

ATMOSPHERIC CHEMISTRY—CHEM 415
Spring Quarter 2012

Instructor: Dr. Scott Nickolaisen
Office: PS 820
Phone: (323) 343-2382
Office hours: M,W: 11:30 a.m. – 1:00 p.m.
Th: 12:00 – 1:00 p.m.
Class hours: T,Th 1:30 a.m. – 3:20 p.m., SH C162
Text: *Chemistry of Atmospheres, 3rd Edition* Richard P. Wayne
The text will be placed on reserve in the library.

Course Outline. This course will cover current topics of interest in atmospheric chemistry. The subjects to be discussed in this course are:

- I. Classifications of Earth's atmosphere
- II. Processes influencing the atmosphere
 - A. Weather and circulation of air
 - B. Natural phenomena such as volcanoes and lightening
 - C. Interaction between the atmosphere and the oceans
 - D. Anthropogenic influences
- III. Chemical kinetics and photochemistry
- IV. The stratosphere
 - A. Natural formation and destruction of ozone
 - B. Anthropogenic perturbations to the ozone cycle
 1. Stratospheric ozone depletion
 2. Ozone holes
- V. The troposphere
 - A. Photochemical smog
 - B. Acid rain
 - C. The "Greenhouse" effect and global warming
- VI. Modelling the atmosphere

Learning Outcomes. Upon completion of this course, students will have an understanding of the interplay between field measurements, laboratory studies, and computational models used to elucidate atmospheric systems. Students will also be able to explain atmospheric chemistry discussed in the media to colleagues, family and friends.

Grading. Grading will be based on four exams (50 points each), a research project and classroom presentation developed as an assigned group (100 points), and a final paper (100 points). Exam dates will be announced a week prior to the exam.

For the joint project, each group will be assigned a topic to fully research and evaluate. Each member of the group will be required to give a 10 – 15 minute classroom presentation on his or her group's assigned topic. The first presentation will introduce the problem to the class. This will occur in the 3rd – 4th week of class. The second presentation will explain the scientific input necessary to fully

understand the problem. This will occur in the 6th – 7th week of class. The third presentation will explain the current state of knowledge on the topic including societal impacts and possible remedies. This will occur in the final week of class. Each group member will also write an *independent* 8 - 15 page paper summarizing his or her group results. The final paper will be due on Wednesday, June 13, 2012.

Other Information.

Students with Disabilities. Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation.

Academic Honesty. Students are encouraged to review the University's policy on academic honesty in Appendix D of the University Catalog.

Possible Research Topics.

1. Antarctic Ozone Holes
2. Arctic Ozone Holes?
3. Mid-Latitude Ozone Depletion
4. Tropospheric Ozone Production and Mitigation
5. VOCs and Urban Health
6. PAHs and Urban Health
7. Historic Trends in Arctic and Antarctic Ice Depths
8. Modeling of Global Climate Change
9. The Role of Greenhouse Gases in Global Climate
10. The Use and Validity of Historical Temperature Records