

EES 114W: ECOLOGY, EVOLUTION, AND CLIMATES THROUGH TIME

Fall 2011, MWF 1:10-2pm, 3 Credits, SC6740

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Course Synopsis

Currently, climate change is occurring at unprecedented rates and affecting biological organisms globally. Understanding the potential causes and consequences of climate change, both today and in past is critical to making informed conservation decisions. The primary goal of this course is to investigate the effects of climate change on the ecology and evolution of organisms, with a focus on terrestrial vertebrates. Specifically, lectures will integrate paleontological research methods, vertebrate evolution and extinction, ancient climates, and the ecology of vertebrates through time. Students will also gain an understanding of how paleontological data is collected, analyzed, interpreted, and scientific hypotheses evaluated - using examples from North America and other globally significant fossil sites. Lectures and discussions will focus on salient time periods (e.g., K/T boundary, PETM, Pleistocene), primarily during the Cenozoic (65 million years to the present), providing the context for learning about fossilization, systematics, evolution, mass extinctions, paleoecology, biogeography, biostratigraphy, and other paleontological research tools. Through the combination of lectures, in-depth discussions of the described texts, written assignments, and weekly quizzes, students will leave the course with a general understanding of how organisms have changed over geologic time in response to changing environments and climates. Scientific writing will be explicitly discussed, including methods for synthesizing scientific literature. This course can help prepare students of broad backgrounds with a deep time perspective on past environmental and climate change, the causes and consequences of extinctions, conservation and management implications, and sustainability.

Intended Participants

This course is intended to benefit a broad spectrum of participants ranging from general non-science students to students pursuing majors within the geological or biological fields. This course does not have any prerequisites.

Readings

The text titled, *After the Dinosaurs: The Age of Mammals* by Donald R. Prothero will serve as the primary text. Additionally, *Heatstroke: Nature in an Age of Global Warming* by Anthony Barnosky and *The Eternal Frontier: An Ecological History of North American and its People* by Tim Flannery will be discussed in class and the focus of two written assignments. These books are required and I expect students to bring the Barnosky and Flannery texts to class on discussion days (see the course schedule). Additional required supplemental readings will be handed out in class and/or posted to Oak.

Course Expectations and Evaluation Criterion

Students are expected to come well prepared for all course meetings, this includes: having thoroughly read all assigned readings, demonstrate knowledge of the material through discussion questions and subsequent discussions, and synthesize all course materials through weekly quizzes and written assignments. The final grade will be assessed based on: (1) class participation (15%), (2) two in-class assessments (10%), (3) a final exam (25%), and (4) three written assignments (50%; 20% for the first two and 10% for the last paper). ***If a grade is contested, it must be done in writing (via e-mail) within 24 hours.***

Class participation (15%): Students are expected to attend and participate in class discussions, including posting discussion questions by 9am the day of discussions. Evidence of ones knowledge and completion of assigned readings will be factored into a student's participation grade. Two class absences will be excused, with the exception that missing a quiz will result in a zero. However, student are responsible for all material and instructions given including acquiring all assignments, supplemental readings, and notes from classmates. Any absences beyond these two absences will affect the participation grade.

Extenuating circumstances (e.g., serious illness, hospitalization, family emergencies) will be considered; however, these circumstances must be documented in accordance with Vanderbilt University policy.

Participation points possible = 30.

In Class Assessments (10%): A total of 2 quizzes/assessments will be given according to the class schedule. Each quiz is worth 10 points. Although two absences will not affect the participation grade, if these absences are on days when quizzes are given, absences will result in a zero on the quizzes. Total in class assessment points possible = 20

Final Exam (25%): A cumulative final exam will be given on December 14th at 9am. The final exam is worth 50 points.

Written Assignments (50%): Three written assignments will be assigned and are due electronically by 8:00am on the dates noted on the syllabus with a hard copy due at the beginning of class (1:10pm). Students will have the opportunity to revise a section of their first two papers, with revisions due exactly one week from when the graded paper is returned to the student. No revisions will be accepted for late papers and no revisions will be accepted late. Furthermore, late papers will be docked 5 points per day late and will not be accepted after three days [e.g., if a paper is due electronically on Monday at 8:00am, 5 points will be deducted on Tuesday (prior to 8:00am), 10 points on Wednesday (prior to 8:00am), 15 points on Thursday (prior to 8:00am), and no papers are accepted after Thursday at 8:00am. Revisions must conform to guidelines, including a detailed cover letter discussing what revisions were made, the revised paper, and the original graded paper. The revised paper will be graded based on the quality of the revised paper, cover letter, and how the student addressed prior comments. Students who chose to revise papers can earn up to an additional 5 points over the original paper; however, no extra credit is earned above a perfect paper. All papers must be submitted to SafeAssign via Oak, including registering their papers on the database, and a printed copy of both the paper and the SafeAssign report (printed in color) must be turned in to class by 1:10pm on the dates noted in the course schedule. Electronic papers submitted by the deadline do not count as submitted on-time if a hard copy of the paper and the SafeAssign report are not turned in to class; thus, the paper will be considered late and points deducted according to the above late paper policy until a hard copy is turned in. If a hard copy is not turned in within three days, the paper will receive a zero despite being submitted electronically. The reciprocal is true if a hard copy is turned in absent of an electronic submission to SafeAssign. The first two written assignments are worth 40 points each (6 page papers based on each of the two discussion books, Flannery and Barnosky), the final paper is worth 20 points (3 pages), total points possible = 100.

Responsible Code of Conduct

Students are expected to contribute to class in a productive and respectful manner. This includes turning off cell phones during class and refraining from texting, e-mailing, or conducting non-course related work during class. Failure to compile with these policies may result in the student being asked to leave the classroom and a subsequent absence noted. If a student is asked to leave at the beginning of class, they will not be able to participate in quizzes or graded course activities.

As per the *Student Handbook*:

Undergraduate students are subject to the jurisdiction of the Undergraduate Honor Council. The policies and procedures of the undergraduate Honor System stated in this Student Handbook apply to all students enrolled in undergraduate courses of all the schools and the Division of Unclassified Studies, whether full-time or part-time, or whether regularly enrolled, transient, or cross-registered from a neighbor institution.

Students should realize that an act of plagiarism may include some degree of premeditation or may be the result of carelessness or ignorance of acceptable forms for citation. Regardless of intent or premeditation, the act is plagiarism and is a violation of the Honor Code. Students, therefore, must be conscious of their responsibilities as scholars under the Honor System, to learn to discern what is included in plagiarism as well as in other breaches of the Honor Code, and must know and practice the specifications for citations in scholarly work.

Special Accommodations

If you need course accommodations due to a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please make an appointment with me and/or the EAD (2-4705) as soon as possible.

Course Schedule & Critical Dates

This course is divided up into sub themes, as listed below, enabling the chronological comparison and discussion of key periods in Earth history. Please note assigned readings in parentheses, bolded discussions (requires the posting of discussion questions on Oak by 9am the morning of the discussion), quizzes, and paper due dates. Note, lecture days also include discussions and/or class activities; however, they do not require formal submission of discussion questions as bolded discussion days require.

Introduction to Paleontology: What are paleontology and paleoecology? How do paleontologists determine the age and evolutionary relationships of extinct organisms? How do paleoecologists interpret past environments? Why should biologists, anthropologist, and geologists care about earth history? How can paleoecology help current conservation efforts? Why does earth history matter in my daily life?

8/24 (W): Introduction/Lecture

8/26 (F): Discussion (Paleoecology, Assigned Paper)

8/29 (M): Lecture (*After the Dinosaurs*, Ch. 1: Introduction)

8/31 (W): Lecture (*After the Dinosaurs*, Ch. 1: Introduction)

9/2 (F): Discussion (*Eternal Frontier: Intro-Act 1*)

9/5 (M): Lecture (*After the Dinosaurs*, Ch. 1: Introduction)

9/7 (W): Lecture (*After the Dinosaurs*, Ch. 1: Introduction)

9/9 (F): Discussion (*Eternal Frontier: Act 2*)

Precambrian through the Paleocene: What happened prior to the Cenozoic? How did the extinction of non-avian dinosaurs contribute to the success of mammals? Why is the Paleocene Eocene Thermal Maximum (PETM) critical to our understanding of current global warming? If we don't make sustainable choices could we see similar phenomenon in our lifetime? How have different paleontological methods helped clarify our understanding of the PETM?

9/12 (M): Lecture (*After the Dinosaurs*, Ch. 2: The End of the Dinosaurs?)

9/14 (W): Lecture (*After the Dinosaurs*, Ch. 2: The End of the Dinosaurs?)

9/16 (F): Discussion (*Eternal Frontier: Act 3*)

9/19 (M): Lecture (*After the Dinosaurs*, Ch. 3: The Paleocene)

9/21 (W): Lecture (*After the Dinosaurs*, Ch. 3: The Paleocene)

9/23 (F): Discussion (*Eternal Frontier: Act 4*)

9/26 (M): Lecture (*After the Dinosaurs*, Ch. 4: The Eocene)

9/28 (W): Lecture (*After the Dinosaurs*, Ch. 4: The Eocene)

9/30 (F): Discussion (*Eternal Frontier: Intro-Act 4*)

Eocene to Oligocene: What was the aftermath of the PETM? How is modern biodiversity a function of mammalian diversification? How and why did the Earth transition to an icehouse world? What role did immigration play in influencing mammalian communities?

10/3 (M): Eternal Frontier Paper Due & Lecture (*After the Dinosaurs*, Ch. 4: The Eocene)

10/5 (W): Quiz/Assessment #1

10/7 (F): UNDERGRADUATE BREAK (NO CLASS)

10/10 (M): Lecture (*After the Dinosaurs*, Ch. 5: The Oligocene)

10/12 (W): Lecture (*After the Dinosaurs*, Ch. 5: The Oligocene)

10/14 (F): Discussion (*Heatstroke: Part 1*)

Miocene to Pliocene: How and when did grassland ecosystems evolve? How do multiple paleoecological tools help clarify the evolution of these ecosystems? What conservation and management lessons can we learn from the Great Biotic Interchange?

10/17 (M): Lecture (*After the Dinosaurs*, Ch. 6: The Miocene)

10/19 (W): Lecture (*After the Dinosaurs*, Ch. 6: The Miocene)

10/21 (F): Discussion (*Heatstroke: Part 2*)

10/24 (M): TBD

10/26 (W): TBD

10/28 (F): Group Discussions of Scientific Literature

10/31 (M): Lecture (*After the Dinosaurs*, Ch. 7: The Pliocene)

11/2 (W): Discussion (*Heatstroke: Part 3*)

11/4 (F): Quiz/Assessment #2

Pleistocene to Holocene: How did glacial and interglacial cycles affect mammalian communities? What factors contributed to the extinction of the Pleistocene megafauna? What evidence is needed to clarify the megafaunal extinction debate, globally? How can paleontology contribute to our understanding of current climate change? How might the impact of early humans on Pleistocene and Holocene plants and animals affect our choices today? What lessons can we learn from the fossil record and can these lessons help us to make more sustainable decisions?

- 11/7 (M): Lecture (*After the Dinosaurs*, Ch. 7: The Pliocene)
- 11/9 (W): Lecture (*After the Dinosaurs*, Ch. 8: The Pleistocene)
- 11/11 (F): **Discussion** (*Heatstroke*)
- 11/14 (M): **Heatstroke Paper Due**, Lecture (*After the Dinosaurs*, Ch. 8: The Pleistocene)
- 11/16 (W): Lecture (*After the Dinosaurs*, Ch. 8: The Pleistocene)
- 11/18 (F): **Discussion** (Scientific Literature)
- 11/21-11/25: **THANKSGIVING BREAK**
- 11/28 (M): Lecture (*After the Dinosaurs*, Ch. 9: The Holocene)
- 11/30 (W): Lecture (*After the Dinosaurs*, Ch. 9: The Holocene)
- 12/2 (F): **Discussion** (Scientific Literature)
- 12/5 (M): **Literature Synthesis Paper Due, Group Presentations**
- 12/7 (W): Course Wrap-Up

Paper Due Dates:

- Eternal Frontier Paper due* – October 3rd
- Heatstroke Paper due* – November 14th
- Literature Synthesis Paper due* – December 5th

Assessments:

- Assessment #1* – October 5th
- Assessment #2* – November 4th
- Final Exam* – December 14th at 9am