

SIO 217a Atmospheric and Climate Sciences I: Atmospheric Thermodynamics

Course Syllabus and Lecture Schedule

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

Fall 2010	Ch	Skip:	Title and Topics
26-Sep 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.)
28-Sep W	2	2.11	First and Second Laws of Thermodynamics (Work, Heat, First Law, Second Law, Heat Capacity, Adiabatic Processes)
3-Oct M	2		
5-Oct W	7		Introduction to Stability: Application and Limitations of Dry Theory (pp. 191-194 ONLY)
10-Oct M	3	3.4-6	Transfer Processes (Time-dependent Thermodynamics. Radiant Energy. Radiative Transfer. Transport.)
12-Oct W	4	4.5-6	Thermodynamics of Water (Molecular Structure, Properties of Water. Phase Equilibria. Atmospheric Humidity Variables.)
17-Oct M	4		
19-Oct W			Review
24-Oct M			Midterm (Ch. 1-4)
26-Oct W	5	5.5-7	Nucleation (Surface Tension. Droplet Nucleation. Droplet Growth. Ice Formation.)
31-Oct M	5		
2-Nov W	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.)
7-Nov M	6		
9-Nov W	7		Stability (Criteria. Stability of a Saturated Atmosphere. Processes Changing Stability.)
14-Nov M	8		Cloud Characteristics and Processes (Cloud Classification and Characteristics. Precipitation Processes. Radiative Transfer in a Cloudy Atmosphere. Fogs, Stratus, and Stratocumulus Clouds. Cumuliform Clouds.)
16-Nov W	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 M	12		
22-Nov Tu	13	13.6-7	Thermodynamic Feedbacks in the Climate System
			Thanksgiving (holiday)
28-Nov M			ROAST Presentations
29-Nov Tu			ROAST Presentations
TBD	*		Review
8-Dec Th			Final Exam (Ch. 1-8, 12, 13, ROAST)