

SIO 217a Atmospheric and Climate Sciences I: Atmospheric Thermodynamics

Course Syllabus and Lecture Schedule

Instructor: Lynn Russell, 343 NH, 534-4852, lmrussell@ucsd.edu
Text: *Thermodynamics of Atmospheres and Oceans*, J. A. Curry & P. J. Webster (1999)

Fall 2012	Ch Skip:	Title and Topics
1-Oct M	1 1.2, 1.8-9	Composition, Structure, and State (Composition and Vertical Structure. Kinetic-Molecular Model of the Ideal Gas. Equation of State. Hydrostatic Equilibrium.)
3-Oct W	2 2.11	First and Second Laws of Thermodynamics (Work, Heat, First Law, Second Law, Heat Capacity, Adiabatic Processes)
5-Oct F		Hurricane Example (Emmanuel) + Homework (Ch1-2) Recitation
8-Oct M	3 3.4-6	Transfer Processes (Time-dependent Thermodynamics. Radiant Energy. Radiative Transfer. Transport.)
10-Oct W	3	More Transfer Processes
15-Oct M	4 4.5-6	Thermodynamics of Water (Molecular Structure, Properties of Water. Phase Equilibria. Atmospheric Humidity Variables.)
17-Oct W	4	More Water Thermodynamics
19-Oct F		Energy Balance Example (Ch12) + Homework (Ch3-4) Recitation
22-Oct M	5 5.5-7	Nucleation (Surface Tension. Droplet Nucleation. Droplet Growth. Ice Formation.)
24-Oct W	5	More Nucleation. Project Assignments.
26-Oct F		Cloud Demo + Review (Example Questions and Derivations) + Project Discussions
29-Oct M	6	Moist Thermodynamic Processes in the Atmosphere (Isobaric Cooling. Evaporation of Water. Adiabatic, Isobaric Mixing. Saturated Adiabatic Cooling. Ice Phase. Conserved Moist Thermodynamic Variables. Thermodynamic Diagrams.)
31-Oct W		Midterm (Ch. 1-4)
5-Nov M	6	More Moist Thermodynamics
7-Nov W		Projects: Adiabatic Cloud Model
9-Nov F		Project Recitation (Programming with Johannes)
12-Nov M		Veteran's Day
14-Nov W	7	Introduction to Stability: Application and Limitations of Dry Theory (pp. 191-194 ONLY)
16-Nov F	8	Cloud Characteristics and Processes (Cloud Classification and Characteristics. Precipitation Processes. Radiative Transfer in a Cloudy Atmosphere. Fogs, Stratus, and Stratocumulus Clouds. Cumuliform Clouds.)
19-Nov M	12	Global Energy and Entropy Balances (Planetary Radiation Balance. Global Heat Engine. Entropy and Climate. Global Hydrologic Cycle. Water Vapor Feedback. Cloud-Radiation Feedback. Snow/Ice-Albedo Feedback.)
21-Nov W		Rescheduled to 11/16? (Class Decision)
		Thanksgiving (holiday)
26-Nov M	12	More Global Energy Balances
28-Nov W	13 13.6-7	Thermodynamic Feedbacks in the Climate System
30-Nov F		ROAST Presentation Practice
3-Dec M		ROAST Presentations (start at noon, submit presentations to Alexis in advance)
5-Dec W		Jeopardy Review Session (Alexis will be MC, Lynn will attend by Skype)
13-Dec Th		Final Exam (Ch. 1-8, 12, 13, ROAST)