


Course Syllabus


ATS 715 (2 Credits)
Atmospheric Oxidation Processes
Fall 2023
Instructor: Jeff Collett
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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. Examine 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/>). 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/>) 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 Tuesdays and Thursdays. Classes will generally be held in person, although an occasional online session may be scheduled for makeup classes required due to travel conflicts.

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




Each student will be expected to 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:	20%
Oral Exam:	40%
Article Discussions:	40%

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>) and in the [Student Conduct Code](https://resolutioncenter.colostate.edu/wp-content/uploads/sites/32/2018/08/Student-Conduct-Code-v2018.pdf).  (<https://resolutioncenter.colostate.edu/wp-content/uploads/sites/32/2018/08/Student-Conduct-Code-v2018.pdf>)  (https://docreader.readspeaker.com/docreader/?cid=11403&lang=en_us&url=https%3A%2F%2Fresolutioncenter.colostate.edu%2Fwp-content%2Fuploads%2Fsites%2F32%2F2018%2F08%2FStudent-Conduct-Code-v2018.pdf)


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 Fall 2023 Schedule

Date	Lecture Topic	Reading
		Aki = Akimoto SP = Seinfeld and Pandis
Aug. 22, 24	Thermodynamics and reaction kinetics	Aki pp. 23-34; SP pp. 69-77
Aug. 29, 31	Photochemistry (Light absorption and fates of excited molecules)	Aki pp. 11-23 and 47-67
Sept. 5, 7	Photochemistry cont'd. (Photolyzing tropospheric species)	Aki pp. 71-114
Sept. 12	Photochemistry (Radical generation)	SP pp. 175-181 and 203-208
Sept. 14, 19, 21, 26, 28	Hydrocarbon oxidation mechanisms	SP pp. 181-192 and 213-233
Oct. 3	Inorganic nitrogen chemistry	SP 192-208 and 244-246
Oct. 5	Article discussion #1	Brown et al. (2004), Nighttime removal of NO _x in the summer marine boundary layer, <i>Geophys. Res. Lett.</i> 31 , L07108, doi:10.1029/2004GL019412.
Oct. 10	Biogenic hydrocarbons	SP pp. 233-244
Oct. 12*, 17	Ozone formation and control	Handout (Finlayson-Pitts pp. 882-918) Cooper et al. (2016) Challenges of a lowered U.S. ozone standard, <i>Science</i> 348 (6239), 1096-1097, DOI: 10.1126/science.aaa5748
Oct. 19	Article Discussion #2	TBD (to be determined)
Oct. 24*	Front Range O ₃ and its regulation	TBD
Oct. 26*, 31 Nov. 2, 7	Organic aerosols	SP pp. 573-615
Nov. 9	Article discussion #3	Worton et al. (2013) Observational insights into aerosol formation from isoprene. <i>Environ. Sci. Technol.</i> 47 , 11403-11413, dx.doi.org/10.1021/es4011064
Nov. 14*	Organic Aerosols	SP pp. 573-615

Nov. 16*	Aqueous phase chemistry and photochemistry	SP pp. 264-277
Nov. 21, 23	No class (Thanksgiving Break)	
Nov. 28, 30 Dec. 5	Aqueous phase chemistry and photochemistry	SP 286-295 and 308-313 and 615-622
Dec. 7	Article discussion #4	TBD
Dec. 4-8	Schedule individual oral exam during this period	