



ATS 715 (2 Credits)
Atmospheric Oxidation Processes
Spring 2026

Instructor: Jeff Collett

Mon & Wed 2:00-2:50 PM

Atmospheric Science/CIRA Research Center 212B

491-8697

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Office Hours: By Arrangement

Objectives:

1. Develop an understanding of kinetic and equilibrium aspects of important chemical pathways in the troposphere.
2. Examine detailed mechanisms that account for the reactions of volatile organic compounds and nitrogen oxides in the atmosphere and resultant oxidant formation.
3. Consider the molecular composition and formation of organic aerosol particles.
4. Examine aqueous phase oxidation and photochemistry.

Text:

Atmospheric Reaction Chemistry, by H. Akimoto, Springer, 2016. Available via free download from CSU Libraries: <https://lib.colostate.edu/> [\(https://lib.colostate.edu/\)](https://lib.colostate.edu/). Reading assignments correspond to page numbers in .pdf version.

Atmospheric Chemistry and Physics: From Air Pollution to Climate Change, 3rd Ed., by J.N. Seinfeld and S.N. Pandis, Wiley, 2016. Available via free download from CSU Libraries: <https://lib.colostate.edu/> [\(https://lib.colostate.edu/\)](https://lib.colostate.edu/). Reading assignments correspond to page numbers in .pdf version.

Supplemental readings will be assigned from relevant journals.

Course Structure and Grading Criteria:

The course is offered for two credits. The class is conducted in a lecture/discussion format and is scheduled to meet at 2:00 Mondays and Wednesdays.

An oral final exam will be given. This exam will cover material from lectures.

Each student will be expected to co-lead discussion of one research article. Active participation in discussions of other articles is also expected.

Preparation for class (especially reading) and participation in class discussions and occasional practice exercises are important components of the course.

Grades will be weighted as follows:

Class Participation:	30%
Oral Exam:	35%
Article Discussions:	35%

Statement on Academic Integrity:

This course will adhere to the CSU Academic Integrity Policy as found on the Student' Responsibilities page of the [CSU General Catalog](http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity) [\(http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity\)](http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity), and in the [Student Conduct Code](https://resolutioncenter.colostate.edu/conduct/code/). [\(https://resolutioncenter.colostate.edu/conduct/code/\)](https://resolutioncenter.colostate.edu/conduct/code/)

At a minimum, violations will result in a grading penalty in this course and a report to the Office of Student Resolution Center.



Contact Hours:

2 (At least 2 hours of effort are expected to complete reading and homework assignments outside of class for each hour of class time).

ATS 715 - Atmospheric Oxidation Processes Spring 2026 Schedule

Date	Lecture Topic	Reading
		Aki = Akimoto SP = Seinfeld and Pandis
Jan 21, 26	Thermodynamics and reaction kinetics	Aki pp. 23-34; SP pp. 69-77

Jan 28, Feb 2	Photochemistry (Light absorption and fates of excited molecules)	Aki pp. 11-23 and 47-67
Feb 4, 9	Photochemistry cont'd. (Photolyzing tropospheric species)	Aki pp. 71-114
Feb 11	Photochemistry (Radical generation)	SP pp. 175-181 and 203-208
Feb 16, 18, 23, 25, Mar 2	Hydrocarbon oxidation mechanisms	SP pp. 181-192 and 213-233
Mar 4	Inorganic nitrogen chemistry	SP 192-208 and 244-246
Mar 9	Biogenic hydrocarbons	SP pp. 233-244
Mar 11	Ozone formation and control	Finlayson-Pitts & Pitts pp. 882-918 (https://colostate.instructure.com/courses/220648/files/38571710?wrap=1) Cooper et al. (2016) Challenges of a lowered U.S. ozone standard, <i>Science</i> 348 (6239), 1096-1097, DOI: 10.1126/science.aaa5748
Mar 16-20		Spring Break
Mar 23	Ozone formation and control (cont'd)	Finlayson-Pitts & Pitts pp. 882-918 (https://colostate.instructure.com/courses/220648/files/38571710?wrap=1) Cooper et al. (2016) Challenges of a lowered U.S. ozone standard, <i>Science</i> 348 (6239), 1096-1097, DOI: 10.1126/science.aaa5748
Mar 25, 30	Front Range O ₃ and its regulation	Colorado O ₃ State Implementation Plan Executive Summary
Apr 1	Article discussion #1	TBD
Apr 6, 8, 13, 15, 20	Organic aerosols	SP pp. 573-615
Apr 22	Article discussion #2	TBD
Apr 27, 29, May 4, 6	Aqueous phase chemistry and photochemistry	SP 264-277, 286-295, 308-313 and 615-622
May 7, 8	Schedule individual oral exam during this period	

Course Summary:

Date	Details	Due
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