270.377-Climates of the Past
Spring 2011

Earth's climate history through study of forcing mechanisms, climate proxies, and paleoclimate modeling. Presentation of climate-sensitive archives will be followed by discussion of geochemical principles, climates through time, recent advances and emerging problems. For upper-level undergraduate and graduate students in the natural sciences. Prerequisite: 270.220, or instructors' permission (3 credits; Hinnov, Levin, Passey).

Instructors: Dr. Linda Hinnov, hinnov@jhu.edu - Office: Room 227, Olin Hall
Dr. Ben Passey, bhpassey@jhu.edu - Office: Room 120, Olin Hall
Dr. Naomi Levin, nlevin3@jhu.edu - Office: Room 123, Olin Hall

Meetings: Tuesdays, Thursdays, 1:30-2:45 pm, Room 304, Olin Hall

Requirements: 3 problem sets (15% each), 1 midterm exam (20%), 1 final exam (25%), attendance (10%)

Text: *Encyclopedia of Paleoclimatology and Ancient Environments*, by Vivien Gornitz, 2009. Go to: https://catalog.library.jhu.edu/ipac20/ipac.jsp?profile=default type the book title into the search field, follow to SpringerLink, and download pdfs (click on links in left panel). Paleoclimates: Understanding Climate Change Past and Present (2010) by Thomas Cronin will be available on the library reserve as an additional reference.

Resources: Blackboard site (http://blackboard.jhu.edu): Course PPTs and additional readings.

Schedule:

Class #	Date	Day	Description (Instructor)
1	02.01	T	First day of class; Introduction (Hinnov)
2	02.03	Th	Climate forcing--Part 1 (solar radiation; astronomical forcing; albedo) (Hinnov)
3	02.08	T	Climate forcing--Part 2 (GHGs, aerosols; tectonics; weathering; feedbacks) (Hinnov)
4	02.10	Th	Global circulation (atmosphere; oceans; climate zones; monsoons) (Hinnov)
5	02.15	T	Climate variations and the paleoclimate spectrum (Hinnov)
6	02.17	Th	Intro. to paleoclimate archives (sedimentary rocks, ice, fossil fauna and flora) (Hinnov)
7	02.22	T	Dating--Part 1 (biostratigraphy; magnetostratigraphy; radiometric techniques) (Hinnov)
8	02.24	Th	Dating--Part 2 (varves; astrochronology; chemostratigraphy; emerging techniques) (Hinnov)
9	03.01	T	Ice cores: stable isotope thermometry (Passey) (Problem Set 1 due)
10	03.03	Th	Ice cores: trapped gases, past atm composition, gas age versus ice age (Passey)
11	03.08	T	CO_2 proxies: leaf stomata, soil carbonate carbon isotopes (Passey)
12	03.10	Th	Futures Seminar (attendance required)
13	03.15	T	CO_2 proxies: seawater pH (boron isotopes), alkenone carbon isotopes (Passey)
14	03.17	Th	MIDTERM EXAM in class period
	03.22	T	spring break
	03.24	Th	spring break
15	03.29	T	Temperature proxies: inorganic stable isotope thermometers, Mg/Ca (Passey)
16	03.31	Th	Temperature proxies: organic thermometers (TEX86, UK37) (Passey)
17	04.05	T	Terrestrial systems introduction (Levin) (Problem Set 2 due)
18	04.07	Th	Speleothems (Levin)
19	04.12	T	Tree rings, pollen, leaf physiogomy, packrat middens (Levin)
20	04.14	Th	Mammals and soils (Levin)
21	04.19	T	Long-term trends throughout Earth History; intro to 'examples' (Levin)
22	04.21	Th	Examples of Earth's climate: PETM, Cretaceous, Carboniferous, Snowball (Levin)
23	04.26	T	Examples of Earth's climate: PETM, Cretaceous, Carboniferous, Snowball (Levin)
24	04.28	Th	Examples of Earth's climate: PETM, Cretaceous, Carboniferous, Snowball (Levin/Henkes)
25	05.03	T	Introduction to paleoclimate modelling – EdGCM (Levin/Passey/Hinnov)
26	05.05	Th	Discussion of modelling results (Levin/Passey/Hinnov) (Problem Set 3 due)
	May 11-19		FINAL EXAM in exam period