

# CHEM 2104 for Winter 2025

## Physical Chemistry II

We, the people of the Faculty of Science at Carleton University, acknowledge that our campus is located on the traditional, unceded territories of the Algonquin Anishinabeg people. Miigwetch for your hospitality and stewardship of this territory and the teachings that come from it. We are grateful for this land, the air that we breathe, and the water that sustains us all as well as for the animals, plants and other living beings: these enable us to research, teach, mentor, support, study, and learn. We recognize our responsibility to our natural environment and to reconciliation with Indigenous peoples.

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**Course Instructor:** Seán Barry

**How to address me:** Seán

**Gender Pronouns:** (he/him/his)

**Email:** sean\_barry@carleton.ca

Note: If you have a question or would like to talk with me, you can send an email, visit me in my office at any time (see below), or approach me after lecture.

**Best Ways to be in Touch:** in class, via email, or during dropping by

**Student Hours:** any time that my door is open

**Office Location:** Room 203b, Steacie Building

**Class Location:** Please check Carleton Central for the room location.

**Class Times:** Monday, Wednesday  
10:05 am – 11:25 am

**Prerequisites: If any**

**Preclusions: If any**

**Department/Unit: Chemistry**

**Lab Coordinator:** Xun (Daniel) Sun  
(XunSun@CUNET.CARLETON.CA)

**Course TAs: Dexter Dimova**  
(dexterdimova@cmail.carleton.ca)

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## Topics Covered and Learning Outcomes

In this class, I aim to create an inclusive and welcoming environment where every student feels valued and supported. I celebrate diverse perspectives, recognizing that each student brings unique strengths and experiences to our learning community.

I encourage questions and foster curiosity, emphasizing that mistakes are a natural part of learning. Together, we will build both knowledge and confidence. My goal is for everyone to feel empowered to succeed and inspired to see chemistry in their everyday lives.

### Course Description

Further development of thermodynamic equations and their applications to mass changes, chemical potential, chemical equilibria, transport properties and advanced phase equilibria. Use of partial differentials and development of Maxwell's relations will also be covered.

### Topics to be Covered

Week (approximate)	Topic/Content
1	Chemical Kinetics
4	Phase Diagrams and Phase Changes
7	Ideal and Real Solutions
10	Spectroscopy

### List of Lab Experiments

Exp.1 - Oxidation of Iodide	Formal Report
Exp.2 - Solution of Differential Rate Equations	Interview with Daniel
Exp.3 - Catalytic Decomposition of Hydrogen Peroxide	Informal Report
Exp.4 - Electrode Potentials	Formal Report
Exp.5 - Phase Diagrams	Informal Report
Exp.6 - Viscosities of Liquids	Informal Report
Exp.7 - Thermal Conductivity of Gases	Informal Report

(Note: The lab schedule is posted on Brightspace lab page. Please attend the 1<sup>st</sup> tutorial for the Lab Intro, then, lab experiments start on Jan 23<sup>rd</sup>.)

### Learning outcomes for lab:

1. Follows proper procedures and regulations for safe handling and use of chemicals and hazardous substances.
2. Demonstrates experimental procedures and methods applied in physical chemistry.
3. Effectively communicates the experimental results in both oral and written form.
4. Assesses and quantifies uncertainties in measurements.

Important dates and deadlines can be found here:

<https://carleton.ca/registrar/registration/dates/academic-dates/>, including class suspension for fall, winter breaks, and statutory holidays.

## Grade Breakdown

Component	Grade Value
Assignments	14%
Midterm	21%
Final Exam	35%
Lab	30%

The lab total grade (**30%**) = video learning sessions (**1%**) + quizzes (**2%**) + prelabs (**2%**) + informal reports & interview (**15%**) + formal reports (**10%**).

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## Late and Missed Work Policies

### Late Work

Late work happens: please try to have it submitted on time.

If that can't happen, let me or the TA for the course know in advance. In this case, where an agreement is reached, there is no penalty.

If you inform us after the due date, discuss it with the TA or me, and we will try to reach an accommodation.

Failing all of this, a penalty of 50% off the mark will be applied.

For the lab - Late penalty for lab works (including video sessions, quizzes, prelabs, reports, interview): 10% off per day late with four days maximum.

### Missed Work

Short-term ( 5 days or less): The above policy applies to work that is late for 5 days or less.

Long-term (> 5 days): For missed work that is late beyond 5 days, we will use the course-related policy for [longer-term accommodation](#) .

For the lab - Students are required to complete all lab works (including in-person lab experiments, Brightspace video sessions, quizzes, prelabs, reports, interview) to pass the course. Students who missed any lab work need to contact lab coordinator ASAP to schedule a makeup.

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## Learning Material(s) and Other Course/Lab-Related Resources

Ancillary fees associated with this course, e.g., textbooks, course packs, lab manuals, field work, online resources or links required for the course along with their associated cost (if applicable). Estimated costs can be acquired based on current bookstore offerings, Amazon, etc.

Learning Material	Options for Purchasing (e.g. <i>Bookstore, Used, etc.</i> )	Approximate Cost
Engel and Reid, Physical Chemistry: Thermodynamics, Statistical Thermodynamics and Kinetics; Pearson: ISBN-13: 9780137403066	Bookstore, used, anywhere	\$225 (new)

**Students are not required to purchase textbooks or other learning materials for this course.**

*Resources required to finish the lab:*

*lab coat, safety goggles, lab notebook, which are available from the Science Store (<https://science.carleton.ca/science-stores/>).*

*Note: you can use your previous lab coat, safety goggles, lab notebook.*

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## 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/>).

### Statement on Chat GPT/Generative AI usage

In general, you can use AI to assist with writing, but not in the synthesis or creation of new ideas. 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.

AI Usage in Lab: AI is only allowed for word formatting in lab reports. Never use AI to generate any content.

Students can use AI as a searching tool like Google or Wikipedia. For example, talk to AI and get responses, then, verify the information by checking with reliable sources like

textbooks or scientific publications, then, describe the information in lab reports with your own words with at least 70% difference to the AI responses, and finally reference. When reference AI, use the name of the creator as the author and include both an in-text citation and a reference list entry, also include the questions used and the responses generated in an appendix.

### **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 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 & 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.

### **Mental Health and Wellness:**

As a student you may experience a range of mental health challenges that significantly impact your academic success and overall well-being. If you need help, please speak to someone. There are numerous resources available both on- and off-campus to support you. For more information, please consult <https://wellness.carleton.ca/>.

## 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](#).



## Assistance for Students

Writing and Learning Support: <https://carleton.ca/csas/support/>

Peer Assisted Study Sessions (PASS): <https://carleton.ca/csas/pass/>

Math Tutorial Centre: <https://carleton.ca/math/math-tutorial-centre/>

Science Student Success Centre: <https://sssc.carleton.ca/>