

SIO 117 (Spring 2007)
The Physical Climate System

Instructor: Joel Norris 440 NH 822-4420 jnorris@ucsd.edu

Textbook: Hartmann's "Global Physical Climatology"

Website: You should frequently check the website for updates:
<http://meteora.ucsd.edu/~jnorris/sio117/sio117.html>.

Grading: 35% final, 20% midterm, 35% homework, 10% classroom participation.

Reading: Students are expected to read the assigned material *before* class time.

Homework Problems: Many answers to homework problems are in the back of the textbook so students should describe in clear detail how they obtain solutions. Homework problems must be completed on time and extensions will be granted only in exceptional circumstances.

Collaboration: Students are encouraged to work together on the homework assignments as long as each student individually develops his or her own answers.

Examinations: There will be a midterm and a final. No collaboration is allowed.

Topics:

Introduction to the Climate System: atmospheric structure and composition; properties of the ocean, ice, and land surface

Global Energy Balance: solar and terrestrial radiation emission; planetary albedo; greenhouse effect; poleward energy transport

Atmospheric Radiative Transfer: electromagnetic radiation; selective absorption and emission by atmospheric gases; effects of clouds

Surface Energy Balance: heat storage; radiative, sensible, and latent energy fluxes; diurnal variations

Hydrological Cycle: transport of water between the ocean, atmosphere, and land; evaporation and transpiration

Atmospheric General Circulation: atmospheric motions; transport of energy and momentum; large-scale circulation patterns

Ocean General Circulation: ocean structure and composition; wind-driven circulation; deep thermohaline circulation

Earth's Climate History: climate of the early Earth; geological record; ice ages

Climate Sensitivity and Feedbacks: definitions; water vapor, ice albedo, cloud, and other feedbacks; role of biology

Global Climate Models: atmosphere, ocean, land surface, and sea ice components; model validation; types of experiments

Natural and Anthropogenic Climate Change: solar variations; volcanic eruptions; orbital parameter variations; anthropogenic aerosol and greenhouse gas emissions; outlook for the future