

# 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
25-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.
30-Sep	Tu	2	First and Second Laws of Thermodynamics
2-Oct	Th	2.11	Work, Heat, First Law, Second Law, Heat Capacity, Adiabatic Processes
7-Oct	Tu	3	Transfer Processes
9-Oct	Th		Time-dependent Thermodynamics. Radiant Energy. Radiative Transfer. Transport.
14-Oct	Tu	4	Thermodynamics of Water
16-Oct	Th	4.5-6	Variables.
21-Oct	Tu		Review
23-Oct	Th		<b>Midterm (Ch. 1-4)</b>
28-Oct	Tu	5	Nucleation
30-Oct	Th	5.5-7	Surface Tension. Droplet Nucleation. Droplet Growth. Ice Formation.
4-Nov	Tu	6	Moist Thermodynamic Processes in the Atmosphere
6-Nov	Th		Cooling. Ice Phase. Conserved Moist Thermodynamic Variables. Thermodynamic
11-Nov	Tu	7	Static Stability of the Atmosphere
13-Nov	*		Stability Criteria. Stability of a Saturated Atmosphere. Processes Changing Stability.
18-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.
20-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.
25-Nov	Tu	13	13.6-7 Thermodynamic Feedbacks in the Climate System
27-Nov	Th		Thanksgiving (holiday)
2-Dec	Tu		ROAST Presentations
TBD	*		ROAST Presentations
4-Dec	Th		Review
11-Dec	Th		<b>Final Exam (Ch. 1-8, 12, 13, ROAST)</b>