METR 4533 / METR 5533 / GEOL 4533 / GEOL 5533
Earth's Past Climate
Fall 2010

Instructors:

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Text: Ruddiman, W.F., 2001, Earth's Climate: Past and Future, *1st edition*: W.H. Freeman and Co, NY, 465 p.

Prerequisite: Introductory geology and meteorology or equivalent (or permission of instructor); senior undergraduate or graduate standing. Intended for students in both the geosciences and science education.

Course Philosophy and Objectives: Climate is interdisciplinary. Our goal is to provide you with a fundamental understanding of how Earth's climate system works, how climate has changed through geologic time, how to decipher climate archives from the geologic record, and practice in communication.

Readings: Readings are from Ruddiman and journal articles. You are responsible for material covered in all assigned readings. Journal readings will be provided 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 non-text reading assignment. Details will be discussed in class.

Term Project: For your term paper, you should focus on, and research *extensively*, a paleoclimatic topic selected by you and approved by us. Use existing literature, or newly collected data. 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. This is a semester-long project, due the last day of class, but may be turned in prior to pre-finals week if desired. Our goal is to help you learn to write. For additional help (outside of class), please remember OU's writing center; for more information visit www.ou.edu/writingcenter. Please submit one hardcopy of the term paper by the due date. Familiarize yourself with the definition of plagiarism.

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. 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 will be provided later. All exercises must be uploaded to the D2L dropbox by the due date. Students who plan to observe a religious holiday that falls on an exam or due date should notify the professor as soon as possible to make appropriate arrangements for rescheduling of class work.

Field Trip: A field trip is planned to discuss climate proxies from field data. More details later.

Grading: 1000 points total: Exercises/Readings (25%), Exams (45%), 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. 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 (with Ruddiman readings)	Projects (Point Totals)
PART I: Introduction to Core Geologic and Climatic Concepts			
Week 1	Tu 24 Aug	Logistics, Philosophy [Both]	
	Th 26	Why Study Past Climate? (Chapter 1) [Lynn]	
Week 2	Tu 31 Aug	Plate Tectonics, Rock Cycle (p. 101-112) [Lynn]	
	Th 2 Sep	The Earth as a System; Geologic Time and Dating	Radio-isotopic Dating Web Exercise
Week 3	Tu 7	Sed Rocks Review, Lithologic Climate Proxies I	Sed Rocks/Proxies Lab (25 pts)
	Th 9	Lithologic Climate Proxies II [Lynn]	
Week 4	Tu 14	Isotopic Climate Proxies (Chapter 11 – parts) [Lynn]	Isotope Exercise (20 pts)
	Th 16	In-Class Practicum: Lithologic Climate Proxies	
	Sat 18 Sep	*FIELDTRIP (details TBA)*	
Week 5	Tu 21	Intro to Climate System I (Chapter 2) [Susan]	Carbon Cycle Exercise (35 pts)
	Th 23	Dynamics of the Climate System / Global Warming	
Week 6	Tu 28	Evolution of Atmosphere, Faint Young Sun Paradox	
PART II: Major Controls on the Climate System			
	Th 30	The Carbon Cycle (Chapters 4, 11) [Susan]	
Week 7	Tu 5 Oct	Orbital Controls on Climate (Chapters 8, 10, 11) [Susan]	
	Th 7	Plate Tectonics and Climate I (Chapters 4, 5) [Susan]	
Week 8	Tu 12	Plate Tectonics and Climate II [Susan]	
	Th 14	**EXAM I**	Exam I (225 pts)
PART III: Case Studies of Past Climates			
Week 9	Tu 19	The Snowball Earth (Proterozoic) I (p. 89) [Susan]	• Reading Assignments (7@25 pts each)
	Th 21	The Snowball Earth II	• Term Paper Title DUE 21 Oct (10 pts)
Week 10	Tu 26	Annotated Biblio & Literature Search Workshop	
	Th 28	Pangaean Climate (Late Paleozoic) (p. 110-116) [Lynn]	
Week 11	Tu 2 Nov	The Cretaceous Greenhouse (Mesozoic) (p. 129-146) [Lynn]	
	Th 4	The Hothouse Earth (Paleocene-Eocene) [Susan]	
Week 12	Tu 9	Back into the Icehouse (Cenozoic) (p. 147-171) [Susan]	• Term Paper Annotated Biblio DUE 4 Nov (25 pts)
	Th 11	The Quaternary Icehouse (p. 274-329) [Lynn]	
Week 13	Tu 16	Millennial-Scale Climate Change (p. 330-351, 383-404) [Susan]	• Term Paper Draft DUE 18 Nov (50 pts)
	Th 18	Peer Review of Term Paper Drafts [Lynn & Susan]	
Week	**Tu 23**	**EXAM II**	Exam II (225 pts)
	Th 25	THANKSGIVING—no class	
Week	Tu 30	Project Presentations	• Term Paper Oral Evaluations
	Th 2 Dec	Project Presentations	
Week 16	Tu 7	Project Presentations	• Term Paper DUE 9 Dec 5 PM (200 pts)
	Th 9	Project Presentations	