Foundations for Environmental Chemistry - CHEM 2800

Winter 2026

Instructors: Bob Burk, Daniel Sun

Lecture Hours

Mondays and Wednesdays 4:30 – 6:00 PM. Please check Carleton Central for location.

Tutorials

Tutorials are offered for your benefit on Fridays 5:30 – 6:30 PM
There are no tests during tutorials.

Textbook

I am not prescribing a textbook for the course, although there are many that cover various aspects of the material to be taught. Any book with the title "Environmental Chemistry" will likely do. Authors include Baird and Cann, Hites and Raff, vanLoon and Duffy, and so on. But in general, you need to take detailed notes in class and come to the tutorials to do well.

Marking

Assignments: 4@5%
Midterm Test 20%
Final exam: 30%
Lab: 30%

None of the assignments, test, exam or labs are optional, and the marking scheme is the same for everyone. The final exam will not be weighted more to make up for a poor mark on a test or assignment. You must complete the lab to pass the course.
You must have a total course grade of 50.0% to pass the course. 49.9 = F.

Problem Assignments

Problem assignments will be given regularly. A total of 20% may seem to you to be too small to care about. The simple truth is that if you do not do these assignments and receive needed feedback, you will do poorly on the test and exam, where the stakes are much higher.

Midterm Tests

The mid-term test will be written in class on Wednesday February 11, 2026

Laboratory

Daniel Sun is the lab coordinator for this course. You will receive detailed information from him and on Brightspace about the lab requirements. <u>One</u> criterion for passing this course is that you must complete all laboratory experiments.

Communicating With You

You can get any help you need from me by one of the following methods:

1. Visit me during my office hours. I will post office hours on the calendar on Brightspace one week in advance. Make an appointment (via email) if you want extra time.
2. Email me (robert.burk@carleton.ca). In general, all emails received before 10 PM will be answered the same day.

Your TAs, fellow students and other people on campus are also great resources.
But you are paying me to teach you. Use me.

Late and Missed Work Policies

Late Work

You will have plenty of time to do each assignment, so when the due date and time are reached, you will get a grade for whatever you have submitted.

Missed Work

If you miss a homework assignment, you get zero on it, because you have plenty of time to complete it if you start when it is assigned. If you miss a lab, see the lab coordinator immediately to reschedule it (you cannot pass the lab unless all labs are complete). If you miss the midterm test, contact Bob immediately to see what can be done. If you miss the final exam, you are at the mercy of the University policies on missed exams, and must follow their rules.

Academic Accommodations and Regulations

Carleton 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 (https://students.carleton.ca/course-outline/).

AI Use in This Course

Students may use AI tools for basic word processing and formatting functions, including:

- Grammar and spell checking (e.g., Grammarly, Microsoft Word Editor)
- Basic formatting and design suggestions (e.g., Microsoft Word's formatting tools, PowerPoint Design editor)

It is not necessary to document the use of AI for the permitted purposes listed above. Using AI for other purposes will be considered an instructional offence, and the penalties are severe, so just don't do it. We are good at what we do and are as familiar with AI as you are!

As our understanding of the uses of AI and its relationship to student work and academic integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

Statement on Academic Integrity

Students are expected to uphold the values of academic integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using artificial intelligence tools such as ChatGPT when your assessment instructions say it is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy. A list of standard sanctions in the Faculty of 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 abide by Carleton University's Academic Integrity Policy.

Student Rights and 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

Carleton University maintains and enforces a comprehensive policy on academic integrity. Please click here and read the policy in detail. It is your responsibility to understand the integrity standards and to abide by them.

Syllabus

1. Introduction to Environmental Chemistry

2. The Atmosphere

Physical models of the atmosphere
T and p variation with altitude
Radiation budget of the atmosphere
Stratospheric photochemistry , the ozone layer, the ozone hole
Atmospheric warming
Tropospheric chemistry, smog, acid rain, indoor air

3. The Hydrosphere

Physical and chemical properties of water; vapour pressure, freezing, concentrations of solutes
Speciation of carbonates in natural waters; alkalinity
pH of natural waters, acidification, buffering
Speciation of metals; the role of ligands
Activities; effects of ionic strength
Redox chemistry in water

4. Other Topics

Organic chemicals in the environment
Partition coefficients, K_{OW}, bioconcentration factors, biomagnification
Toxicitity of organics
Pesticides and emerging pollutants
Degradation of organics
Radionuclides in the environment, nuclear waste