The Chemistry of Environmental Pollutants

CHEM3800A [0.5] credit
Fall 2025

Course Instructor: David McMullin, PhD
How to address me: David
Email: david.mcmullin@carleton.ca

Note: If you have or question or would like to talk with me, you can send an email, visit me during student hours (see below), or approach me after lecture.

Office Hours: Friday, 1:30-3 pm

What are 'Student Hours'?
Student hours are dedicated times each week for the course instructor to meet with YOU. Pop in to introduce yourself, ask questions about the course, or discuss content from the course.

Note: If these times don't work for you, email me and we can arrange an alternate time to meet.

Office Location: 420 Steacie Building

Class Location: see Carleton Central

Modality: In person plus 1 asynchronous class (Nov 04)

Class Times: Tuesdays and Thursdays, 11:35 pm-1:00 pm

Prerequisites: CHEM 2207 or 2203 or 2800
CHEM 2207: Intro to Org Chem I
CHEM 2203: Org Chem I
CHEM 2800: Foundations for Env Chem

Department: Chemistry

Teaching Assistant: Amelia Williams

Welcome!

This course will build on the chemistry knowledge acquired in first and second year and apply it to problems in environmental science, with a focus on pollutants in biota, water, and air. It covers topics such as the sources, fate, transport, and transformation of pollutants, the chemistry of natural systems, and the impact of human activities on environmental quality. The course will also provide an opportunity to prepare a presentation of a case study in environmental chemistry. An existing knowledge of basic organic chemistry is expected and will not be reviewed in class.

Course level learning objectives:

1. Evaluate multidisciplinary issues using chemical toxicology and environmental chemistry knowledge and skills.
2. Describe major biochemical pathways targeted by toxicological hazards.
3. Relate physicochemical properties of chemicals to principles of ADME.
4. Understand the importance of information literacy.
5. Apply chemistry principles to predict the transport and fate of chemicals in the environment.
6. Describe various instrumentation and quantitation techniques that can be used for pollutant analysis.
7. Develop principles of effective communications, proficiency in structuring and organizing content for clear and compelling presentations.
8. Receive constructive feedback and learn to provide meaningful evaluations to peers.

Inclusive teaching statement:
I am committed to fostering an inclusive and equitable learning environment that values the diverse perspectives and experiences of every student. I recognize the importance of creating a space where all students feel respected, valued, and empowered to contribute. Throughout the semester, there will be opportunities to provide feedback about inclusive learning environments and would appreciate your support.

Land Acknowledgement

At Carleton University, it is important that we acknowledge that the land on which we gather is the traditional and unceded territory of the Algonquin nation.

Tentative Schedule

DATE	DAY	THEME	LOs	PRESENTATION DUE DATES	ASSIGNMENT DUE DATE
Sep 04	R	Course Overview			
Sep 09	T	Toxicology 1	1-4		
Sep 11	R	Toxicology 2	1-4		
Sep 16	T	Toxicology 3	1-4	Topic approval	
Sep 18	R	Toxicology 4	1-4		
Sep 23	T	The Hydrosphere 1	5		Assignment 1
Sep 25	R	The Hydrosphere 2	5		
Sep 30	T	The Hydrosphere 3	5		
Oct 02	R	The Hydrosphere 4	5		
Oct 07	T	Chemical analysis 1	6	Annotated bibliography	
Oct 09	R	Chemical analysis 2	6		
Oct 14	T	Microbial Life 1	5		Assignment 2
Oct 16	R	Microbial Life 2	5		
Oct 21	T	**FALL BREAK**			
Oct 23	R	**FALL BREAK**			
Oct 28	T	*Guest Speaker*	1		
Oct 30	R	Chemistry of Waste	5	Draft presentation	
Nov 04	T	Peer review of presentations (virtual)	5		
Nov 06	R	Atmospheric Chemistry	5	Peer review	
Nov 11	T	*Daniel Gregoire- Hg*	1		
Nov 13	R	**MIDTERM**			
Nov 18	T	Student Presentations	7,8		
Nov 20	R	Student Presentations	7,8		
Nov 25	T	Student Presentations	7,8		
Nov 27	R	Student Presentations	7,8		
Dec 2	T	Student Presentations	7,8		
Dec 04	R	Student Presentations	7,8		

Note: Some classes might be moved around later in semester due to guest speaker availability.

Assistance for Students

Academic and Career Development Services: http://carleton.ca/sacds/
Writing Services: http://www.carleton.ca/csas/writing-services/
Peer Assisted Study Sessions (PASS): https://carleton.ca/csas/group-support/pass/
Math Tutorial Centre: https://carleton.ca/math/math-tutorial-centre/
Science Student Success Centre: https://sssc.carleton.ca/

Learning Materials

Students are not required to purchase textbooks or other learning materials for this course. While we will not be using one specific textbook for the course, the following is recommended:

Suggested textbook:
G. vanLoon and S. Duffy (2011). *Environmental Chemistry: A Global Perspective, 3 Ed.* Oxford University Press.

Technology Checklist:

- ☐ An internet-enabled computer (laptop/desktop)
- ☐ Zoom software installed on computer (can also install on phone as backup!)
- ☐ Access to reliable internet

For students who do not have access to these resources: Options include financial aid from Carleton, inexpensive options for technology (Best Buy refurbished products, Kijiji), & single workspaces available for student use on campus.

Assessment in this Course

Research about learning strongly suggests that the most important factor in learning is doing the work of reading, writing, recalling, practicing, synthesizing, and analyzing. Learning happens best when people *actively engage* material on a consistent basis, and that is why we have high standards in this course. We are confident that, with appropriate effort, you **all** can meet those standards.

Course Evaluation

COMPONENT	GRADE VALUE
ASSIGNMENT 1	15%
ASSIGNMENT 2	15%
MIDTERM	35%
PRESENTATION	35%

Assignments

There are two assignments in this course. Full assignment descriptions and marking rubrics will be posted on Brightspace.

ASSIGNMENT	GRADE VALUE	TOPIC	DUE
1	15%	Toxicology	Sep 23
2	15%	The hydrosphere and analysis	Oct 14

Late Assignments:

I will provide a 48 hour no questions asked grace period for each assignment. Late assignments will lose 10% per day (1 grade point value). An assignment can no longer be submitted 9 days following its initial deadline.

Midterm

One midterm will take place during class time in the classroom. The midterm will consist of multiple choice, short answer and problem-solving questions like the ones that we have practiced in the course and on assignments.

MIDTERM	GRADE VALUE	TOPIC	DATE
1	35%	All lectures to date	Nov 13

Looking for help preparing for midterms? Student Academic Success Services (SASS) at Carleton offers course-targeted study groups and supports and the Science Student Success Centre (SSSC) provides help with study skills.

If you must miss the midterm for any reason, you must complete the Academic Consideration for Coursework Form within 3 business days of the missed exam. Then schedule an appointment to see me in person and we can discuss alternatives.

Presentations and peer-evaluations

There will be group presentations expected to take 30 minutes each of class time each (20 min presentation, 10 minutes questions). More detail on the expectations for the presentation and the peer evaluations will be provided.

GRADE VALUE	GRADE DISTRIBUTION		DUE DATE
40%	Annotated bibliography	10%	Oct 07
	Presentation draft	10%	Oct 30
	Peer review	15%	Nov 08
	Final presentation	65%	Nov 15-Dec 04

Feeling Sick?

If you feel very sick (e.g., fever, chills, upset stomach) do not come to class or campus.

Mental Health

If you are struggling, please do not hesitate to reach out. I am happy to listen, and/or direct you to resources that might help. In terms of class, if you need extra help or missed a lesson, don't stress! Email me and we will set a time to meet. Remember that Carleton also offers an array of mental health and well-being resources, which can be found here.

University Policies

In accordance with the Carleton University Undergraduate Calendar Regulations, the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A- = 80-84	B- = 70-72	C- = 60-62	D- = 50-52

F = <50
WDN = Withdrawn from the course
DEF = Deferred

Academic Accommodations, Regulations, Plagiarism, Etc.

Carleton University is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (students.carleton.ca/course-outline)

- **Deferred/missed term work for short-term accommodation (5 days or less)**: Please submit to me via email a self-declaration form to discuss the appropriate accommodation.
- **Deferred/missed term work for longer term incapacitation (5 days or longer):** Please email me for guidance about how accommodation needs can be met for CHEM3800. You will need to go to the Registrar's Office for support, but it is important that I am apprised of the long-term accommodation needs.

Academic Integrity

Academic Integrity is upholding the values of honesty, trust, respect, fairness, responsibility, and courage that are fundamental to the educational experience. Carleton University provides supports such as academic integrity workshops to ensure, as far as possible, that all students understand the norms and standards of academic integrity that we expect you to uphold. Your teaching team has a responsibility to ensure that their application of the Academic Integrity Policy upholds the university's collective commitments to fairness, equity, and integrity. (Adapted from Carleton University's Academic Integrity Policy, 2021).

Use Of Artificial Intelligence (AI) In Course

The use of AI (Chat GPT/Generative AI, Perplexity, etc) is not permitted for any assignments in the course (including Homework and Term Project). The use of AI is considered at the same level as plagiarism (see above) and will follow the Academic Regulations and the associated Academic Integrity Policy as Plagiarism. If it is required, you need to clarify "how" you are using it.

Examples of actions that do not adhere to Carleton's Academic Integrity Policy include:

- Plagiarism
- Accessing unauthorized sites for assignments or tests
- Unauthorized collaboration on assignment and exams
- Using artificial intelligence tools such as ChatGPT when your assessment instructions say that it is not permitted.

Please review the checklist linked here to ensure you understand your responsibilities as a student with respect to academic integrity and this course.

Sanctions for Not Abiding by Carleton's Academic Integrity Policy

A student who has not upheld their responsibilities under Carleton's Academic Integrity Policy may be subject to one of several sanctions. A list of standard sanctions in science can be found here.
Additional details about this process can be found on the Faculty of Science Academic Integrity website. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy. The Policy is strictly enforced and is binding on all students.

Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If a concern arises regarding this course, **your first point of contact is me**: Email or drop in during student hours and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are (in this order):

Note: You can also bring your concerns to Ombuds services.