Syllabus
Modeling Atmospheric Chemistry

ENVR 890-04
Tues./Thurs. 11:00-12:15 p.m., McGavren-Greenberg 1305

Spring Semester 2011

1 Course Summary

Textbook: Seinfeld, J., Pandis, S. 2006, *Atmospheric Chemistry and Physics:From Air Pollution to Climate Change*, Wiley Interscience, New York, Second edition.

The formation of air pollution is an important scientific problem that must be understood to ultimately protect human health. Air pollution is formed through the interaction of hundreds of nonlinear chemical reactions involving thousands of different chemical species. Scientists turn to computer models to simulate this complex chemistry. In turn, they use these models to make policy aimed at improving air quality. Current computational restraints prevent any explicit chemical representation of the atmosphere. Instead, a simplified representation must be derived where the number of reactions and species have been either generalized or deleted. These simplified representations, or chemical mechanisms, is the focus of this course, with special attention toward the application of these chemical reaction systems to regional scale air quality model simulations.

I will begin the course with an introduction to tropospheric chemistry, with a focus on ozone chemistry. The first goal will be a detailed understanding of the explicit reactions involved in chemically producing ozone. We will then discuss condensed representations of these chemical mechanisms by using examples from ongoing research. Building on that understanding, we will focus on the oxidation of Toluene and build a detailed chemical mechanism. The course will end with a group effort to condense that mechanism. This will also include examples from ongoing research. The course will provide you with the knowledge of how these condensed mechanisms are produced to allow you to effectively evaluate uncertainties resulting from their use in air quality model simulations.

2 Course Outline

1. Gas Phase Chemistry of the Troposphere
2. Gas Phase Modeling the Chemistry of the Troposphere

3 Grading

Class attendance	10%
Homework	20%
Mid-term report	30%
Final report	40%

Deadline for final report is May 4, 2011 by 11:59 p.m. EST.

4 Contact Information

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