

E515: Fundamentals of Air Pollution
Fall 2002

Professor: Philip Stevens
Office: SPEA 233. Phone: 5-0732, pstevens@indiana.edu
Office Hours: TR 2:30-4:00 or by appointment
Class Meetings: TR 9:30-10:45 PV 275

The topic of *air pollution* is extremely broad. Issues which fall under the category of air pollution have traditionally included photochemical smog, acid rain and fog, and airborne toxic chemicals. As the field of atmospheric chemistry has grown in response to these issues, it has become clear that the atmospheric processes that control issues of air pollution are tightly linked to each other and to the natural chemistry of the atmosphere. It is also becoming clear that anthropogenic influences on the local scale are influencing the state of the atmosphere on the global scale. As a result, recent national and international policies have addressed the global problems of stratospheric ozone depletion and global climate change, adding these issues to the topic of air pollution.

The formulation of effective policy addressing the issues of air pollution and global change requires an in-depth knowledge of the chemistry and physics behind these issues. The goal of this course is to provide an introduction to the fundamental chemical and physical processes that control the composition and properties of the atmosphere. Topics that we will cover include the chemistry of the natural atmosphere, the polluted atmosphere, photochemical smog, acid precipitation, stratospheric ozone chemistry, polar ozone chemistry and global warming. We will also discuss issues of atmospheric transport, pollutant dispersion, and aerosols.

Resources

Finlayson-Pitts and Pitts, *Chemistry of the Upper and Lower Atmosphere*, 1999
Jacob, *Introduction to Atmospheric Chemistry*, 1999

Other supplementary material will be placed on reserve.

Course Requirements

Problem sets (25%)

2 Term Exams (50%, 25% each). Take home exams, tentatively scheduled for the weeks of ***October 1*** and ***November 5***.

Final Exam (25%)

Syllabus (Topics scheduled roughly by week)

Atmospheric composition and structure	F-P&P Chapter 1, 2	DJ 1, 2
Sources and effects of pollutants	F-P&P 2	
Introduction to chemical reactivity -Basic Tools	F-P&P 3, 5	DJ 9
The chemistry of the troposphere	F-P&P 6	DJ 11
Photochemical Smog	F-P&P 6, 16	DJ 12
Meteorology of air pollution - diffusion and transport		DJ 4
Aqueous-phase chemistry	F-P&P 8	DJ 13
Acid Deposition	F-P&P 20	
The chemistry of the stratosphere, polar ozone chemistry	F-P&P 12	DJ 3, 10
Stratospheric ozone depletion / the Ozone Hole	F-P&P 13	
Radiation and the atmospheric greenhouse effect	F-P&P 14	DJ 7
Global climate change	F-P&P 14	DJ 6