Atmospheric Sciences 212 – Winter Quarter 2011
Air Pollution: From Urban Smog to the Ozone Hole

General Information

Class Meeting Times: Daily (M-F) 12:30-1:20 pm.
Class Meeting Location: Johnson Hall (JHN) room 111.

Instructor: Becky Alexander
Phone: (206) 543-0164
Email: beckya@u.washington.edu (Only email me for personal reasons (e.g. illness). Please use the message board for questions about course material.)
Office: Room 306 in Atmospheric Sciences/Geophysics (ATG) building
Office hours: Tuesday 3:30-4:30 or by appointment
Class web site: http://www.atmos.washington.edu/2011Q1/212/

Course Description

This course is an introduction to air pollution on local, regional, and global scales. We will focus on the sources, transformation, and dispersion of pollutants responsible for urban smog, acid rain, climate change and the stratospheric ozone hole. We will examine the health and environmental effects of air pollutants, as well as current (or potential) technological solutions and policy regulations.

The class will be divided in three parts:

- Introduction to air pollution (weeks 1-2). We will define air pollution and present a brief history of current regional and global air pollution problems. We will discuss the factors controlling the natural composition of the atmosphere.
- Local and regional pollution issues (weeks 3-8). In this part of the class we will discuss the sources and fate of pollutants focusing on specific local/regional air pollution issues: urban smog, aerosols and acid rain, visibility, and indoor air pollution. For each of these issues we will discuss the health and environmental effects, technological solutions, as well as current national and international regulations.
- Global scale pollution issues (weeks 9-10). We will examine the causes and effects of two major global air pollution issues: stratospheric ozone depletion and climate change. We will discuss projections of future air quality in the U.S. an around the world. Will the future be cleaner? What choices will we make?

The course is intended for non-science, liberal arts majors and fulfills 5 credits of the Natural World (NW) distribution requirement. The course is also designated as a "W" course.

Prerequisites
None. Open to all undergraduates.

Textbook

Required textbook: *"Earth Under Siege"* by Richard Turco, Oxford University Press, 2002.
Each week the students will be given reading assignments directly relevant to the class. In addition, after each class, lecture notes will posted on the web. These notes will summarize the main topics covered and provide additional material not included in the book.

Other useful textbook: *"Atmospheric Pollution"* by Mark Z. Jacobson, Cambridge University Press, 2002. This textbook is placed on reserve in the Odegaard Undergraduate Library. Max loan period: 2 hours (no overnight).

Grading policy

Your grade will be based on exams (4 short exams), a research project, and class participation:

Exams (4) 60%
Class participation 15%
Papers 15%
Poster presentation 10%

You are expected to attend lectures and participate in class. There will be no make-up exams except in extreme circumstances, in which case you must contact the instructor at least 24 hours in advance of the exam.

Research project and symposium

Students will research the details of some aspect of air pollution. This is an opportunity for you to explore something of particular interest to you in more detail than we may cover in class. The instructor will suggest some topics. Whatever topic you choose, you must check with the instructor to make sure the topic is appropriate and of reasonable scope. Your grade on the project will be based on (1) a written report (which will need to be revised if you are taking this as a "W" class) and (2) a poster presentation scheduled for the last week of class (March 7-11, 2011). Examples of appropriate poster format will be provided. If you are taking this class as a "W" class, the first draft of your paper is due on Friday, March 4 and the final draft is due on Friday, March 11. If you are not taking this class as a "W" class, your final paper is due on Monday, March 7.

Fridays: practice problems and exams

Exams will be held in class on the following Fridays: Jan. 14, Jan. 28, Feb. 11, and Mar. 4. Every other Friday there will be an in class, group problem solving session. These will not be graded; however, it is strongly recommended that each student attend and participate as these sessions will provide valuable problem solving practice for the exams. Practice problems will be provided in advance. It is strongly recommended that each student attempt the problem set on his/her own in advance and come to class on Fridays with questions.

Class policies

1. Late assignments (papers and posters) or exams are accepted only with at least 24 hours advanced OK from the instructor.
2. If you miss class, copy notes from a classmate. Lecture slides are available on the class web site.
3. If you feel your exam was graded incorrectly, you must submit your complaint to the instructor in writing, along with your graded exam, no earlier than 24 hours, and no later than 1 week, after your graded exam is returned to you. Your entire exam will be re-graded.

How to do well in this class

- Attend lectures and ask questions. Read the textbook for supplemental information.
- Attempt practice problems in advance and come to practice problem solving sessions.
- Get started early on your final project.
- Discuss project topic with the instructor before beginning your final project.

Important dates

In class exams: Fridays Jan. 14, Jan. 28, Feb. 11, and Mar. 4.

Final project papers and posters are due on Monday, March 7.

"W" papers: First draft due on Friday, March 4; final draft due on Friday, March 11.

There is no class on Monday, Jan. 17 (MLK day) or Monday, Feb. 21 (President's day).

Student learning goals

- Understand how emissions, transport, chemistry and deposition impact air pollution.
- Explain the chemical and physical mechanisms behind ozone depletion, air pollution and acid rain.
- Develop skills to critically evaluate discussions of air pollution and climate change based on scientific evidence and organized knowledge.