SIO 217d Atmospheric and Climate Sciences IV: Atmospheric Chemistry

Winter 2014: Course Syllabus and Lecture Schedule (Tu/Th 2:00-3:20pm in Spiess 330)

Instructors: Lynn Russell, 343 Nierenberg Hall, 4-4852, lmrussell@ucsd.edu. Office Hr: Th 3:30-5:30 and appointment.
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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		Ch	Instr.	Topics
	7-Jan Tu	1-5	LR	Review: Atmopsheric Chemistry Overview; Course Logistics.
	7-Jan Tu		LR	*Tracking Progress in Atmospheric Chemistry:* Charlson et al. (1987, *Science* 326: 655).
1				**Aerosol Microphysics**
	9-Jan Th	8	LR	Atmospheric Aerosol Size Distributions.
	14-Jan Tu	9	LR	Particle Slip, Drag, Velocity, and Lifetimes.
	14-Jan Tu		LR	*Demo and Problem Solving:* Clark and Whitby (1967, *J. Atmos. Sci.* 24: 677).
	16-Jan Th	12	LR	Mass Transfer of Gases to Particles.
	21-Jan Tu	13	LR	Dynamics of Aerosol Populations.
	21-Jan Tu		LR	*Reviewing the Implications*: Hoppel et al. (1990, *J. Geophys. Res.* 95: 3659-3686).
	23-Jan Th	11	LR	Signatures of Nucleation, Condensation, Cloud Processing, and Coagulation.
	28-Jan Tu			*Rescheduled.*
	28-Jan Tu			*No discussion.*
2				**Aerosol-Cloud Interactions**
	30-Jan Th	17	LR	Aerosol Activation to Cloud Droplets (Theoretical).
	4-Feb Tu			*Rescheduled.*
	4-Feb Tu			*No discussion.*
	6-Feb Th			*Rescheduled.*
	11-Feb Tu	24	LR	Observational Evidence for Aerosol-Cloud Interactions
	11-Feb Tu		LR	*Evaluating the Evidence:* Leaitch et al. (1992, *J. Geophys. Res.* 97: 2463-2474).
	13-Feb Th	7	LR	Aqueous Phase Chemistry in Cloud Droplets
	18-Feb Tu			Organic Aerosol Sources, Sinks, and Properties.
	18-Feb Tu			*No discussion.*
	20-Feb Th	14	LR	Gas-Phase Tropospheric Chemistry: NOx, O3, OH.
	25-Feb Tu	6	LR	*Beneath the Complexity*: Haagen-Smit (1952, *Ind. Eng. Chemistry* 44:1342-1346).
	25-Feb Tu		LR	*No discussion.*
3				**Anthropogenic Greenhouse Gases**
	27-Feb Th	6	RK	Methane
	4-Mar Tu	**5**	RK	Nitrous Oxide (N2O)
	4-Mar Tu			*Make-up Class if needed.*
	6-Mar Th	22	RK	Carbon Dioxide (CO2) Part 1
	11-Mar Tu		RK	Carbon Dioxide (CO2) Part 2
	11-Mar Tu			*Make-up Class if needed.*
	13-Mar Th		RK	Carbon Dioxide (CO2) Part 3
	20-Mar **Th**			Final Exam (80 min, in class, written, no notes or calculators).