

SIO 217d

Atmospheric and Climate Sciences IV: Atmospheric Chemistry

Winter 2016:

Course Syllabus and Lecture Schedule (Tu/Th 2:00-3:20pm in OAR 150)

Instructors: Lynn Russell, 343 Nierenberg Hall, 4-4852, lmrussell@ucsd.edu. Office Hr: Th 3:30-5:30 and appointment.
Ralph Keeling, 312 Vaughan Hall, 4-7582, rkeeling@ucsd.edu. Office Hr: TBD and by appointment.

Text: *Atmospheric Chemistry and Physics*, Seinfeld and Pandis (2006); selected classic papers.
http://www.knovel.com/web/portal/basic_search/display?_EXT_KNOVEL_DISPLAY_bookid=2126

Philosophy: This course focuses on the chemical compounds and processes that affect the Earth's atmosphere.
The topics include aerosols, clouds, greenhouse gases, and other climate-relevant aspects.
The goals include developing a quantitative understanding of:
(1) the microphysical mechanisms that regulate aerosol concentrations and evolution in the atmosphere.
(2) the physical and chemical interactions of aerosols with clouds and their effects on climate.
(3) the anthropogenic controls on greenhouse gases, with a focus on recent rises in CH₄, N₂O and CO₂.
Students will participate regularly in discussions related to these topics.
You may follow the course at your own level, realizing that what you learn is based on what you do.

Grading: 20% Participation (Attendance-Required; Discussion; In-Class Problem Solving)
20% Homework and Discussion Problems
60% Final Exam

Policies: Rescheduling requires a written reason from a doctor, dean, divinity, or DoD.
Honest, objective, polite participation; no cheating or misrepresentation of others' work as your own.
I understand these and other dishonest practices are considered academic dishonesty and are not allowed.

Date: _____ Signature: _____

Part	Time	Ch	Instr.	Topics
	5-Jan Tu	2:00	1-5	LR Review: Atmospheric Chemistry Overview; Course Logistics.
	5-Jan Tu	3:30	LR	<i>Office Hours.</i>
1				Aerosol Microphysics
	7-Jan Th	2:00	8	LR Atmospheric Aerosol Size Distributions.
	12-Jan Tu	2:00	9	LR Particle Slip, Drag, Velocity, and Lifetimes.
	12-Jan Tu	3:30	LR	<i>Demo and Problem Solving: Clark and Whitby (1967, J. Atmos. Sci. 24: 677).</i>
	14-Jan Th	2:00	12	LR Mass Transfer of Gases to Particles.
	19-Jan Tu	2:00	13	LR Dynamics of Aerosol Populations.
	19-Jan Tu	3:30	LR	<i>Office Hours.</i>
	21-Jan Th	2:00	11	LR Signatures of Nucleation, Condensation, Cloud Processing, and Coagulation.
2				Methane and Nitrous Oxide
	26-Jan Tu	2:00	6	RK Methane
	26-Jan Tu	3:30	RK	<i>Office Hours.</i>
	28-Jan Th	2:00	5	RK Nitrous Oxide (N ₂ O)
3				Aerosol-Cloud Interactions
	2-Feb Tu	2:00	24	LR Observational Evidence for Aerosol-Cloud Interactions
	2-Feb Tu	3:30	LR	<i>Discussing the Evidence: Leaitch et al. (1992, J. Geophys. Res. 97: 2463-2474).</i>
	4-Feb Th	2:00	7	LR Aqueous Phase Chemistry in Cloud Droplets
	9-Feb Tu	2:00		<i>Rescheduled.</i>
	9-Feb Tu	3:30		<i>No Office Hours.</i>
	11-Feb Th	2:00		<i>Rescheduled.</i>
	16-Feb Tu	2:00	14	LR Organic Aerosol Sources, Sinks, and Properties.
	16-Feb Tu	3:30	LR	<i>Office Hours.</i>
	18-Feb Th	2:00	6	LR Gas-Phase Tropospheric Chemistry: NO _x , O ₃ , OH.
	23-Feb Tu	2:00	17	LR Aerosol Activation to Cloud Droplets (Theoretical).
	23-Feb Tu	3:30	LR	<i>Office Hours.</i>
4				Carbon Dioxide and the Carbon Cycle
	25-Feb Th	2:00	22	RK Carbon Dioxide (CO ₂) Part 1
	1-Mar Tu	2:00	RK	Carbon Dioxide (CO ₂) Part 2
	1-Mar Tu	3:30	RK	<i>Office Hours.</i>
	3-Mar Th	2:00	RK	Carbon Dioxide (CO ₂) Part 3
	8-Mar Tu	2:00	LR	Project Presentations
	8-Mar Tu	3:30	LR	<i>Office Hours.</i>
	10-Mar Th	2:00	LR	Aerosols Review
	17-Mar Th	3:00		Final Exam (180 min, in class, written, no notes or calculators).