

UNIVERSITY OF CALGARY
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
FALL 2019

COURSE: CHEMISTRY 321 – Environmental Chemistry

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	PHONE	EMAIL	OFFICE HOURS
L01	TuTh	15:30-16:45	ENG 60	Dr. Osthoff	SB 205	220-8689	hosthoff@ucalgary.ca	TR 12-1

COURSE WEBSITE: <https://d2l.ucalgary.ca/d2l/home/278291>

METHOD OF INSTRUCTION:

To enhance your learning experience and help you develop problem-solving skills, we will be using a flipped class-room approach for some lectures. We will spend class time on working together in teams to solve problems. I will assign the teams the week of Sept 9 to ensure that each time has a representative number of 1st, 2nd, 3rd, 4th and 5th year students and has students with a variety of declared majors.

To maximize the amount of time we spend in class working on practice problems, you will need to watch screencasts available through D2L ahead of each flipped lecture. More information will be provided in class and on D2L. These screencasts will remain accessible for review until the end of term.

ASSIGNMENTS:

Assignments will be posted on D2L and appear on Sept 12, Oct 3, Oct 17 and Nov 7 (tentative dates – check on D2L) and will be due one week after they appear (unless noted otherwise on the assignment sheet). Please print the assignments and answer the questions in the space provided, using ink (no pencil, please).

Team work will be accepted for assignments, with every team members receiving the same grade; please only hand in one answer sheet per team and write each team member's name (those who have contributed) on the first page. Though not required, you are strongly encouraged to work with the team members assigned the week of Sept 9.

CLASSROOM PERFORMANCE SYSTEM:

We will use the classroom performance system Top Hat Monocle during the lecture component of this course. Your use of the Top Hat Monocle system is optional. If you wish to participate, you need to have a cell phone or tablet with which you can send text messages, and you need to register for an account with Top Hat Monocle. See <https://app-ca.tophat.com/e/869196/> and the course's D2L site for more information.

If you answer $\geq 85\%$ of the in-class questions, the percentage obtained answering Top Hat questions, if higher, will replace the lowest grade of your completed assignments.

RECOMMENDED TEXTBOOKS:

The course does not follow a single text. The following are recommended resources:

- "Fundamentals of Environmental and Toxicological Chemistry: Sustainable Science", Fourth Edition, by Stanley E. Manahan, CRC Press (2013), available at <http://www.crcpress.com/product/isbn/9781466553163>.
- "Elements of Environmental Chemistry", 2nd Edition, by Ronald Hites and Jonathan Raff (2012), ISBN 978-1-118-04155-0, available online via the library web site.
- "Environmental Chemistry", 5th or 4th Edition, by Colin Baird and Michael Cann (2012 or 2008), W.H. Freeman, NY.
- "Environmental Chemistry – a global perspective", Third or Fourth Edition, by Gary van Loon and Stephen Duffy, Oxford University Press (2011 or 2018), ISBN 978-0-19-922886-7 or 978-0-19-874997-4.

TOPICS COVERED AND RECOMMENDED READING:

	Manahan (4th ed.)	Hites/Raff (2nd ed.)	Baird/Cann (4th / 5th ed.)	vanLoon/Duffy (3rd ed.)
Review of chemistry fundamentals: States of matter; gas laws; elements and chemical bonding; kinetics; equilibria; mass balance; overview of organic compounds	Ch. 19-20	Ch. 1-2	-	-
Global biogeochemical cycles	Ch. 1	-	-	Ch. 1; 15.2-15.4
Toxicology and bioaccumulation	Ch. 2	Ch. 7	Ch. 10-11/13-15	-
Aqueous chemistry and water pollution	Ch. 19.5; 3-4	Ch. 5	Ch. 13 / 10	Ch. 9-12
Waste water treatment and colloids	Ch. 5	-	Ch. 14 / 11	Ch. 16, 14
Pesticides, DDT, organochlorine compounds	Ch. 4.10-4.13	Ch. 6.1	Ch. 10-11 / 13-15	Ch. 20
Herbicides, Dioxins, Furans, and PCBs	Ch. 4.10-4.13	Ch. 6.1 and 8	Ch. 10-11 / 13-15	Ch. 20
PAH, estrogens, fire retardants	Ch. 4.10-4.13	Ch. 8	Ch. 12 / 13-15	Ch. 20
Chemistry and pollution of the atmosphere	Ch. 6-7	Ch. 3	Ch. 1 / 1	Ch. 2
Regional air pollution: Ozone, fine particulate matter, and acid rain	Ch. 6-7	Ch. 3	Ch. 3, 5 / 3-4	Ch. 4-6
Catalytic destruction of stratospheric ozone and Montreal Protocol	Ch. 7.9, 8.11	Ch. 3	Ch. 2 / 2	Ch. 3
Greenhouse effect and climate forcing	Ch. 8.1-8.3	Ch. 4	Ch. 6 / 5	Ch. 8
Soil Chemistry	Ch. 10 -11	-	Ch. 16 / -	Ch. 17-18
Environmental chemistry of the biosphere	Ch. 12-13	-	Ch. 15 / -	Ch. 15
Toxic metals and high-tech trash	Ch. 14-15	-	- / Ch. 12	Ch. 19
Energy	Ch. 17	-	Ch. 7-8 / 6-8	-
Radioactivity & nuclear energy	Ch. 14, 17	-	Ch. 9 / 9	-

This course does not have a laboratory component.