Atmospheric Chemistry 11:375:346

Term: Spring 2013
Lectures: Tuesdays/Thursdays 2:15-3:35
Location: Thompson Hall 201
Instructor: Ann Marie Carlton
Office Hours: Tuesday and Thursday 8-9 am (ENR, Room 354)
Email: carlton@envsci.rutgers.edu
Textbook: *Atmospheric Chemistry and Physics 2nd Edition* by J. Seinfeld and S. Pandis

Learning Goals
- Acquire in-depth knowledge of chemical processes in the atmosphere
- Use mathematical and scientific knowledge to solve air quality and climate problems
- Communicate technical information effectively
- Understand contemporary atmospheric chemistry issue in global and regional context

Course Structure and Grading:
Five homeworks will be assigned and due at the start of class indicated. Late homework will not be accepted without prior approval of the instructor. Homework will be graded and returned. Exam questions will be similar in design to homework problems.

Each student will present solutions to homework or exam questions.

Grades are weighted as follows:
Homework: 25% Exam 1: 25% Exam 2: 25% Final: 25%

Week 1	Introduction to the atmosphere Atmospheric trace constituents	Week 9	Review and Exam 2
Week 2	Global biogeochemical cycles Effective lectures	Week 10	Intro. to aerosol Chemistry of particles
Week 3	Review of chemical kinetics Principles of photochemistry	Week 11	Organic aerosols Secondary organic aerosol
Week 4	Chemistry of the stratosphere	Week 12	Aerosols and climate Air quality regulations
Week 5	Review and Exam 1	Week 13	Atmospheric models
Week 6	Tropospheric gas phase chemistry	Week 14	Air quality data analysis
Week 7	Tropospheric multi-phase chemistry	Week 15	Course Review
Week 8	The CLAW hypothesis		

1. **Acquire in-depth knowledge of chemical processes in the atmosphere**

Instructional Activity: Concepts of chemical kinetics, photochemistry, physical chemistry, thermodynamics and biogeochemical cycling during atmospheric transport will be covered in lectures. Students will apply these concepts in homework problems and exam questions.

Assessment Activity: Knowledge of chemical processes in the atmosphere will be assessed in the homework assignments and Exams 1 and 2, in addition to the Final.

2. **Use mathematical and scientific knowledge to solve air quality and climate problems**

Instructional Activity: Students will learn how to calculate atmospheric concentrations of trace constituents, equilibrium constants, chemical decay rates, and other chemical information as applied to the atmosphere. Students will set up differential equations to solve chemical systems, that can be simplified and solved using algebra. These types of questions will be regular homework problems, as well as exam questions.

Assessment Activity: The ability of students to use mathematical and scientific knowledge to solve problems related to air quality and climate will be assessed in the homework assignments and Exams 1 and 2, in addition to the Final.

3. **Communicate technical information effectively**

Instructional Activity: Students will present and discuss the solutions to homework problems and Exams questions in class to their peers, in particular during review periods.

Assessment Activity: The ability of students to communicate during presentation of problems will be assessed, as will class participation. Further, communication in the answers to specific technical questions will be assessed in the homework assignments, Exams 1 and 2, and the Final.

4. **Understand contemporary atmospheric chemistry issues in a global and regional context**

Instructional Activity: Description and discussion or various atmospheric chemistry issues related to regional air quality and global climate, and the impacts on society and human health.

Assessment Activity: Understanding of air pollution issues will be assess by student answers to specific questions in Exams 1, 2 and the Final Exam.