SYLLABUS
Paleoclimatology and Paleoceanography
Spring 2009

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Audience: This course is intended for advanced undergraduate and graduate students who are interested in learning about the history of the earth’s climate, and how paleoclimate studies can help us learn more about the workings of the climate system and associated biogeochemical cycles. There are no specific prerequisites, but some coursework in earth sciences, oceanography, and/or geochemistry is helpful.

Format: Tuesday’s class period is devoted to an overview/background lecture on each weekly topic, and during Thursday’s class students will work with instructors on in-class problems related to Tuesday’s lecture material.

Problem sets:
Three problem sets will be assigned during the semester. Problem set must be submitted in Geophysical Research Letters journal article format (instructions provided).

Grading:
25% Recitation section participation & assignments
25% Problem sets
20% Midterm Exam
30% Final Exam


Schedule:

Week 1 (JLS):
Jan 6 Introduction and overview
Jan 8 Global Energy Balance and Faint Young Sun
   Reading: Ruddiman 1st Ed: Ch 2 (pp. 19-31) and 3 for reference
   Ruddiman 2nd Ed: Ch 2
**Week 2 (KMC):**
Jan 13  CO2-Weathering Climate regulation  
Jan 15  Recitation: Energy Balance and Long term CO2  
   Reading: Ruddiman 1st Ed: Ch 4 and 5 for reference  
   Ruddiman 2nd Ed: Ch 3 and 4 for reference  


**Week 3 (KMC):**  
Jan 20  Greehouse Earth: Cretaceous Climate/ Late Paleocene Thermal Maximum  
   Ruddiman 2nd Ed: Ch 5 for reference  
Jan 22  Recitation: Problem Set 1 Work Session  

**Week 4 (JLS):**  
Jan 27  Cenozoic Cooling and Glaciation  
Jan 29  Milankovitch and Monsoons  
   Week 4 Reading: Ruddiman 1st Ed: Ch 7, 8  
   Ruddiman 2nd Ed: Ch 6, 7

**Week 5 (JLS):  Problem Set #1 due**  
Feb 3  Milankovitch and Glaciation  
Feb 5  Recitation: Milankovitch  
   Week 5 Reading: Ruddiman 1st Ed Ch 9, 10  
   Ruddiman 2nd Ed: Ch 8, 9  

**Week 6 (JLS):**  
Feb 10  Ice Core Records of Atmospheric Composition  
Feb 12  Midterm exam

**Week 7 (JLS):**  
Feb 17  Last Glacial Maximum: Ice Sheets, Sea Level, Dust, Dating  
Feb 19  Recitation: Oxygen Isotopes in paleoclimate studies  
   Week 7 Reading: Ruddiman 1st Ed: Ch 13  
   Ruddiman 2nd Ed: Ch 12

**Week 8 (JLS):**  
Feb 24  Last Glacial Maximum: Ocean Circulation  
Feb 26  Recitation: Carbon Isotopes (13C, 14C) in paleoclimate studies  
   Week 8 Reading:

**Week 9 (KC):**
Mar 3 Last Glacial Maximum: Temperature reconstructions
Mar 5 Recitation: Problem Set 2 Work Session
   Week 9 Reading: Ruddiman 1st edition Chapter 13
   Ruddiman 2nd Ed: Chapter 12

**Week 10 (KC):**
Mar 10 Last Glacial Maximum: CO₂
Mar 12 Recitation: Marine biogeochemical cycles
   Week 10 Reading: Ruddiman 1st Ed: Chapter 11
   Ruddiman 2nd Ed: Chapter 10

**Week 11 (JLS):**  **Problem Set #2 due**
Mar 24 Rapid Climate Change – Records from Ice Cores and Land
Mar 26 Recitation: Oxygen isotopes and paleo-hydrology
   Week 11 Reading: Ruddiman 1st Ed: Chapter 15
   Ruddiman 2nd Ed: Ch 14

**Week 12 (JLS):**
Mar 31 Rapid Climate Change – Oceanic Records and Mechanisms
Apr 2 Recitation: Dating paleoclimatic archives

**Week 13 (KC):**
Apr 7 Holocene Climate
Apr 9 Recitation: Problem Set 3 Work Session
   Week 13 Reading: Ruddiman 2nd edition: pp 240-46

**Week 14 (KC):**
Apr 14 Climate change during the last millennium
Apr 16 Recitation: Multi-proxy reconstruction
   Week 14 Reading: Ruddiman 1st Ed: Chapter 15
   Ruddiman 2nd Ed: Chapter 16
Week 15 (KC): **Problem Set #3 due**
Apr 21 A paleoclimate perspective on global warming
  Reading: Intergovernmental Panel on Climate Change AR4, 2007, Executive Summary.
Apr 23 Final Exam Review- Bring questions

May 1, 11:30-2:30pm: **FINAL EXAM**