SIO 217d Atmospheric and Climate Sciences IV: Atmospheric Chemistry

Spring 2011: Course Syllabus and Tentative Lecture Schedule (Mo/We 9:30-10:50 am Spiess 330)

Instructor: Lynn Russell, 343 Nierenberg Hall, 534-4852, lmrussell@ucsd.edu.
Office Hours: Mo/We 10:50-noon and by appointment.

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

Philosophy: Several courses are taught regularly at SIO that cover greenhouse gases, the ozone hole, and meteorology.
This course provides advanced lectures on several topics relating the chemistry of aerosols to climate.
The focus will be on developing a quantitative understanding of how aerosol microphysics (size) and atmospheric chemistry control the production of cloud droplets in the atmosphere.
The students will help to define the direction of the lectures and assignments to incorporate their interests.
You may follow the course at your own level, realizing that what you learn is based on what you do.

Grading: 30% Participation (Attendance-Required; Discussion; In-Class Problem Solving)
30% Midterm May 26 (80 min during regularly-scheduled class period)
40% Term Project (Hmwk, Results, Outline, Reviews, Talk, Final Paper)

Policies: Rescheduling requires a written reason from a doctor, dean, divinity, or DoD.
Honest, objective, polite reviews; no cheating, plagiarism, 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:

Wk/Date/Day	Ch	NB	Topics
1 28-Mar Mo	1-5,16		Review: Atmopsheric Chemistry ("Slide Show"); Course Logistics.
30-Mar We			*Rescheduled*
2 Clark and Whitby (1967): "...Measurements...and Test of Self Preserving Size Distribution." *J. Atmos. Sci.* 24: 677-687.			
4-Apr Mo			*Rescheduled*
6-Apr We	8,9		Review: Atmospheric Aerosol Size Distributions
8-Apr Fr	10		Particle Slip, Drag, Velocity, and Lifetimes.
3 Kohler (1936): "The Nucleus in and the Growth of Hygroscopic Droplets." *Trans. Faraday Soc.* 1152-1161.			
11-Apr Mo	17		Introduction to MATlab-based Aerosol Dynamics Model
13-Apr We		Hmwk	Aerosol Activation to Cloud Droplets; Equilibrium Model (Kohler Curve and Modifications).
15-Apr Fr			Mass Transfer of Gases to Particles.
4 Leaitch et al. (1992): "The Relationship Between Cloud Droplet...and Pollution..." *J. Geophys. Res.* 97: 2463-2474.			
18-Apr Mo	12		Dynamics of Aerosol Populations: Condensation and Coagulation.
20-Apr We	13	Result	Modeling with MATlab-based Aerosol Dynamics Model
5 Charlson et al. (1987): "Oceanic phytoplankton, atmopsheric sulfur, cloud albedo and climate." *Science* 326: 655-661.			
25-Apr Mo	11		Nucleation of Particles from the Gas Phase.
27-Apr We		Outlin	Special Topic: Does 20 Orders of Magnitude Uncertainty Matter for CCN Sensitivity?
6 Haagen-Smit (1952): "Chemistry and Physiology of Los Angeles Smog." *Ind. Eng. Chemistry* 44:1342-1346.			
2-May Mo	6		Gas-Phase Tropospheric Chemistry: NOx, O3, OH.
4-May We		Draft	Special Topic: NOx-VOC Isopleths -- How Different is LA from the Rest Of World?
7 Hoppel et al. (1990): "Aerosol Size Distributions...in the Marine Boundary Layer..." *J. Geophys. Res.* 95: 3659-3686.			
9-May Mo	7		Aqueous-Phase Chemistry in Cloud and Fog Droplets: Sulfates.
11-May We		Revie	Special Topic: Other Heterogeneous Chemistry -- Dinosaurs, Mice, and the Remaining Zoo.
8 Novakov and Penner (1993): "Large Contribution of Organic Aerosols as CCN" *Nature* 365: 823-826.			
16-May Mo	14		Atmospheric Organic Aerosol Sources, Sinks, and Properties.
18-May We		Midter	**Midterm (80 min, in class, written, no notes or calculators; Ch. 8-14, 17; six papers).**
9 Special Topic Publication: Selected by Class.			
23-May Mo			*Special Topic: Selected by Class.*
25-May We			*Special Topic: Selected by Class.*
27-May Fr			*Make-up Class if needed.*
10 30-May Mo			Holiday
1-Jun We		Talks	Term Projects.
3-Jun Fr		Talks	Term Projects.
7-Jun Tu		Final Manuscript Due	