ESE/Ge 148c, Global Biogeochemical Cycles

Spring 2006

Logistics
When: MWF, 10:00 – 10:55am
Where: North Mudd 142
Web Page: www.gps.caltech.edu/classes/ge148c/

Instructors
Professor: Alex Sessions   phone: x6445
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Office hours: afternoons or by arrangement

TA: Ashley Jones (G2, ESE)   phone: x2320
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Office hours: by arrangement

Reading

Grading/Assignments
• 10% - Class participation, including paper discussions.
• 30% - Problem sets (3).
• 10% - Idea for automotive ‘X-prize’ (2 pages, twice)
• 20% - Term paper (5-7 pages).
• 30% - Final exam. 72-hour take-home exam covering everything about everything in great detail.

Important Dates
March 27 – First day of class
April 5 – X-prize idea due
April 10 – no class, Alex travelling
April 12 – PS#1 due
April 26 – Term paper due
May 10 -- PS#2 due
May 26 – PS#3 due
May 26 – last day of classes for seniors
May 29 – no class, Memorial Day
June 2 – revision of X-prize idea due
June 2 – last day of class for everyone
June 7-9 – exam period
Lecture Topics

This list of topics is tentative, and may change depending on how fast we actually cover materials in class, as well as the interests of the students. If there is a particular subject you would like to see covered, let me know. The lecture schedule will be posted on the course web page and updated frequently. Lecture slides will be posted there prior to each lecture.

- Biogeochemistry and phenomenology
- Co-evolution of the Earth and life
- Chemical equilibria (esp. carbonate)
- Redox reactions (esp. organic)
- Stable isotopes
- The lithosphere, plate tectonics, weathering and erosion
- The pedosphere, soil composition and formation
- The oceans, circulation and chemistry
- The atmosphere, composition and structure
- The hydrologic cycle
- The biosphere, composition and structure
- Box models and feedback loops
- Ecosystems, function and measurement
- Photosynthesis and primary production
- Organic matter degradation and preservation
- Global Carbon cycle
- Nitrogen cycle
- Phosphorous cycle
- Oxygen cycle
- Methane cycle
- Nitrous oxide in the atmosphere
- Stratospheric ozone and oxidation capacity of the atmosphere
- Climate change and Earth systems
- Global change in the arctic
- Acid rain and forest ecosystems
- Human domination of biogeochemical cycles