

SIOC217d	Atmospheric and Climate Sciences IV: Atmospheric Chemistry				
Winter 2022	Course Syllabus and Lecture Schedule (Tu/Th 11:00-12:20pm in Spiess 330)				
Instructors:	Lynn Russell, 343 Nierenberg Hall, 4-4852, lmrussell@ucsd.edu. Office Hr: TBD and by appointment. Ralph Keeling, 312 Vaughan Hall, 4-7582, rkeeling@ucsd.edu. Office Hr: TBD and by appointment. Atmospheric Chemistry and Physics, Seinfeld and Pandis (2016); selected papers.				
Structure:	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 CH ₄ , N ₂ O and CO ₂ . Students will participate regularly in discussions related to these topics.				
Grading:	35% Carbon Cycle (Exam 20%, Homework 15%) 65% Aerosol-Cloud Microphysics (Homework Project 35%, Exam 20%, Discussion 10%)				
Policies:	Rescheduling exams 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.				
Date	Time	Ch	Instr.	Topics	
4-Jan	Tu	11:00	8	LR	Aerosol Size Distributions; Course Logistics.
Aerosol Microphysics					
6-Jan	Th	11:00		LR	<i>Week1 Reading: Size Distributions and Losses</i>
11-Jan	Tu	11:00	9	LR	Particle Slip, Drag, Velocity, and Lifetimes.
13-Jan	Th	11:00		LR	<i>Week2 Presentations and CodeSwap: Problem Set 1</i>
18-Jan	Tu	11:00	12	LR	Mass Transfer of Gases to Particles.
20-Jan	Th	11:00		LR	<i>Week3 Reading: Time Scales and Self-Preserving Distributions</i>
25-Jan	Tu	11:00	13	LR	Dynamics of Particle Populations
27-Jan	Th	11:00		LR	<i>Week4 Presentations and CodeSwap: Problem Set 2</i>
Aerosol-Cloud Interactions					
1-Feb	Tu	11:00	10	LR	Thermodynamics of Particles and Droplets
3-Feb	Th	11:00		LR	<i>Week5 Reading: Kappa, Activated Fraction, Hoppel Gap</i>
8-Feb	Tu	11:00	17	LR	Cloud Microphysics
10-Feb	Th	11:00		LR	<i>Week6 Presentations and CodeSwap: Problem Set 3</i>
15-Feb	Tu	11:00		LR	<i>Project Presentations and Review (Homework Projects Due for Grading)</i>
Aqueous Chemistry of CO₂					
17-Feb	Th	11:00		RK	Part 1
22-Feb	Tu	11:00		RK	Part 2
The Carbon Cycle					
24-Feb	Th	11:00	6	RK	Part 1
1-Mar	Tu	11:00	5	RK	Part 2
Other Greenhouse Gases					
3-Mar	Th	11:00	22	RK	GHG lifetimes and global warming potential
8-Mar	Tu	11:00		RK	Methane budget and controls
10-Mar	Th	11:00		RK	Nitrous oxide budget and controls
17-Mar	Th	11:30-2:30		RK+LR	Oral portion of final exam (15 min per student - remote optional)