

# **SEA CHANGE: THE RISE AND FALL OF SEA LEVEL AND THE JERSEY SHORE**

**Kenneth G. Miller** Department of Earth and Planetary Sciences,  
Wright Labs Room 246 (445-3622; [kgm@rci.rutgers.edu](mailto:kgm@rci.rutgers.edu))

01 460 110 (3 credits) Lecture: Wright Lab Auditorium Busch, T, Th 5<sup>th</sup> period (3:20-4:40)

Recitations: every other Thursday: section 1 WL 260, Stephen Graham; section 2 SEC211, Gabe Gallegos;  
section 3 WL Aud, Chris Johnson; section H WL239 Jesse Thornburg

**Learning Goals and Outcomes.** This course fulfills the Natural Sciences and 21<sup>st</sup> Century Challenges requirements by having students learn and apply basic concepts of physics, chemistry, geology, oceanography, and atmospheric science to the history of sea-level and climate change. Students are required to understand the science of climate change, ocean and atmospheric circulation, nearshore coastal processes, and the history of climate and sea-level change during Earth history. They will evaluate relationships among anthropogenic carbon dioxide release, temperature, and modern sea-level rise and test the role of carbon dioxide and other greenhouse gasses through time by evaluating their relationship over Earth history. Students are evaluated through lecture-based exams (midterm 35% and final (noncumulative) 35%), attendance (5%), and recitation (25%). In recitation, students: 1) complete problem sets and/or laboratory exercises and interact with teaching assistants to complete the sets and discuss issues arising from the lectures; and 2) students give short presentations from a group of suggested topics or ones approved by the class oversight team. Students are encouraged to select topics in their field of interest, looking for intersections amongst science, economics, ethics, political, and legal issues.



Date	Lecture	Assignment
	<i>Background: Climate and sea-level change</i>	
Sept. 1, Tu	1. Introduction: climate controversy, sea level, & Jersey shore	Hudson, Chap. 1; Crichton, State of Fear
Sept. 3, Th	2. How the Earth works	Hudson, Chapter 2
Sept. 8, Tu	No class Monday schedule	Hudson, Chapter 3

Sept. 10, Th	NO LECTURE THURSDAY	<b>Recitation: CO<sub>2</sub> budget worksheet; pretest; State of Fear discussion</b>
Sept. 15, Tu	3. Plate Tectonics, evolution, atmosphere	Hudson, Chapter 3
Sept. 17, Th	4. Climate and the greenhouse effect	Hudson Chapter 14.3
Sept. 22, Tu	5. Ocean Circulation and storms	
Sept. 24, Th	NO LECTURE THURSDAY	<b>Recitation: geological record of sea level</b>
Sept 29, Tu	6. Beach processes (tides, currents, waves)	Hudson Chapter 9
Oct. 1, Th	7. Sandy comes to the Jersey shore	Reading TBA
	<i>History sea-level change and Earth history</i>	
Oct. 6, Tu	8. Sea-level change	
Oct. 8, Th	NO LECTURE THURSDAY	<b>Recitation: oxygen isotopes &amp; review</b>
Oct. 13, Tu	9. Instrument scale climate change	Hudson Chapter 14.4, 14.5
Oct. 15, Th	10. Reconstructing temperature & climate: Paleorecord	
Oct. 20, Tu	<b>Mid term exam</b>	
Oct. 22, Th	11. The Carbon cycle and first 3 billion years of Earth	<a href="http://www.indiana.edu/~g105lab/1425chap11.htm">Hoffman &amp; Schrag, Sci Am; http://www.indiana.edu/~g105lab/1425chap11.htm;</a>
Oct. 27, Tu	12. Phanerozoic (last 535 Myr) Icehouses & Greenhouses	
Oct. 29, Th	NO LECTURE RECITATION	<b>Recitation: student presentations I</b>
Nov. 3, Tu	13. Ice Ages and abrupt climate change; Nicole Abdul	
Nov. 5, Th	14. Last 10,000 year and Noah's Ark	
	<i>Economic, ethical and political impacts</i>	
Nov. 10, Tu	15. Predicting the future	
Nov. 12, Th	16. Impacts of sea-level rise	
Nov. 17, Tu	NO LECTURE THURSDAY	<b>Recitation: student presentations</b>
Nov. 19, Th	17. Fighting back: Politics of sea level rise	
Nov 24, Tu	18. Mass Extinction	
Nov 26, Th	Thanksgiving	
Dec. 1, Tu	19. Energy Options	
Dec. 3, Th	NO LECTURE THURSDAY	<b>Recitation: student presentations</b>
Dec. 8, Tu	20. The Economics of Climate Change	
Dec. 10 Th	NO LECTURE THURSDAY	<b>Recitation: student presentations</b>

Final noncumulative exam Thursday December 17, 8-11 AM WL Auditorium

Pages in Crichton e-book pp. 82-92, 336-364, 522-529; or paperback pp. 91-100, 404-429, 625-638;