METR 4533 / METR 5533 / GEOL 4533 / GEOL 5533
Earth's Past Climate
Fall 2006

Instructors:

Susan Postawko (spostawk@ou.edu)
Meteorology
5329 NWC; 325-6561
Office Hours: Tu/Th 10:30-11:30 or appt

Lynn Soreghan (lsoreg@ou.edu)
Geology & Geophysics
868 SEC; 325-3253
Office Hours: Tu/Th 10:30-11:30 or by appt.

Text: Ruddiman, W.F., 2001, Earth's Climate: Past and Future: W.H. Freeman and Co, NY, 465 p.

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. Our goal 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: Readings will be from the assigned text (Ruddiman, 2001) and from journal articles. You are responsible for material covered in all assigned readings. Photocopies of journal readings will be provided electronically when possible, or available on reserve in the Youngblood Library (2nd floor, SEC). Reading primary literature is an important component of advanced education because it requires you to read, synthesize and analyze research papers. For non-text reading assignments, you must be prepared to present a 5-10 minute synopsis of the reading. Details will be discussed in class.

Term Project: For your term paper, you should focus on, and research *extensively*, a climatic topic that will be selected by you and approved by us. 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; we will provide detailed instructions on these requirements soon.

A Note on Research: Please note that we expect your research on course projects to be extensive, given the level of this course. Searching web sources for information is fine for starters, but we expect you to 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, databases which can be accessed on the OU libraries web page (go to "LORA", then the alphabetical listing).

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. For Team Presentations (latter part of semester), student teams will be assigned a specific case-study topic related to the lectures and present a 5-minute 'news briefing' suitable for a general audience. More details later.

Grading: Exercises and Reading Synopses (20%), Exams (50%), Term Project (30%).

KNOW THE GEOLOGIC TIMESCALE!!!

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.

Tentative Schedule

Week	Date	Lecture (annotated with text reading)	Projects
PART I:	*Introduction to Core Geologic and Climatic Concepts*		
Week 1	Tu 22 Aug	Logistics, Philosophy of Course, Scientific Writing [Both]	
	Th 24	Why Study Past Climate? [Lynn]	
Week 2	Tu 29	Plate Tectonics, Rock Cycle (read p. 59-64 on dating) [Lynn]	Radioisotopic Dating Web Exercise
	Th 31	The Earth as a System; Geologic Time and Dating (p. 1-17; 59-64) [Susan]	Radioisotopic Dating Exercise DUE
Week 3	Tu 5 Sep	Dynamics of the Climate System (p. 18-50) [Susan]	
	Th 7	Evolution of the Atmosphere and Faint Young Sun Paradox [Susan]	
Week 4	Tu 12	Sed Rocks Review, Lithologic Climate Proxies (p. 54-83, 357-369) [Lynn]	
	Th 14	In-Class Practicum: Lithologic Climate Proxies [Lynn]	Sed Rocks/Proxies Lab DUE
Week 5	Tu 19	Isotopic Climate Proxies [Lynn]	Isotope Exercise
PART II:	*Major Controls on the Climate System*		
	Th 21	Paleoclimates, ocean depth, and the oxygen isotopic composition of seawater [Dr. J. Kasting, PSU]	Paper title, preliminary references DUE
Week 6	Tu 26	The Carbon Cycle (p. 86-102; opt—234-253) [Susan]	Isotope Exercise DUE
	Th 28	Orbital Controls on Climate (p. 174-192, 210-233, 254-273) [Susan]	Orbital Controls on Insolation HW
Week 7	Tu 3 Oct	Plate Tectonics and Climate I (p. 86-102, 103-128) [Susan]	Orbital Controls HW DUE
	Th 5	Plate Tectonics and Climate II [Susan]	Abstract of Dr. Kasting's lecture DUE
Week 8	Tu 10	Quantitative Climate Models (p. 71-83) [Susan]	Model Exercise
	Th 12	**EXAM I**	
PART III:	*Case Studies of Past Climates*		
Week 9	Tu 17	The Snowball Earth (Proterozoic) I (p. 89) [Lynn]	
	Th 19	The Snowball Earth (Proterozoic) II [Lynn/Susan]	Model Exercise DUE
Week 10	Tu 24	Pangaean Climate (Late Paleozoic) I (p.110-116) [Lynn]	Term Paper Drafts DUE [Team Presentations]
	Th 26	Pangaean Climate (Late Paleozoic) II [Lynn]	
Week 11	Tu 31	The Cretaceous Greenhouse (Mesozoic) (p. 129-146) [Lynn]	[Team Presentations]
	Th 2 Nov	Back into the Icehouse (Cenozoic) (p. 147-171) [Lynn]	[Team Presentations]
Week 12	Tu 7	The Quaternary Icehouse (p. 274-329) [Lynn]	[Team Presentations]
	Th 9	Millennial-Scale Climate Change I (p. 330-351) (p. 383-404) [Susan]	[Team Presentations]
Week 13	Tu 14	Millennial-Scale Climate Change II (p. 330-351) (p. 383-404) [Susan]	[Team Presentations]
	Th 16	**EXAM II**	
Week 14	Tu 21	Guest Lecture, Dr. Karoly, Global	Term Projects DUE

		Climate Change	
	Th 23	**THANKSGIVING—no class**	
Week 15	Tu 28	Project Presentations	Critiques Due
	Th 30	Project Presentations	Critiques Due
Week 16	Tu 5	Project Presentations	Critiques Due
	Th 7	Project Presentations	Critiques Due