Environments, Ecosystems and Evolution: Evidence from the Turkana Basin

An introduction to the ways scientists use the fossil and archaeological records to learn about past changes in Earth’s climates, environments, and animal communities, and how humanity’s ancestors responded to those changes physiologically and technologically. Interdisciplinary lectures will show evidence from the Turkana Basin’s paleoenvironmental, fossil and archaeological records of the dynamic interactions between the climate, environment, local food webs, and ancient human populations. This background will prepare students for training in paleoanthropological and archaeological field methods.

A few short excursions and one multi-night field trip are planned as part of this module. Trips to nearby fossil-bearing locations and the habitats discussed in the course will expose students to the geological and paleoenvironmental context of important discoveries of the Turkana Basin. Lab and field exercises will acquaint students with key methods of paleoecological and paleoenvironmental reconstruction. Students should be prepared to spend time outdoors for this module and have adequate packs for carrying notebooks, water and other supplies. Lab exercises will showcase analytical methods that reveal prehistoric organisms’ diet or locomotion, and give examples of physiological changes that coincided with major shifts in prehistoric climate and environment.

Instructor: Dr. Jason E. Lewis
Office & Phone: Soc. Behav. Sci. N-513A
jason.lewis@stonybrook.edu
631-632-5808
Will be generally available to students for office hours during the module.

Teaching Assistants: There will be at least one graduate student TA available at the facility for the duration of the program.

Class Meetings: Monday - Saturday, 8:00 am - 12:00 pm, and 2:30 - 5:30 pm

Note: for Contact Hour calculation ‘Lab’ is considered as requiring outside preparation time and given a 2/1 ratio, while ‘Field’ is considered as not requiring outside preparation time and given a 3/1 ratio.
There is no assigned textbook for this course; assigned readings will be given digitally to the students at the beginning of the course. The readings will be useful for clarifying concepts discussed in class and for supplying additional examples from those presented in lecture. Students will find that reading the material before attending lecture will make the lecture easier to follow. Other documents, review sheets, class announcements, etc, will be downloadable from the class Blackboard site (https://blackboard.stonybrook.edu).

**COURSE LEARNING OBJECTIVES**

The objectives of this course are to teach you to:

- Understand the application of the scientific method (i.e., how to construct and test a hypothesis).
- Be able to summarize and describe simple quantitative and qualitative observations and react to such observations critically
- Understand the theory of evolution at both the molecular and organismal levels.
- Understand the biology, ecology and behavior of a number of extinct and living primate species, especially humans.
- Begin to develop skills needed to be a critical consumer and ultimately user of the primary scientific literature (e.g., access and use Web of Science, critical consumption of online information).
- Be able to discuss critical events and ongoing issues in human evolution.

This course satisfies the following requirements of the DEC:

**Category E- Natural Sciences**

This course satisfies the following requirements of the SBC:

**Study the Natural World (SNW):**

1. Understand the methods scientists use to explore natural phenomena including observation, hypothesis development, measurement and data collection, experimentation, and evaluation of evidence.
2. Understand the natural world and the major principles and concepts that form the basis of knowledge in the natural sciences.
3. Assess scientific information and understand the application of scientific data, concepts, and models in the natural sciences.
4. Make informed decisions on contemporary issues involving scientific information.

- In this class, via field practicals and lab experiments (see details below), students will have hands-on practice with the methods scientists use to explore natural phenomena, will gain
direct understanding of the natural world and the major principles and concepts that form
the basis of knowledge in the natural sciences, learn how to Assess scientific information
and understand the application of scientific data, concepts, and models, such that at the
end of the module they will be able to make informed decisions on contemporary issues
involving scientific information.

and
Engage Global Issues (GLO):
1. Demonstrate knowledge and understanding of the interconnectedness of the world, past and
present.
2. Demonstrate knowledge and understanding of a society or culture outside of the United States.
-This course physically takes place in a nation, region, and culture that is significantly
different from the United States and Europe in almost all respects. It examines the
interconnectedness between geography, geological history, climate and environment, and
the organismal evolution of plant and animal communities and the origins and cultural
development of our own species.

PREREQUISITES
This course is part of a 3-course themed cluster (field school) and there are no prerequisites
except permission from the instructor and/or study abroad office. Lectures will cover the basic
concepts that are required to understand the material. A science background is not necessary for
the successful completion of the course.

COURSE REQUIREMENTS
- Participation (20%) – students are expected to actively participate in the data collection in the
field and in class discussion and debates.
- Lab/Practical exercises (40%) – lab or practical exercises must be completed and handed in
prior to the following exercise.
- Final exam (40%) – the exam consists of multiple choice, matching, and short answer questions
covering topics from the course.

COURSE POLICIES
Classroom etiquette:
While students are in class, they are expected to give their full attention to the lecture. Reading,
talking, eating, texting or browsing on cell phones, leaving or packing up to leave before the
professor has dismissed the class are inappropriate classroom behaviors and disruptive to other
students. Also, please make sure that your watch alarms, pagers, and cell phones do not go off
during class.

Attendance and preparation of assignments:
Students are expected to attend all classes; if you expect to miss one or two classes, please email
your TA, who will inform me. Unexcused absences will lower your grade. Computer glitches
(such as computers that die, hard disks that crash, flash drives that are lost, etc) will not be
accepted as excuses for failure to do assignments on time, to study for exams, etc.

Policy Regarding Missed Exams:
Generally, makeup examinations are not given (and the score for the missed exam is entered as
zero “0”). If you would like to be considered for a makeup examination, the following conditions
must be met:  1. You should have a legitimate excuse for having missed the original exam, e.g., illness, family emergency.  2. You must inform me within 48 hrs before or after the scheduled exam date that you cannot take the exam. If the above conditions apply, then you will be allowed to do a makeup exam.

Americans with Disabilities Act:
If you have a physical, psychiatric/emotional, medical or learning disability that may impact on your ability to carry out assigned course work, please contact the Disability Support Services office in the Educational Communications Center (ECC) Building, room 128 (632-6748). DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.

Academic Integrity:
Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/

Critical Incident Management:
Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Syllabus

Arrive in NBI, transfer to Mpala Reserve with Dino Martins

Day 0- Sunday at Mpala
Morning: Field- Game drive
Afternoon: Field- Game drive

Day 1- Karibuni and Introduction
Morning: Lecture- Ecology and Evolution Overview
Afternoon: Lecture- The African Savannah, overview of ecosystems and habitats

Day 2- Introduction to Modern Africa Savannah Ecology
Morning: Lecture- Introduction to Modern Africa Savannah Ecology
Afternoon: Field- Game drive

Day 3- Modern Africa Savannah Ecology cont’d
Morning: Lecture- Plant density, patterns, reproduction
Afternoon: Field- Game drive

Day 4- Fly to TBI-Ileret
Day 5- History of Life, Environmental Change, Evolution and Extinction
Morning: Lecture- A Brief Outline of the History of Earth
Afternoon: Lab- A First Look at Fossils

Day 6- Earth Before Humans: 65 to 6 Million Years Ago
Morning: Lecture- Cenozoic Environments and Vertebrate Evolution
Afternoon: Lecture- History of Paleontology in the Turkana Basin (M. Leakey)

Day 7- Rest Day

Day 8- Finding and Studying Fossils
Morning: Field- excursion around facility
Afternoon: Lab- Identification and study of collected material

Day 9- Planet of the Apes
Morning: Lecture- Miocene Apes of the World and especially the Turkana Basin
Afternoon: Lecture- Global Cooling and Drying and Earliest Putative Hominins

Day 10- Mosaic Environments and Mosaic Creatures
Morning: Lecture- Gracile Australopithecines
Afternoon: Lecture- Robust Australopithecines

Day 11- Breaking Rocks in the Hot Sun
Morning: Lecture- Stone Tool Making & Homo Responses to Environmental Change
Afternoon: Lab- individual experimental knapping & tool use

Day 12- Back to TBI Turkwel
Morning: Driving back to facility
Afternoon: Reviewing for Final w/ Instructor

Day 13- Showing What You Learned
Morning: Final Exam

Day 14- Class Over: Rest Day Before Next Module

Readings
Readings for individual lectures will be distributed as PDFs/photocopies before or at the beginning of the module. Students are expected to have read the papers before the day that topic is covered and come prepared with questions for discussion sessions.

Day 5-


**Day 6-**


**Day 8-**
Leakey, MG et al. n.d. Field protocol for fossil prospecting, documentation, collection, and curation. Manuscript on file at TBI.


**Day 9-**


Cerling et al, 2011. Woody cover and hominin environments in the past 6 million years.

Wood and Harrison 2011. The evolutionary context of the first hominins.

**Day 10-**


**Day 11-**


