

SIO 217a Atmospheric and Climate Sciences I: Atmospheric Thermodynamics

Course Syllabus and Tentative Lecture Schedule

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Text: *Thermodynamics of Atmospheres and Oceans*, J. A. Curry & P. J. Webster (1999)

Fall 2008	Ch	Skip:	Title and Topics
24-Sep	Th	1	Composition, Structure, and State 1.2, Composition and Vertical Structure. Kinetic-Molecular Model of the Ideal Gas. Equation 1.8-9 of State. Hydrostatic Equilibrium.
29-Sep	Tu	2	First and Second Laws of Thermodynamics
1-Oct	Th	2.11	Work, Heat, First Law, Second Law, Heat Capacity, Adiabatic Processes
6-Oct	Tu	3	Transfer Processes
8-Oct	Th		Time-dependent Thermodynamics. Radiant Energy. Radiative Transfer. Transport.
13-Oct	Tu	4	Thermodynamics of Water
15-Oct	Th	4.5-6	Molecular Structure, Properties of Water. Phase Equilibria. Atmospheric Humidity Variables.
20-Oct	Tu	5	Nucleation
22-Oct	Th		Review
27-Oct	Tu		Midterm (Ch. 1-4)
29-Oct	Th	*	Class rescheduled
3-Nov	Tu	5.5-7	Surface Tension. Droplet Nucleation. Droplet Growth. Ice Formation.
5-Nov	Th	6	Moist Thermodynamic Processes in the Atmosphere
10-Nov			Isobaric Cooling. Evaporation of Water. Adiabatic, Isobaric Mixing. Saturated Adiabatic Cooling. Ice Phase. Conserved Moist Thermodynamic Variables. Thermodynamic Diagrams.
12-Nov	Th	7	Stability Criteria. Stability of a Saturated Atmosphere. Processes Changing Stability.
17-Nov	Tu	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	Th	12	Global Energy and Entropy Balances Planetary Radiation Balance. Global Heat Engine. Entropy and Climate. Global Hydrologic Cycle. Introduction to Feedback and Control Systems. Water Vapor Feedback. Cloud-Radiation Feedback. Snow/Ice-Albedo Feedback.
24-Nov	Tu	13	13.6-7 Thermodynamic Feedbacks in the Climate System
26-Nov	Th		Thanksgiving (holiday)
1-Dec	Tu		ROAST Presentations
3-Dec	Th		ROAST Presentations
TBD	*		Review
10-Dec	Th		Final Exam (Ch. 1-8, 12, 13, ROAST)