in which you refer to them in the text.

Appendices

Appendices include supplemental information that will help the reader understand the details of your study, but is not necessary to include in your text (e.g. participant contact scripts, questionnaires, statistical model output, etc.).

- Label this section Appendices (or Appendix if only one).
- Begin this section and each new appendix on a separate page.
- List as Appendix 1, Appendix 2, etc.
- If one appendix includes multiple parts, label as Appendix 1A, Appendix 1B, etc. and do not include separate page between each.
- Label tables and figures in appendices the same way you would in your Table and Figures sections above (i.e. table legends above, figure legends below, descriptive, standalone, etc.).
- **Just like with your tables and figures, ALWAYS refer to any appendices in the body of your paper (i.e. in the text)!**

Appendix 2

Course related information use consent form.

“Release to allow for the use of photographs, recordings, written assignments, and project reports for the OTS program.

1. Use of photographs and recordings: During the course of the OTS program, pictures, video and audio may be taken by OTS staff or others. I agree to allow for the reasonable use of any photos, videos or other recordings of myself by OTS for the marketing of the programs and/or as part of the record keeping process for OTS.

2. Written reports: I agree to allow OTS to include my written assignments and individual or group project reports in the program book published on paper, the worldwide web or any other media; written products include, but are not limited to, the course Blog entries and excerpts from journal entries. I understand that these written reports are part of my course work and I agree to allow them to be used by OTS for the purpose of compiling and distributing the program report.

Participant Signature: _____ Date: _____

Photographs: (Mark one): I accept _____ I do not accept _____

Written reports: (Mark one): I accept _____ I do not accept _____”

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.