SYLLABUS
Paleoclimatology and Paleoceanography
Spring 2007

Prof. Jean Lynch-Stieglitz
Email: jean@eas.gatech.edu
Phone: 404-894-3994
Office Hours: by appointment 1236 ES&T

Prof. Kim Cobb
Email: kcobb@eas.gatech.edu
Phone: 404-894-1992
Office Hours: by appointment 2234 ES&T

Website: http://shadow.eas.gatech.edu/~jean/paleo/

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. 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 on in-class problems related to Tuesday’s lecture material and weekly readings, and instructors will answer student questions.

Discussion: Graduate students must attend the weekly discussion of journal article(s), and will be asked to lead this discussion twice each semester. For undergraduates, the discussion is optional. Undergraduates who are pursuing paleoclimate research are strongly encouraged to participate in the discussion section as well.

Problem sets:
Three problem sets will be assigned during the semester. A write-up of each 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 9 Introduction and overview
Jan 11 Global Energy Balance and Faint Young Sun
Reading: Ruddiman Ch 2 (pp. 19-31) and 3 for reference

**Week 2 (JLS):**
Jan 16 CO2-Weathering Climate regulation
Jan 18 Recitation: Energy Balance and Long term CO2
   Reading: Ruddiman Ch 4 and 5 for reference

**Week 3 (JLS):**
Jan 23 Greenhouse Earth: Cretaceous Climate/ Late Paleocene Thermal Maximum
Jan 25 Recitation: Problem Set 1 Work Session

**Week 4 (JLS):**
Jan 30 Cenozoic Cooling and Glaciation
Feb 1 Milankovitch and Monsoons
   Week 4 Reading: Ruddiman Ch 7, 8

**Week 5 (JLS):**  **Problem Set #1 due**
Feb 6 Milankovitch and Glaciation
Feb 8 Recitation: Milankovitch
   Week 5 Reading: Ruddiman Ch 9, 10

**Week 6 (JLS):**
Feb 13 Ice Core Records of Atmospheric Composition
Feb 15 Midterm Exam

**Week 7 (JLS):**
Feb 20 Last Glacial Maximum: Ice Sheets, Sea Level, Dust, Dating
Feb 22 Recitation: Oxygen Isotopes in paleoclimate studies
   Week 7 Reading: Ruddiman Ch 13

**Week 8 (JLS):**
Feb 27 Last Glacial Maximum: Ocean Circulation
Mar 1 Recitation: Carbon Isotopes (13C, 14C) in paleoclimate studies
   Week 8 Reading:

J. Lynch-Stieglitz, et al. review submitted to Science

Week 9 (KC):
Mar 6 Last Glacial Maximum: Temperature reconstructions
Mar 8 Recitation: Problem Set 2 Work Session
Week 9 Reading: Ruddiman Chapter 13

Week 10 (KC):
Mar 13 Last Glacial Maximum: CO2
Mar 15 Recitation: Marine biogeochemical cycles
Week 10 Reading: Ruddiman Chapter 11

Week 11 (KC): Problem Set #2 due
Mar 27 Rapid Climate Change – Records from Ice Cores and Land
Mar 29 Recitation: Oxygen isotopes and paleo-hydrology
Week 11 Reading: Chapter 15

Week 12 (KC):
Apr 3 Rapid Climate Change – Oceanic Records and Mechanisms
Apr 5 Recitation: Dating paleoclimatic archives

Week 13 (KC):
Apr 10 Holocene Climate
Apr 12 Recitation: Problem Set 3 Work Session
Week 13 Reading: Ruddiman Chapter 14

**Week 14 (KC):**
- Apr 17 Climate change during the last millennium
- Apr 19 Recitation: Multi-proxy reconstruction
  - Week 14 Reading: Ruddiman Chapter 16; National Academies of Science: Surface Temperature Reconstructions for the last 2000 years

**Week 15 (KC):** **Problem Set #3 due**
- Apr 24 A paleoclimate perspective on global warming
  - Reading: Intergovernmental Panel on Climate Change 2001, Executive Summary.
- Apr 26 Final Exam Review- Bring questions

May 3, 8-11am: **FINAL EXAM**