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Environmental Research Methods and Ethics

ENVI-3500 (3 credits)

Tanzania: Climate Change and Sustainability from Mount Kilimanjaro to Zanzibar (Summer)

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

Course Description

The Environmental Research Methods and Ethics course prepare students to study and practice effectively in a new setting nontraditional and cross-cultural environment. It introduces field study techniques, both ecological and anthropological. Course content emphasizes understanding the human-environment context as fundamental to knowing ecosystems, climate change, and people through fieldwork. The course teaches skills and integrates field observation, activities, and interviews, presentation, and written assignment. Students gain familiarity with record-keeping, scientific analysis, interpretation, and presentation based on primary sources. Through excursions and field assignments, the course introduces and critically employs scientific and social scientific methods appropriate to the program theme and for feasible and ethical research.

Learning Outcomes

Upon completion of the course, students will be able to:

- Demonstrate self-confidence and familiarity with key conceptual tools and skills for field study in ecology, society, and sustainability management;
- Master basic natural science and social science methods to study climate change and human impacts and adaptations;
- Show awareness of society and the practicalities of field research in Tanzania; and
- Show familiarity with appropriate, feasible, and ethically-sound field research.

Language of Instruction

This course is taught in English, but students will be exposed to vocabulary related to course content as well as the nuances of economic change and development through in-country expert lectures and field visits in a wide range of venues and regional locales.

Instructional Methods

Students participate in activities and reflexive discussions to learn the methods and ethics appropriate to the theme of climate change and sustainability in Tanzania. Students apply both natural and social science concepts, skills, and methods learned in the course. The academic director evaluates student participation and assignments based on timeliness, completeness, depth of thought, clarity of organization, application of skills and methods, quality of primary data, depth of analysis, coherence of argument, and ethical practice.

Assignments and Evaluation

Assignment Descriptions and Grading Criteria

1) Marine ecosystem field activity (15%)
This assignment involves working in a Field Study Team (FST). Depending on the nature of the site or coastal community visited you will collect data to capture the element of climate change on marine ecosystems and then present your findings to the broader group. Each FST analyzes its own collected data or the collected data from all FST are pooled together and each FST use same data but apply different analysis methods and formulas. The FST will analyze and orally present their findings just before you leave for Tanga.

2) Human communities and climate change (Hadzabe and Maasai) field activity (15%)
Students in their FST will collect data relating to climate change through participating in social activities performed by Hadzabe and Maasai communities. Data will be collected in your FST while visiting and interacting in different planned activities with both the Hadzabe (hunter gather) and the Maasai community. In this case the collected data will either be consolidated into a single set of data or as separate FST group data analyzed depending on the situation on the ground. The FST will present their findings just in Arusha.

Please note: Your Field Study Team presentations need to be in PowerPoint and done professionally. There are often formatting problems converting from a Mac, or problems trying to access presentations that have been stored in Google docs or similar. Please make sure that, by the time you need to present, you have your presentation in the correct format stored on a flash drive.

3) Systematic detailed Journal Entries (20%)
The Systematic Journal Entries is a comprehensive document detailing the data collection methods (marine and terrestrial environments) you have learned either during class sessions or during your field excursions. The journal should be written in three main sections.

- Preliminary pages
    - Cover page
        - Title of document
        - name of AD
        - name of the student
        - sending school

        - major
        - declaration statement
    - Table of contents
- Main body
    - detailing a brief description of each method (categorized as either a social science or natural science method)
    - when is it appropriate to use the method
    - the merits and demerits of each method
- Conclusion
    - evaluate what points to consider when selecting an appropriate data collection method for research project

4) Mini Scientific Report on Climate Methods and Skills (30%)
This assignment requires a student to write a scientific report of minimum 1000 words focusing on two (one social and one natural science) or multiple data collection method(s) from the pool of the taught methods during the program. However, the selected method(s) should stem from pre-simulated climate change related study questions a student wants to explore during this program. The report should therefore include the following components.

Research questions: simply a climate related question you wish to answer, it could come from the class session we have had or from site visited or excursions. For example, what are determinants of Climate Change adaptation strategies among smallholder farmers in Tanzania?

Study area description
Before explaining the method(s), based on the formulated study question the student should suggest and describe a study area where the study can be conducted, detailing geographical location (geographical coordinates and location, the study area size if available, location of the area), the area's climatic condition, the area's demographical characteristics (economic activity and populations status), where applicable state study site description and selection criteria describing the unique characteristics of the study site and the reasons for the site(s) selection as a subsection of the study area description, visual map of the study area and or site. Make sure this part is well intext cited.

Methods: Here the student should describe the method (s) you think could be used to obtain the required data to respond to the developed study question, why the method (s) are appropriate to collect the intended information, what kind of data do you expect to collect how or from which group you intend to get your response from. Make sure this part is well intext cited.

Data collection instruments: This section describes the instrumentation to be used in collecting data e.g., interview guides, questionnaire, key informant guides, group discussion topics or questions, observation checklists, quadrats, traps, GPS, mis nets, etc.

Example 1

The following instruments were used to assist with data collection: a notebook, pen, audio recorder on a phone, and camera on a phone. During both semi-structured interviews and focus group discussions, the notebook and pen were used to record participants' responses to questions. The audio recorder recorded all of the interviews and the focus group discussion as a way to have the participants' complete responses recorded. This way, it could supplement any information missed or not fully captured in the handwritten notes. The same was done during key informant interviews and non-participant observation. During non-participant observation on the farms, the notebook and pen were used to record what was seen and also any information the farmers shared. The camera visually documented practices used on the farm

Example 2
The following instruments and materials will be used for collecting data: notebook, pencil, binoculars, rangefinder, vehicles, and their odometers. Data will be collected by making a count of the number of elephants seen in each block and using a rangefinder, to measure the elephant's distance from the road. Additionally, the length of the road travelled will be collected by the vehicle's odometer. The notebook will be used to record the observed populations in the park, and the pencil used to write these counts. The binoculars will be used to assist in observationally counting the elephants in each area, to ensure that the count is as accurate as possible. The rangefinder will be used to find the perpendicular distance of an elephant from the vehicle or road at a 90° angle. Lastly, the odometer will be used to measure the total area covered during the entirety of the study, and the vehicle, as a mode of transportation throughout the park.

Ethical considerations: This part should detail what things will be considered to ensure that the data collection process that uses the selected method(s) does not in any way jeopardize the study's participants. Examples of such measures in social science studies are informed consent, protection of participants, opportunity for withdrawal, storage of data should be well explained under this section. A well-constructed with a good logical follow is enough for this part.

References: All works cited in the main text should appear here under the reference list and they should be properly written in APA format.

5) Participation (20%)
For participation, an "A" grade refers to full attendance, punctuality, attentive listening and active engagement in all discussions, field activity, individual assignment, presentation, discussion, and other activities. It also means polite and respectful behavior as it pertains to both the host culture and the group. This means not talking to each other during a presentation, not looking at your phone, taking notes and looking interested and attentive, not bored! The level, frequency, and quality of the students` participation is monitored throughout the semester and considered when assigning your participation grade. Attendance - promptness to class and positive presence in class.

<u>Assessment</u>
Marine ecosystem field activity – 15%

Human communities and climate change (Hadzabe and Maasai) field activity – 15%
Systemic Detailed Journal entries – 20%
Climate Methods and Skills (review) – 30%
Participation – 20%

Attendance and Participation

Due to the nature of SIT Study Abroad programs, and the importance of student and instructor contributions in each and every class session, attendance at all classes and for all program excursions is required. Criteria for evaluation of student performance include attendance and participation in program activities. Students must fully participate in all program components and courses. Students may not voluntarily opt out of required program activities. Valid reasons for absence – such as illness – must be discussed with the academic director or other designated staff person. Absences impact academic performance, may impact grades, and could result in dismissal from the program.

Late Assignments

SIT Study Abroad programs integrate traditional classroom lectures and discussion with field-based experiences, site visits and debriefs. The curriculum is designed to build on itself and progress to the culmination. It is critical that students complete assignments in a timely manner to continue to benefit from the sequences in assignments, reflections and experiences throughout the program.

Example: Students may request a justified extension for one paper/assignment during the semester. Requests must be made in writing and at least 12 hours before the posted due date and time. If reason for request is accepted, an extension of up to one week may be granted at that time. Any further requests for extensions will not be granted. Students who fail to submit the assignment within the extension period will receive an 'F' for the assignment.

Grading Scale

94-100%	A
90-93%	A-
87-89%	B+
84-86%	B
80-83%	B-
77-79%	C+
74-76%	C
70-73%	C-
67-69%	D+
64-66%	D
below 64	F

Program Expectations

- Show up prepared. Be on time, have your readings completed and points in mind for discussion or clarification. Complying with these elements raises the level of class discussion for everyone.
- Have assignments completed on schedule, printed, and done accordingly to the specified requirements. This will help ensure that your assignments are returned in a timely manner.
- Ask questions in class. Engage the lecturer. These are often very busy professionals who are doing us an honor by coming to speak.
- Comply with academic integrity policies (no plagiarism or cheating, nothing unethical).
- Respect differences of opinion (classmates', lecturers, local constituents engaged with on the visits). You are not expected to agree with everything you hear, but you are expected to listen across difference and consider other perspectives with respect.

SIT Policies and Resources

Please refer to the SIT Study Abroad Handbook and the Policies section of the SIT website for all academic and student affairs policies. Students are accountable for complying with all published policies. Of particular relevance to this course are the policies regarding: academic integrity, Family Educational Rights and Privacy Act (FERPA), research and ethics in field study and internships, late assignments, academic status, academic appeals, diversity and disability, sexual harassment and misconduct, and the student code of conduct.

Please refer to the SIT Study Abroad Handbook and SIT website for information on important resources and services provided through our central administration in Vermont, such as Library resources and research support, Disability Services, Counseling Services, Title IX information, and Equity, Diversity, and Inclusion resources.

Course Schedule

**Please be aware that topics and excursions may vary to take advantage of any emerging events, to accommodate changes in our lecturers' availability, and to respect any changes that would affect student safety. Students will be notified if this occurs*

Module 1: Climate Change Methods and Evidence – Overview (Zanzibar Archipelago)
This one-week module introduces climate change methods and evidence.

Readings:
Maslin, M. 2014. *Climate Change*. Oxford U. Press. (excerpts)
Neelin, J. 2011. *Climate Change and Climate Modelling*. Cambridge U. Press. (excerpts)
United States Environmental Protection Agency. n.d. *Models, Tools, and Databases for Climate Change Research*. Online report.

Module 2: Climate Change and Sustainability - Human Communities and Marine Environments (Zanzibar Archipelago)
This two-week module addresses climate change impacts on environments and human communities on Unguja Island. It further addresses resilience strategies for people who depend on marine environments. The module introduces key marine environmental research methods and engages impacts on the water table, shoreline, mangrove forests, seagrass beds, and coral reefs. Activities, readings, and discussions emphasize field equipment, geological techniques, plant, and fish census techniques for measuring biodiversity impacts, and, for corals, basic coral surveying and coring to investigate broad and long-term climate change. Small teams of students collect, analyze, and present primary field data. In addition, students work with the Institute for Marine Sciences in Zanzibar to interview community members about collaborative solutions to coastal climate change and to learn basic scientific techniques and tools for mitigation.

Readings:

Ellison, J. 2015. "Vulnerability Assessment of Mangroves to Climate Change and Sea-Level Rise Impacts," *Wetlands Ecology and Management* 23.

Milroy, S. 2015. *Field Methods in Marine Science: From Measurements to Models*. Garland Science. (excerpts).

Obura, D., and G. Grimsditch. 2009. *Resilience Assessment of Coral Reefs*. IUCN.

Richmond, M. 2002. *A Field Guide to the Seashores of Eastern Africa and the Western Indian Ocean Islands*. SAREC. (read and skim, as assigned)

Walley, C. 2004. *Rough Waters: Nature and Development in an East African Marine Park*. Princeton U. Press. (excerpts)

Yu, R., and D. Packard. 2012. "Assessing the Viability of Desalination for Rural Water Supply, Chwaka, Zanzibar," *Cross-Cultural Communication* 8.

Module 3: Climate Change and Sustainability: Human Communities and Terrestrial Environments, Part 1 (Usambara Mountains and Ngorongoro Conservation Area)
This two-week module examines climate change impact on landscapes, plant and animal communities, and humans in two terrestrial ecosystems: montane forests and upland grasslands. Students investigate the influences of heightened climate change on migrating wildlife (such as wildebeests and zebras), and, most importantly, on the livelihoods of the pastoral Maasai in the Ngorongoro Conservation Area and the agricultural Shambaa in the Usambaras. During excursions, students complete short field studies on climate refugia and indigenous solutions to climate change. In addition, this module introduces social science research methods, including participant observation and interview survey methods. Teams of students collect, analyze, and present primary data. Students further consider the ethics surrounding identity, language use, translators, dress, field equipment, project scheduling, scholarly reporting, and reciprocity.

Readings:

Armstrong, C. *et al*. 2017. "Anthropological Contributions to Historical Ecology." *PLoS One*.

Bedelian, C., and J. Ogutu. 2016. *Trade-offs for Climate-Resilient Pastoral Livelihoods in Wildlife Conservancies in the Mara Ecosystem, Kenya*. Overseas Development Institute.

Bernard, H. 2012. *Social Research Methods: Qualitative and Quantitative Approaches*. Sage.

Harrison, S., and R. Noss. 2017. "Endemism Hotspots are linked to Stable Climatic Refugia." *Annals of Botany* 119.

Inderberg, T., and S. Eriksen. 2014. *Climate Change Adaptation and Development: Transforming Paradigms and Practices*. (excerpts)

Porter, P. 2006. *Challenging Nature: Local Knowledge, Agroscience, and Food Security in Tanga Region, Tanzania*. U. of Chicago Press.

Module 4: Climate Change and Sustainability: Human Communities and Terrestrial Environments, Part 2 (Mount Kilimanjaro and Arusha)

This one-week module examines climate and climate changes that impact landscapes, plant and animal communities, and humans in the unique terrestrial ecosystem of Mount Kilimanjaro, the highest mountain on the African continent. Students consider glacial retreat, deforestation, and surface water effects on Mount Kilimanjaro. Presentations by faculty, guest lecturer and Mount Kilimanjaro National Park experts introduce the climatology, ecology, and hydrology of the extinct volcano, including details about its glaciers. Activities include the study of ice cores. This module highlights the challenges to and solutions of Tanzanians.

Readings:

Hemp, A. 2009. "Climate Change and its Impacts on the Forests of Kilimanjaro." *African Journal of Ecology* 47(1).

Mote, P., and G. Kaser. 2007. "The Shrinking Glaciers of Kilimanjaro: Can Global Warming Be Blamed?" *American Scientist* 95(4).

Thompson, L., *et al.* 2015. "Glacier Loss on Kilimanjaro Continues Unabated." *Proceedings of the National Academy of Sciences* 106(47). (and, two competing scientific responses in *PNAS* 2015)

