METR 4533 / METR 5533 / GEOL 4533 / GEOL 5533
Earth's Past Climate
Fall 2012

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 text, and journal articles. *You are responsible for material covered in all assigned readings.* Journal readings will be uploaded as pdfs on D2L. Reading primary literature is an important component of advanced education because it requires you to absorb, synthesize and analyze research papers. An online exercise will accompany each non-text reading assignment, due 24 hours prior to the relevant lecture. Further details will be discussed in class.

Term Project: For your term project, you should focus on, and research *extensively*, a paleoclimatic topic selected by you and approved by us. Use existing literature. Project 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 graduates are expected to work independently. This is a semester-long project with components due throughout the semester; see syllabus for due dates. 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. Know the definition of plagiarism, and don't plagiarize. More instructions will follow soon.

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—using uncited material is a form of plagiarism. Good starting points for literature searches are Georef, Web of Science, Geoscience World, and Google Scholar.

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. 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 (35%), Exams (40%), Term Project (25%).

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 21 Aug	Logistics, Philosophy [Both]	Reading assignments throughout semester (210 pts)
	Th 23	Why Study Past Climate? (Chapter 1) [Lynn]	
Week 2	Tu 28 Aug	Plate Tectonics, Rock Cycle (p. 101-112) [Susan]	Radio-isotopic Dating Web Lab (10 pts)
	Th 30	The Earth as a System; Geologic Time and Dating (p. 59-64 for dating; Chapter 4) [Lynn]	
Week 3	Tu 4	Sed Rocks Review, Lithologic Climate Proxies I (Chapter 3) [Lynn]	Sed Rocks/Proxies Lab (25 pts)
	Th 6	Lithologic Climate Proxies II [Lynn]	Leaf Analysis Lab (25 pts)
Week 4	Tu 11	In-Class Practicum: Lithologic Climate Proxies [Lynn]	
	Th 13	Isotope Practicum	Isotope Exercise (25 pts)
Week 5	Tu 18	Isotopic Climate Proxies (Chapter 11 – parts) [Lynn]	
	Th 20	Intro to Climate System I (Chapter 2) [Susan]	Carbon Cycle Exercise (25 pts)
Week 6	Tu 25	Climate System Dynamics / Global Warming (Chapters 2, 18, 19) [Susan]	
PART II: Major Controls on the Climate System			
	Th 27	Evolution of Atmosphere, Faint Young Sun Paradox (Chapter 4) [Susan]	
	Sat 29	*Fieldtrip [detail TBA]*	
Week 7	Tu 2 Oct	Orbital Practicum	Orbital Exercise (30 pts)
	Th 4	Orbital Controls on Climate (Chapters 8, 10, 11) [Susan]	
Week 8	Tu 9	Plate Tectonics and Climate I (Chapters 4, 5) [Susan]	
	Th 11	Plate Tectonics and Climate II [Susan]	Exam I (200 pts)
PART III: Case Studies of Past Climates			
Week 9	**Tu 16**	**EXAM I**	• Wiki Project Title DUE 20 Oct (20 pts)
	Th 18	The Snowball Earth (Proterozoic) I (p. 89) [Susan]	
Week 10	Tu 23	The Snowball Earth II	
	Th 25	Pangaean Climate (Late Paleozoic) (p. 110-116] [Lynn]	
Week 11	Tu 30 Oct	The Cretaceous Greenhouse (Mesozoic) (p. 129-146) [Lynn]	
	Th 1 Nov	The Hothouse Earth (Paleocene-Eocene) [Susan]	• Wiki Project Annotated Biblio DUE 1 Nov (40 pts)
Week 12	Tu 6	Back into the Icehouse (Cenozoic) (p. 147-171) [Susan]	
	Th 8	The Quaternary Icehouse & Last Glacial Max (p. 274-329) [Lynn]	• Wiki Project Draft DUE 15 Nov (100 pts)
Week 13	Tu 13	Millennial-Scale Climate Change (p. 330-351, 383-404) [Susan]	
	Th 15	Peer Review of Term Paper Drafts [Lynn & Susan]	
Week 14	**Tu 20**	**EXAM II**	Exam II (200 pts)
	Th 22	THANKSGIVING—no class	
Week 15	Tu 27	Project Presentations	• Wiki Project Oral Evaluations (grads only; 40 points). Wiki final version DUE
	Th 29	Project Presentations	

Week 16	Tu 4 Dec	AGU [Work on finalizing & uploading Wiki]	27 Nov 5 PM (50 pts grads/ 90 pts undergrads). *Must upload final (corrected) version by Fri, Dec 7 to obtain full credit.*
	Th 6	AGU [Work on finalizing & uploading Wiki]	