



Environmental Research Methods and Ethics

ENVI-3500 (3 credits / 45 hours)

SIT Study Abroad program:

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

Please Note: This syllabus represents a recent 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 prepares students to study and practice effectively in a new setting and nontraditional, 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. 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

Environmental Research Methods and Ethics comprises academic study and events (3 credits). At the completion of the course, students will:

- Demonstrate self-confidence and familiarity with key conceptual tools and skills for field study in ecology, society, and sustainability management;
- Master basic 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.

Course Requirements

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 the scientific and social scientific 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.

Course Program

This course takes the form of topical modules that incorporate activities and assignments:

Module I: Climate Change Methods and Evidence - Overview

(Zanzibar Archipelago)

This **one-week module** introduces climate change methods and evidence.

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*. On-line report.

Module II: Climate Change and Sustainability - Human Communities and Marine Environments

(Zanzibar Archipelago)

This **two week-module** addresses climate change impacts to 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 to the water table, shoreline, mangrove forests, sea grass 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.

- 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 III: Climate Change and Sustainability - Human Communities and Terrestrial Environments,

Part I

(Usambara Mountains and Ngorongoro Conservation Area)

This **two-week module** examines climate change impacts to 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.

- Armstrong, C. et al. 2017. "Anthropological Contributions to Historical Ecology." *PLoS One*.
- Bedelian, C., and J. Ogotu. 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. (excerpts)
- 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, Agrosience, and Food Security in Tanga Region, Tanzania*. U. of Chicago Press.

Module IV: Climate Change and Sustainability - Human Communities and Terrestrial Environments,

Part 2

(Arusha and Mount Kilimanjaro)

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 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.

- 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)

Course Readings

Reference articles and books (see above) are available from the program library (in Zanzibar) and through SIT's electronic library database. (NOTE: COURSE CONTENT, LECTURERS, READINGS, AND ASSIGNMENTS MAY BE MODIFIED. STUDENTS WILL BE NOTIFIED PROMPTLY OF ANY CHANGES.)

Course Grading Distribution

Appropriate Behavior and Dress	10%
Participation in Readings and Discussions	10%
Quizzes	10%

D-I-E Journal Entries	15%
Paper: Climate Methods and Skills	25% (Paper 17.5% / Pres. 7.5%)
Final Exam	30%

Course Grading Scale

The grading scale is as follows:

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

Course Grading Criteria

All assigned grades take into account the students' special circumstances and challenges as foreigner. An "A" grade entails superior (not just "very good") performance in terms of accuracy, structure, and organization for assignments. An "A" grade refers to full attendance, punctuality, attentive listening, and active engagement in all language classes, field exercises, and other activities. It also means polite and respectful behavior. The frequency and quality of the students' participation is monitored and taken into account.

Disability Services: Students with disabilities are encouraged to contact Disability Services at disabilityservices@sit.edu for information and support in facilitating an accessible educational experience. Additional information regarding SIT Disability Services, including a link to the online request form, can be found on the Disability Services website at <http://studyabroad.sit.edu/disabilityservices>.

Student Expectations

Please refer to the SIT Study Abroad handbook for policies on academic integrity, ethics, warnings, probations, diversity, disability, sexual harassment, and the academic appeals process. In addition, students should refer to information in the Student Handbook and the Program Dossier distributed during orientation.