GEO 160 Global Climate Change—Spring 2012

Prof. Robert Allen
Office: Geology 1230

Lecture: Tues & Thurs 2:10-4:00
Discussion: Tues & Thurs 4:10-5:00

Course Goal and Structure: Introduction to fundamental aspects of modern-day climate change. This course (1) develops an understanding of how and why climate is changing; (2) examines the role of humans in driving this change; (3) looks to future rates and impacts of global warming; and (4) reviews the scientific assessments of climate change.

Grades: Grades are determined based on class participation (10%), problem sets/labs (20%), and two examinations (35% each).

Textbooks: The primary text for the course is, "*Introduction to Modern Climate Change*", by Andrew E. Dessler. Students must also read "*The Discovery of Global Warming*", by Spencer R. Weart. We will also cover the *IPCC (2007), Summary for Policymakers (SPM), Working Groups 1-3* (available online).

Additional material (supplementary reading) comes from the following texts:

Global Warming: Understanding the Forecast, by David Archer
Global Warming: The Complete Briefing, by John Houghton
Climate Change and Climate Modeling, by J. David Neelin
Global Physical Climatology, by Dennis L. Hartmann
Understanding Weather and Climate, by Edward Aguado and James E. Burt

Below is a list of topics we will discuss.

Week 1	**Introduction—What is climate?** **Is the climate changing?** **Chaos, exponential growth and uncertainty**	**Ch. 1-2, 10 (Dessler)**
Week 2	**Radiation and energy balance** **A simple climate model** **Greenhouse gases** **The greenhouse effect**	**Ch. 3-4 (Dessler)**

Week 3	**The carbon cycle** **Thermal structure of the atmosphere** **Air pressure and density** **Convection** **Atmospheric Stability**	**Ch. 5 (Dessler)** **Ch. 5 & 10 (Archer)** **Ch. 4 (Aguado & Burt)**
Week 4	**The hydrological cycle** **Clouds and atmospheric moisture** **Atmospheric circulation and dynamics**	**Ch. 5-6 (Hartmann)** **Ch. 5-6, 8 (Aguado & Burt)**
Week 5	**Weather (e.g, mid-latitude cyclones, fronts)** **Mid-term**	**Ch. 6 (Archer)** **Ch. 9-10 (Aguado & Burt)**

Week 6	**Tropical storms & hurricanes** **Natural climate variability (e.g., El Nino-Southern Oscillation)**	**Ch. 8, 12 (Aguado & Burt)** **Ch. 7 (Dessler)**
Week 7	**Ocean circulation** **Ozone hole**	**Ch. 13 (Dessler)** **Ch. 8 (Aguado & Burt)**
Week 8	**Climate change scenarios in SoCal** **Milankovich cycles** **Paleoclimate (glacial/interglacial cycles) and climate proxies**	**Ch. 2, 7 (Dessler)** **Ch. 16 (Aguado & Burt)**
Week 9	**Forcing, feedbacks, and climate sensitivity** **Emission Scenarios** **Future climate projections** **Climate modeling**	**Ch. 6, 8 (Dessler)** **Ch. 5 (Neelin)**

Week 10	**Climate Impacts Adaptation & Mitigation 2°C stabilization level**	**Ch. 9, 11-12, 14 (Dessler) IPCC SPM Ch. 7 (Houghton)**