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**