



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
WINTER 2019

1. COURSE: CHEMISTRY 521 – Introduction to Atmospheric Chemistry

LEC	DAYS	TIME	ROOM	PROFESSOR	OFFICE	PHONE	EMAIL	OFFICE HOUR
L01	TuTh	11:00-12:15	TRA-101	Dr. Hans Osthoff	SB 205	220-8689	hosthoff@ucalgary.ca	TuTh 12:15-13:00

Desire2Learn (D2L): CHEM 521 L01 - (Winter 2019) - Introduction to Atmospheric Chemistry, <https://d2l.ucalgary.ca/d2l/home/252794>
Departmental Office SA 229, (403) 220-5341, e-mail: uginfo@chem.ucalgary.ca

2. **Course Description:** An introduction to tropospheric and stratospheric chemistry. The detailed chemistry of the stratosphere and troposphere; gas-phase chemical kinetics; photochemistry and atmospheric radiation; aerosols; anthropogenic pollution and air quality; climate forcing; introduction to modelling and atmospheric transport

3. TEXTBOOKS:

Required:

"Introduction to Atmospheric Chemistry", Daniel J. Jacob, Princeton University Press (1999) available for download at <http://acmg.seas.harvard.edu/people/faculty/djj/book/index.html> or for purchase at the University bookstore or via the University of Calgary library web site via <https://app.knovel.com/web/toc.v/cid:kplAC00011/viewerType:toc/>

Recommended:

"Chemistry of the Upper and Lower Atmosphere", Barbara Finlayson-Pitts, James Pitts, Academic Press (2000), ISBN 978-0122570605. This book is available via the University of Calgary library web site via <http://ebookcentral.proquest.com.ezproxy.lib.ucalgary.ca/lib/ucalgary-ebooks/reader.action?docID=317000>.
"Atmospheric Chemistry and Physics: From Air Pollution to Climate Change", 2nd ed., John H. Seinfeld and Spyros H. Pandis, Wiley (2006), ISBN 9780471720188. This book is available via the University of Calgary library web site via <http://ebookcentral.proquest.com.ezproxy.lib.ucalgary.ca/lib/ucalgary-ebooks/reader.action?docID=1120465>

4. TOPICS COVERED AND SUGGESTED READING:

Topic	DJ	BFP	JS/SP
Measures of atmospheric composition: Mixing ratio, number density and partial pressure	Ch. 1	Ch.1 and 2D	Ch. 1.6
Atmospheric pressure, structure, and transport; sea-breeze and Hadley circulation	Ch. 2 and 4	Ch. 2B	Ch.1.3-1.5, 21.1-21.3; 16.1-16.2
Gas-phase kinetics: Bimolecular reactions, 3-body reactions, chemical equilibria	Ch. 9	Ch. 5	Ch. 2.1 and 3
Atmospheric photochemistry: Actinic Flux, calculation of photolysis rate constants	Ch. 9.3	Ch. 3-4	Ch. 4
Simple models: Box and puff models	Ch. 3		Ch. 25
Stratospheric ozone: Chapman mechanism, catalytic loss cycles, polar ozone loss, aerosols	Ch. 10	Ch. 12	Ch. 5
Oxidizing power of the troposphere: OH and HO _x , global CO, CH ₄ , NO _x , and O ₃ budgets	Ch. 11	Ch 6-7	Ch. 6
Ozone production efficiency and control strategies	Ch. 12	Ch. 16	Ch. 6
Acid rain	Ch. 13	Ch. 8	Ch. 7
Aerosols	Ch. 8	Ch. 9	Ch. 8-15
Greenhouse effect and global climate	Ch. 7	Ch. 14	Ch. 23-24

This course does **not** have a laboratory component.

Department Approval: Approved by Department Head

Date: January 7, 2019