
CHEM 1012 Winter 2025 Syllabus Enriched General Chemistry II

1. Overview

Calendar Description: CHEM 1012 A

Prerequisite(s): Enriched General Chemistry I, CHEM 1011



Instructor: Jasmine Chihabi



Email: jasminechihabi@cunet.carleton.ca



Office Hours: 115 Steacie Building on Wednesdays from 10:00 to 11:00 AM



Lecture: Times and locations are listed on Carleton Central



Laboratory: Times and locations are listed on Carleton Central

2. Learning Resources

i. *Lectures:* Lectures are synchronous and mandatory. You are encouraged to participate.

ii. *Textbook:* The text for the course is "Chemistry" 4th Canadian Edition by Olmsted, Williams and Burk published by Wiley. The book is available from Carleton's bookstore (\$134.95) However, permanent electronic access is also available through the instructions listed on the course Brightspace page at a discounted price (\$60.00). We recommend buying the latter option.

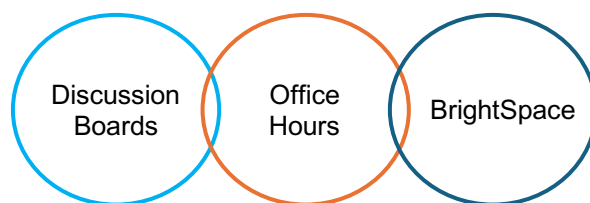
iii. *Scientific Calculator* with \ln , e^x , \log_{10} and 10^x functions. Note: calculators or notebook computers capable of storing information are **NOT** allowed during tests/exams, i.e. most graphing calculators.

iv. **Pearson Mastering Chemistry Online Homework:** required to complete the assigned online homework. One must purchase access to a Mastering Chemistry account. To set-up your account, you must follow the registration instructions provided on the Brightspace site under Content >> Course Resources >> Pearson Mastering Chemistry Info. Those who neglect the assignments do not typically do well on tests and exams!

v. *Molecular Model Kit* (optional **BUT HIGHLY RECOMMENDED**). This kit helps with visualising 3D molecular shapes and organic structures, as well as completing the assigned Aspects of Organic Chemistry lab exercises. A kit can be purchased from the University Bookstores. I recommend the Molecular Visions Model Kit.

vi. **CHEM 1012 Website** – access through [Brightspace](#). Your Username is the part of your CU e-mail address before the "@" sign. Your password is the same as your university e-mail. The course has the same Brightspace as the laboratory. The course website provides a wealth of resources. Announcements relating to course material will be given on Brightspace or you will be notified by email. It is your responsibility to check this site and your email on a regular basis.

Need Help?



vii. **Instructor Office Hours** – If students are unable to attend it due to schedule conflicts, email the course instructor (jasminechihabi@cunet.carleton.ca) to set up an appointment. *Please note that office hours will not take place during holidays or reading week.*

viii. **Student Science Success Center (SSSC)**. This is a resource designed to aid undergraduate students in the Faculty of Science with all subject matters associated with the faculty. You can book an appointment through site <https://sssc.carleton.ca>

x. **Lectures & Tutorials**. Lectures will be held every week. Tutorials will be held during class time during which the instructor and students will be focused on problem solving.

xi. **Laboratory**. Details of the laboratory portions of this course can be found on the Brightspace site. **You must complete all activities of the laboratory portion to receive a passing grade in this course.** Please note: *Students have one to two weeks* (see the lab schedule for due dates) to complete and submit their lab reports for each lab, and multiple submissions are permitted up until the due date. As a result, labs that are submitted late for any reason (including but not limited to electronic submission issues) will be subject to the penalty of 10% per day, with a mark of 0 assigned if an assignment is submitted more than 4 days late. Therefore, you are encouraged to submit your lab report a day or two early, and update it, if necessary, to ensure that you have no issues with your lab submission.

3. Course Schedule:

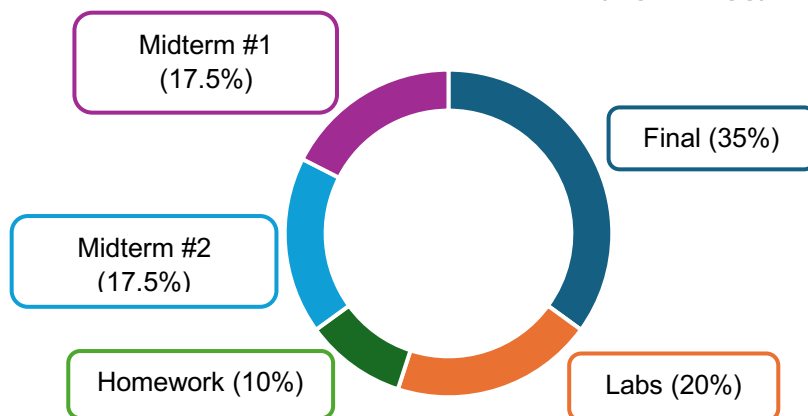
Week	Dates	Chapter	Notes, Deadlines, and Examination Dates
1	Jan 6	Introduction + Overview of Syllabus	
		Ch 3 Energy and Its Conservation	
2	Jan 13	Ch 3 Energy and Its Conservation	<ul style="list-style-type: none"> Last day for add/swap January 17th, 2025
3	Jan 20	Ch 12 Spontaneity of Chemical Processes	<ul style="list-style-type: none"> Assignment #1 Mastering Chemistry due on January 23rd, 2025, at 11:55 PM
4	Jan 27	Ch 13 Kinetics: Mechanisms and Reactions	<ul style="list-style-type: none"> Last day for withdrawal with full fee adjustment on January 31st, 2025
5	Feb 3	Ch 17 Electron Transfer Reactions	<ul style="list-style-type: none"> Midterm 1 held this week. Date, time, and location TBA Assignment #2 Mastering Chemistry due on February 6th, 2025, at 11:55 PM
6	Feb 10	Ch 10 Organic Chemistry: Structure and Nomenclature	
WINTER BREAK WEEK OF FEB 17			
7	Feb 24	Ch 10 Organic Chemistry: Structure and Nomenclature	<ul style="list-style-type: none"> Assignment #3 Mastering Chemistry due on February 27th, 2025, at 11:55 PM
8	Mar 3	Ch 11 Organic Chemistry: Reactions	

9	Mar 10	Ch 11 Organic Chemistry: Reactions	<ul style="list-style-type: none"> Assignment #4 Mastering Chemistry due on March 13th, 2025, at 11:55 PM
10	Mar 17	Ch 19 Transition Metals	<ul style="list-style-type: none"> Midterm 2 held this week. Date, time, and location TBA
11	Mar 24	Ch 19 Transition Metals	<ul style="list-style-type: none"> Assignment #5 Mastering Chemistry due on March 27th, 2025, at 11:55 PM
12	Mar 31	REVIEW WEEK	
13	Apr 8	NO CLASS	<ul style="list-style-type: none"> Last day of classes Assignment #6 Mastering Chemistry due on April 8th, 2025, at 11:55 PM

4. Evaluation

All online assessments are open book. **The work submitted must still be your own, and cannot be completed with the help of classmates, tutors, Chat GPT, AI, or online homework help (e.g. Chegg).** The final course grade will be calculated based on the following components. Please see "Lecture Schedule" for due dates.

Assessment	Weight
Mastering Chemistry Online Homework	10%
Laboratory	20%
Midterm I	17.5%
Midterm II	17.5%
Final Examination	35%



i. Online Homework (Mastering Chemistry):

Chemistry is not a subject that can be easily learned by simply reading a book. To consolidate your understanding, one must work with and use the concepts discussed in the course on a regular basis. Interactive homework is a way to keep up with the course and test your understanding. Access is purchased either online or through the campus bookstores, and detailed instructions are provided on Brightspace. There are 6 assignments, one every two weeks. There are adaptive follow-ups which are generated immediately and available for a week. If an assignment is not attempted, a grade of zero is assigned.

ii. Midterm Examinations.

Midterms I and II comprise 35% of your final grade. The midterm exam will consist of a mixture of multiple choice and short and/or long answer questions. Midterm examinations generally have a minimum duration of 80 minutes.

iii. Final Examination. **Please see exam schedule from the Registrar's office.** The final examination covers the entire course and will be held **in person**.

5. Policy on Missed Work

For short term (a week or less) incapacitation, students must complete and submit a self-declaration form to the instructor Jasmine Chihabi within 48 hours of the missed work (<https://carleton.ca/registrar/wp-content/uploads/selfdeclaration.pdf>). For approved missed tests, the weight will be transferred to the final exam. Long term (longer than 1 week) incapacitation will be evaluated on a case-by-case basis and discussions of accommodations may involve the Chair of the Department of Chemistry and/or the Office of the Dean of Science.

6. Expectations

i. **Academic Integrity, Ethics and Etiquette:** It is expected that all members of the University community will uphold the values of academic integrity (<https://carleton.ca/registrar/academic-integrity/>) and interact with each other in a manner that is respectful, civil, and consistent with the responsibilities outlined in the Student Rights and Responsibilities policy (<https://carleton.ca/studentaffairs/student-rights-and-responsibilities/>). Inappropriate behaviour will not be tolerated, where examples include:

- Posting inflammatory messages about your instructor or fellow students,
- Using obscene or offensive language,
- Copying or presenting someone else's work as your own,
- Adapting information without using proper citations or references,
- Buying/selling lab reports or assignments,
- Posting or selling course materials to course notes websites,
- Recording lectures without the permission of the instructor,
- Having someone else complete your quiz or completing a quiz for/with another student,
- Stating false claims about lost quiz answers or other assignment submissions,
- Threatening or harassing a student or instructor,
- Discriminating against fellow students, instructors, and/or TAs,

Original work performed in good faith is assumed with all course components. Carleton University students have the responsibility of abiding by the University's policy on academic integrity, which prohibits several forms of academic offences, including cheating; falsification; plagiarism; unauthorized collaboration; or recording and/or dissemination of instructional content without express permission of the instructor.

Your graded submissions for online assignments, tests and exams should be your own, individual work. You may not share content from any assignments, tests, exams, etc. with 3rd-parties such as Chegg, CourseHero, Reddit, or any other content repositories. If found guilty of academic misconduct, a grade of zero is a common penalty on such course components, as well as a letter documented the offence being placed in your official student file.

It is also presumed that the data you collect, all data analysis and written/typed calculations and responses that you submit for grading are yours alone. We often find examples of plagiarism in which lab reports are copied from someone else, or from a previous semester. In short, if you have not done something yourself, do not attempt to pass it off as original work.

If you have any questions about what might cross the line, please do not hesitate to ask a TA or Instructor prior to submitting your work.

ii. **Knowledge and Understanding:** The **pre-requisite for CHEM 1012** is high school chemistry (e.g., Ontario 3U and 4U or grade 11 and 12 chemistry), [CHEM 1011](#), and enrollment in a chemistry major at Carleton University. In reviewing the course content of CHEM 1012 you may feel you know most of the material already.

Don't be misled! The topics may be familiar, but we will provide a deeper understanding of the fundamental concepts within chemistry.

The purpose of CHEM 1012 is to build upon your previous exposure to the subject. You will need to move away from just memorization terms and definitions and spend more time thinking about the processes and concepts within chemistry. This will lay the foundation for more advanced courses such as analytical chemistry, biochemistry, organic chemistry, inorganic chemistry and physical chemistry. Note that the course is not designed to "teach" you chemistry. It is, however, constructed to help you learn chemistry.

b) **CHEM 1012 Detailed Course Topics and Learning Objectives** – the course can be subdivided into six sub-sections and the learning objectives for each are as follows:

1. Energy and Its Conservation (Chapter 3)

- a. Understand and apply the **first law of thermodynamics**.
- b. Be able to recognize **energy exchanges** between a system and its surroundings in the form of heat and work.
- c. Distinguish between state and path functions.
- d. Learn how to determine the change in energy for a given reaction.
- e. Understand the *thermodynamic property enthalpy, H*.
- f. Understand and apply **Hess's Law** to determine the **CHANGE** in enthalpy for a given reaction.

2. Spontaneity of Chemical Processes (Chapter 12)

- a. Understand and apply the **second and third laws** of thermodynamics.
- b. Define *thermodynamic property entropy S* and understand what factors influence it.
- c. Be able to calculate the **CHANGE** in entropy for a given reaction.
- d. Relate *Gibbs Free Energy* to the *spontaneity* of a process.
- e. Be able to determine the **SPONTANEOUS DIRECTION** for a process.
- f. Relate spontaneity to **CHANGES** in *Gibbs Free Energy*, *enthalpy*, and *entropy*.

3. Kinetics: Mechanisms and Reactions (Chapter 13)

- a. Define a reaction mechanism.
- b. Understand what the *rate-determining* step is and its relationship with a proposed reaction MECHANISM.
- c. Understand how rate laws relate reaction rates to concentrations of reactants and products.
- d. Be able to write a **rate law** and distinguish between zeroth, first, second, and third order reactions.
- e. Know what the half-life of a reaction is and how it relates to concentrations of reactants and products.
- f. Define the activation energy and calculate it using Arrhenius equation.
- g. Understand the effect of temperature on reaction rates and the activation energy.
- h. Understand how a catalyst increases the reaction rate and distinguish between HOMOGENEOUS and HETEROGENEOUS catalysts.

4. Electron Transfer Reactions (Chapter 17)

- a. Identify **REDOX REACTIONS** by recognizing changes in oxidation states within a chemical species.
- b. Identify oxidation and reduction reactions and learn how to balance redox reactions.
- c. Recognize and identify the components of a galvanic cells and how to express a short-hand cell notation.
- d. Recognize the significance of and the conditions under which standard reduction potentials were measured and documented.
- e. Be able to calculate the **standard electric potential** for a cell and understand how it relates to the **SPONTANEITY** of the given redox reaction.
- f. Relate the standard electric potential to *Gibbs Free Energy* and the equilibrium constant, K_{eq} .
- g. Apply the Nernst equation to understand and recognize the effect of chemical concentration and temperature on cell potentials.

5. Organic Chemistry: Structures and Nomenclature (Chapter 10)

- a. Familiarize students with the **I**nternational **U**nion of **P**ure and **A**ppplied **C**hemistry (IUPAC) system and its relevance in chemical nomenclature.
- b. Recognize the hydrocarbon class of chemical compounds and learn how to name (according to IUPAC system) and draw them.
- c. Recognize branching points within hydrocarbons.
- d. Understand the concept of aromaticity and be able to recognize aromatic compounds.
- e. Learn how to name and draw aromatic compounds, according to the IUPAC system.
- f. Recognize and be able to identify common functional groups including **alkyl halides, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amides, and nitriles**.
- g. Be able to use the IUPAC system to name and draw substances containing these functional groups.
- h. Define and recognize isomers.
- i. Distinguish between constitutional (structural) isomers and stereoisomers (spatial).
- j. Recognize and identify chiral centers.
- k. Know what enantiomers and diastereomers are and be able to recognize an enantiomer/diastereomer of a substance.

6. Organic Chemistry: Reactions (Chapter 11)

- a. Be able to define and identify **nucleophiles**.
- b. Be able to define and identify electrophiles.
- c. Understand that organic chemical reactions involve transfer of electron density via nucleophilic attacks on electrophiles.

- d. Be able to draw transfers of electron densities **FROM** nucleophiles **TO** electrophiles, using curved arrows.
- e. Recognize fundamental organic reactions (including *addition*, nucleophilic substitution, and **elimination** reactions) and be able to draw their products and mechanisms.
- f. Distinguish the mechanistic and kinetic differences between the two types of nucleophilic substitution reactions: S_N1 and S_N2 .
- g. Understand how S_N1 and S_N2 mechanisms affect the stereochemistry of the product.
- h. Recognize what factors influence the tendency for a substance to undergo S_N1 versus S_N2 (and *vice versa*).
- i. Distinguish the mechanistic and kinetic differences between the two types of elimination reactions: $E1$ and $E2$.
- j. Apply Markovnikov's Rule to draw the products of alkene additions reactions.

7. Transition Metals (Chapter 19)

- a. Determine the oxidation state of transition metals in **coordination complexes**.
- b. Distinguish an anionic ligand from a neutral ligand.
- c. Count the number of electrons in a coordination complex.
- d. Be able to name transition metal complexes using **IUPAC** system.
- e. Utilize **crystal field theory** to explain the color and magnetic properties of complexes.
- f. Distinguish between crystal field splitting energy and pairing energy.
- g. Recognize what factors impact crystal field splitting energy.
- h. Distinguish between **HIGH-SPIN** and **LOW-SPIN** complexes.
- i. Know what the spectrochemical list is and its significance.
- j. Be able to draw energy diagrams for octahedral, tetrahedral, and square planar complexes.

University Statements

- a. **Academic Integrity:** The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source. Examples of sources from which the ideas, expressions of ideas or works of others may be drawn from include but are not limited to: books, articles, papers, literary compositions and phrases, performance compositions, chemical compounds, art works, laboratory reports, research results, calculations and the results of calculations, diagrams, constructions, computer reports, computer code/software, material on the internet and/or conversations.

Examples of plagiarism include, but are not limited to: any submission prepared in whole or in part, by someone else; using ideas or direct, verbatim quotations, paraphrased material, algorithms, formulae, scientific or mathematical concepts, or ideas without appropriate acknowledgment in any academic assignment; using another's data or research findings without appropriate acknowledgement; submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and failing to acknowledge sources through the use of proper citations when using another's work and/or failing to use quotations marks.

Plagiarism is a serious offence that cannot be resolved directly by the course's instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course or even suspension or expulsion from the University.

- b. **Course Copyright:** Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copyright protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

- c. **Final Grades:** Standing in a course is determined by the course instructor subject to the approval of the Faculty Dean. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.
- d. **Academic Accommodations:** Carleton University is committed to providing access to the educational experience to promote academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University. The accommodation request processes, including information about the Academic Consideration Policy for Students in Medical and Other Extenuating Circumstances, are outlined on the Academic Accommodations website (students.carleton.ca/course-outline)
- e. **Addressing Human Rights Concerns:** The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca.
- f. **Requests for Academic Accommodation:** You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation (PDF, 2.1 MB).

Religious obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the Student Guide to Academic Accommodation (PDF, 2.1 MB).

Academic Accommodations for Students with Disabilities: If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as

soon as possible to ensure accommodation arrangements are made. For more details, visit the Paul Menton Centre website.

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the Equity and Inclusive Communities website.

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the Senate Policy on Accommodation for Student Activities.

Academic Consideration for Short-term Incapacitation: "Short-term incapacitation" is illness, injury, or other extenuating circumstances beyond your control that can disrupt your ability to meet your academic obligations for five or fewer days. Depending on the circumstances, you may need to temporarily step away from your studies in order to take proper care of yourself.

If you are missing coursework or midterm work due to short-term incapacitation, you can contact your instructor(s) directly to request academic consideration. You are not required to submit a medical note if your absence lasts five or fewer days. If your instructor(s) requests that you provide supporting documentation, complete the self-declaration form. Instructors have the right to determine appropriate consideration at their discretion.

Scheduling and Examination Support: Scheduling and Examination Services provides various supports for both in-term and end-of-term tests and exams. Details can be found on the Exam Support website.