

GEOL150L: Climate Change



Department of Earth Sciences, University of Southern California

Synopsis

This general education undergraduate course will introduce students to the fundamentals of natural and anthropogenic climate change. After briefly recalling the formation of the solar system, our planet and its fluid envelopes, we will introduce the basic physics of the climate system, providing tools to understand everyday weather and longer-term phenomena like monsoons, multiyear climate oscillations (e.g. El Niño), as well as the greenhouse effect. Building on this understanding, a succinct tour of geologic history will help us paint a more complete picture of Earth's climate variations and how they affected human evolution and history. With this context, we will be able to judge the anomalous character of recent climate change, establish its anthropogenic nature, and discuss ways out of the current crisis.

Instructor	Prof. Julien Emile-Geay (julieneg@usc.edu)
Assessment	Midterm 1 20% ; Midterm 2 20% Final Exam 20% Lab reports (11 problem sets) 30%; Weekly quiz using ResponseWare 10%
Dates	Spring semester, 2010.
Class meeting times	<i>MWF</i> 10am – 10:50am (<u>lecture</u>) <i>Lab</i> : 2h/week
Location	THH 301 (Taper Hall)
Office hours	<i>MWF</i> 11am – 12am. ZHS 275
Units	4

Lecture Text

- Aguado E. and Burt J.E. *Understanding weather and climate, 5th edition*. Custom Edition 2010. (order from the bookstore)

Syllabus (Spring 2011)

Climate Physics	<u>Week 1</u> (Jan 10 - Jan 14) M: Organizational meeting. Climate change controversy. W: In the beginning... Earth's formation. F: Atmospheric composition and structure. Reading : <i>Aguado & Burt, Chap 1</i>
Climate Physics	<u>Week 2</u> (Jan 19 - Jan 21) M: no class Jan 17 in observance of Dr Martin Luther King Jr day W: What is Energy ? Energy types & conversions. F: What is Radiation ? Heat and temperature. Reading : <i>Aguado & Burt, Chap 2</i>

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Energy Balance	<u>Week 3</u> (Jan 24 - Jan 28) . Lab 1 : Energy Balance M: The Earth's energy Balance. W: Water in the atmosphere: atmospheric moisture and clouds F: The greenhouse effect. Greenhouse gases. Global warming. Reading : <i>Aguado & Burt, Chap 3,5</i>
Atmospheric & Oceanic Motion	<u>Week 4</u> (Jan 31 - Feb 4) Lab 2 : Greenhouse Gases M: General Atmospheric Circulation. W: The Earth's Oceans F: Ocean Circulation and climate. Reading : <i>Aguado & Burt, Chap 4,8</i>
Climate Variability	<u>Week 5</u> (Feb 7 - Feb 11) Lab 3 : Ocean Circulation M: Midterm Review W: Midterm 1 F: Movie Day: CO ₂ , the Biggest Control Knob Assignment: http://www.agu.org/meetings/fm09/lectures/lecture_videos/A23A.shtml
Weather & Climate	<u>Week 6</u> (Feb 14 - Feb 18). Lab 4: Atmospheric Circulation M: Why it rains: weather systems and their role W: Tropical Cyclones: Hurricanes and Typhoons. F: Droughts and Floods Reading : <i>Aguado & Burt, Chap 10,12</i>
Climate Variability	<u>Week 7</u> (Feb 23 - 25). Lab 5 : The Seasonal Cycle M: no class Feb 21 for President's Day W: Seasonal Cycle. Monsoons. F: El Niño: origins and impacts Reading : <i>Aguado & Burt, Chap 8, (p247 on) + tutorials</i>
History of Climate 1	<u>Week 8</u> (Feb 28 - Mar 4) Lab 6 : El Niño M: Proxies Used to Reconstruct Past Climates W: Timescales of climate variability F: Cenozoic Climate Change Reading: TBD
History of Climate 2	<u>Week 9</u> (Mar 7 - Mar 11) no lab M: The Carbon Cycle W: Glaciers and Glaciations F: Pleistocene Ice Ages: Astronomical Theory Assignment: http://www.agu.org/meetings/fm09/lectures/lecture_videos/A23A.shtml
	Spring Break Mar 14 - Mar 19
History of Climate 3	<u>Week 10</u> (Mar 21 - Mar 25) Lab 7 : Milankovitch Cycles M: Abrupt Climate Change & the deglaciation. W: The Hockey Stick controversy F: Societal collapse and climate change Assignment: http://www.stateoftheplanet.org/content/video

Climate and Man	<p><u>Week 11</u> (Mar 28 - Apr 1) Lab 8 : Carbon part 1 M: Climate shaping mankind: Human Evolution and Climate Change W: Humans shaping climate: the Anthropocene & the Industrial Revolution F: Midterm Review Reading : <i>Davis, M. "Welcome to the Anthropocene"</i></p>
Climate and Man	<p><u>Week 12</u> (Apr 5 - Apr 9) Lab 9 : Carbon part 2 M: Midterm 2. Rooms TBA W: Climate Modeling I. The pioneers: Tyndall and Arrhenius F: Climate Models II : Global Climate Models Reading : <i>IPCC AR 4 Summary for Policy Makers</i></p>
Climate and Man	<p><u>Week 13</u> (Apr 12 - Apr 16) Lab 10 : The IPCC report M: IPCC WG1. Detection and Attribution W: IPCC WG1. Climate Projections: Understanding the forecast F : Climate controversy: Unequivocal Evidence vs. Climate Denialism <i>Assignment: http://www.uctv.tv/search-details.asp?showID=13459</i></p>
Climate and Man	<p><u>Week 14</u> (Apr 19 - Apr 23) Lab 11 : "How to talk to a global warming skeptic" M: The case for Anthropogenic Climate Change W: IPCC WG2 : Impacts on societies & ecosystems F: IPCC WG3: Adaptation & Mitigation Reading : <i>TBD</i></p>
Climate and You	<p><u>Week 15</u> (Apr 26 - Apr 30) no lab M: Climate Change in LA (with guest speaker). W: Climate Change at USC (with guest speaker). F: Final Review Session Assignment : TBD</p>
Final	<p><u>Week 16</u> (May 4 - 11) Final Exam : date and time TBA.</p>

Academic Accommodations:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to us as early in the semester as possible. DSP can be reached at ability@usc.edu and is open 8:30am-5:00pm Monday through Friday. The phone number for DSP is 213-740-0776.