

# SIO 217a Atmospheric and Climate Sciences I: 2013 Fall Atmospheric Thermodynamics

## Course Syllabus and Lecture Schedule

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

Date	Dy	Ch	Skip:	Hmwk	Title and Topics
30-Sep	M	1	1.2, 1.8-9		PODCAST: Composition, Structure, and State (Composition and Vertical Structure. Kinetic-Molecular Model of the Ideal Gas. Equation of State. Hydrostatic Equilibrium.)
2-Oct	W	1			PODCAST: More on Composition, Structure, and State.
4-Oct	F				No Office Hour
7-Oct	M	2	2.11		First and Second Laws of Thermodynamics (Work, Heat, First Law, Second Law, Heat Capacity, Adiabatic Processes)
9-Oct	W	2			More on Laws
11-Oct	F				Office Hour: Hurricane Example (Emmanuel) + Homework 1+2
14-Oct	M	3	3.4-6	1+2 due!	Transfer Processes (Time-dependent Thermodynamics. Radiant Energy. Radiative Transfer. Transport.)
16-Oct	W	12			Energy Balance Example (Ch12)
18-Oct	F				Office Hour rescheduled to Oct. 21 at 4pm or by appointment (Homework 3)
21-Oct	M	4	4.5-6		Thermodynamics of Water (Molecular Structure, Properties of Water. Phase Equilibria. Atmospheric Humidity Variables.)
23-Oct	W	4		3 due!	More on Thermodynamics of Water.
25-Oct	F				Office Hour rescheduled to Oct. 28 at 4pm or by appointment (Homework 4)
28-Oct	M	5	5.5-7		Nucleation (Surface Tension. Droplet Nucleation. Droplet Growth. Ice Formation.) <b>Project Assignments.</b>
30-Oct	W	6		4 due!	Moist Thermodynamic Processes in the Atmosphere (Isobaric Cooling. Evaporation of Water. Adiabatic, Isobaric Mixing. Saturated Adiabatic Cooling.)
1-Nov	F				Office Hour: Review (Example Questions and Derivations)
4-Nov	M	6			More Moist Thermodynamics (Ice Phase. Conserved Moist Thermodynamic Variables)
6-Nov	W			EXAM	<b>Midterm (Ch. 1-4 plus Energy Balance from Ch. 12)</b>
8-Nov	F				Office Hour rescheduled to Nov. 12 at 4pm or by appointment (Homework 5+6)
11-Nov	M				<b>Veteran's Day (Holiday)</b>
13-Nov	W	7		5+6 due!	Introduction to Stability: Application and Limitations of Dry Theory (pp. 191-194 ONLY)
15-Nov	F				Office Hour: Cloud Nucleation Demo, and Project Discussions
18-Nov	M	8		7 due!	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	W	12		Draft	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.)
22-Nov	F				Office Hour: Aerosol Scattering Demos and Project Discussions
25-Nov	M	12			More Global Energy Balances
27-Nov	W	13	13.6-7		Thermodynamic Feedbacks in the Climate System (also available as PODCAST)
29-Nov	F				<b>Thanksgiving (Holiday)</b>
2-Dec	M				<b>ROAST Presentations (submit presentations by noon)</b>
4-Dec	W				Continue ROAST if needed, "Jeopardy" Review Session
6-Dec	F				Office Hour: Optional Final Exam Review
12-Dec	Th			EXAM	<b>Final Exam (Ch. 1-8, 12, 13, ROAST) at 11:30-2:30, Location TBA (likely Spiess330).</b>