METR 4533 / METR 5533 / GEOL 4533 / GEOL 5533
Earth's Past Climate
Fall 2014

Instructor:
Professor Susan Postawko (spostawk@ou.edu)
Meteorology (phone 325-1142)
414 SEC (alternate office: 5329 NWC)
Office Hours: MW 9:30-10:30 in 414 SEC or by appointment

Optional Text: Ruddiman, W.F., 2001, Earth's Climate: Past and Future, 1st ed. W.H. Freeman and Co, NY

Prerequisite: Introductory geology and meteorology or equivalent (or permission of instructor); senior undergraduate or graduate standing. This course is intended for upper-level students in both the geosciences and science education.

Course Philosophy and Objectives: Earth's climate is a truly interdisciplinary topic. The goal of this course is to provide you with a fundamental understanding of how Earth's climate system works, how climate has changed through geologic time, and how we can decipher archives of past climate from the geologic record. You will also gain practice in oral and written communication.

Readings: Required readings will be from journal articles, although textbook chapters have been noted in the topic schedule. Journal readings will be provided electronically on D2L. Reading primary literature is an important component of advanced education because it requires you to absorb, synthesize and analyze research papers. A small writing exercise will accompany each journal reading assignment. Details will be discussed in class.

Term Project: For your term paper, you should focus on, and research *extensively*, a paleoclimatic topic that will be selected by you and approved by me. Use existing literature, or newly collected data. Term-paper and presentation requirements for those enrolled in the graduate levels differ *significantly* from those enrolled in the undergraduate levels; undergraduates may work in teams of two, whereas graduate students are expected to work independently. I will provide detailed instructions on these requirements soon. It is a semester-long project, due the last week of class, but may be turned in prior to pre-finals week if desired. For additional help with writing (outside of class), please remember OU's writing center; for more information visit www.ou.edu/writingcenter.

A Note on Research: Your research on course projects should be extensive, given the level of this course. Go well beyond the web—i.e., to the professional literature (real books and journals). ALL sources, including web sources, must be cited in your list of references—using uncited material is a form of plagiarism. Good starting points for literature searches are Georef, Web of Science, and Geoscience World (see library).

Exams and Exercises: There will be two exams; do not miss either (there will be no make-up exams). Exercises will be linked to lecture topics. Most exercises will be turned in via a Dropbox on D2L.

Field Trip: This course typically includes a day-long field trip (on a Saturday or Sunday) to discuss climate proxies from field data. More details later.

Grading: Readings (15%), Homework (15%), In-class exercises (10%), Exams (40%), Term project (20%)

KNOW THE GEOLOGIC TIMESCALE!!!

A version of the geologic timescale will be posted on D2L. You WILL be tested on this on the exams.

Any student in this course who has a disability that may prevent full demonstration of abilities should contact us personally as soon as possible to discuss accommodations necessary to ensure full participation and facilitate your educational opportunities. Also, it is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required class work that may fall on religious holidays.

Tentative Schedule

Week	Date	Lecture	Activity
Introduction to Core Geologic and Climatic Concepts			
Week 1	Tu 19 Aug	Logistics, Philosophy, Scientific Writing & Research	
	Th 21	Why Study Past Climate?	
Week 2	Tu 26	Plate Tectonics, Rock Cycle	
	Th 28	The Earth as a System; Geologic Time and Dating	Radio-isotopic Dating Web Exercise Homework
Week 3	Tu 2 Sept	Sed Rocks Review; Lithologic climate proxies I	
	Th 4	Lithologic climate proxies II	
Week 4	Tu 9	Isotopic climate proxies	Isotope Exercise
	Th 11	Other climate proxies	Leaf Analysis Homework
Week 5	Tu 16	Intro to the climate system	
	Th 18	Intro to the climate system cont'd	
Week 6	Tu 23	The carbon cycle	Carbon cycle Homework
	Th 25	Evolution of the atmosphere/ faint young sun paradox	
Week 7	Tu 30	Orbital controls on climate	Term paper topic DUE
	Th 2 Oct	Plate tectonics and climate	
Week 8	**Tu 7**	**EXAM 1**	
Case Studies of Past Climates			
	Th 9 Oct	The Snowball Earth (Proterozoic) I	
Week 9	Tu 14	The Snowball Earth (Proterozoic) II	
	Th 16	Pangaean climate (late Paleozoic)	
Week 10	Tu 21	The Cretaceous Greenhouse (Mesozoic)	Term Paper Annotated Bibliography DUE
	Th 23	Back into the Icehouse (Cenozoic)	
Week 11	Tu 28	The Hothouse Earth (Paleocene-Eocene)	
	Th 30	The Quaternary Icehouse	
Week 12	Tu 4 Nov	Millennial-scale climate change	
	Th 6	The Medieval Warm Period and Little Ice Age	
Week 13	Tu 11	Peer review of term papers	Draft of term paper DUE
	Th 13	Current climate change	
Week 14	Tu 18	Future climate change	
	Th 20	**EXAM 2**	
Week 15	Tu 25	Project Presentations	Grad oral presentations
	Th 27	**THANKSGIVING – no class**	
Week 16	Tu 2 Dec	Project Presentations	Term paper DUE
	Th 4	Project Presentations	
		NO FINAL EXAM!	