

COURSE SYLLABUS



COURSE TITLE: CHEM-120: College Chemistry 1

CLASS SECTION: 004

TERM: Fall 2023

COURSE CREDITS: 3

DELIVERY METHOD(S): In-person lecture and labs

Camosun College campuses are located on the traditional territories of the Ləkʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.

Learn more about Camosun's [Territorial Acknowledgement](#).

INSTRUCTOR DETAILS

NAME: Neil Meanwell

EMAIL: meanwen@camosun.ca

OFFICE: F 348 B

HOURS: Mon, Wed, Thurs: 1.30-2.30 pm; Tues: 2.30-3.30 pm; Fri: 10.30-11.30 am

As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.

CALENDAR DESCRIPTION

For both university and technology students, this course starts with atomic structure and periodic properties and leads to a discussion of chemical bonding, thermochemistry, molecular structure, intermolecular structure, colligative properties, intermolecular forces of attraction and their role in environmental issues. The experiments include chemical synthesis and analysis by titration and spectroscopy.

PREREQUISITE(S):

One of:

- C in Chemistry 12
- C in Camosun Alternative

CO-REQUISITE(S):

Not applicable

EXCLUSION(S):

Not applicable

COURSE LEARNING OUTCOMES / OBJECTIVES

Upon completion of this course a student will be able to:

1. Utilize nomenclature rules to name ionic and covalent compounds.
2. Demonstrate an understanding of stoichiometry by balancing chemical equations and performing mathematical calculations involving chemical reactions.
3. Describe the electronic structure of any atom in the periodic table and apply it to explain many of the physical and chemical properties of the elements.
4. Utilize simple bonding theories to explain why elements combine to form the compounds they do and also to explain many of the properties of compounds.
5. Apply knowledge of intermolecular interactions to rationalize many important physical properties of bulk matter in the gas, liquid and solid phases.
6. Use standard chemistry lab equipment, including burets, pipets, Buchner filters, and volumetric glassware in the correct manner.
7. Perform many standard laboratory procedures, such as titrations, preparation of standard solutions, the preparation, isolation, and purification of compounds, as well as use spectrophotometers to make analytical measurements.

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

(a) The required text for the course is: **Chemistry: The Central Science in SI Units, Expanded Edition, Global Edition, Brown, LeMay, Bursten, Murphy, Woodward, Stoltzfus, Langford and George**. It is available as an eText with access to Mastering:

Mastering Chemistry with Pearson eText (ACC); \$119.10

To purchase, please go to https://www.camosuncollegebookstore.ca/buy_access_codes.asp

Once you have purchased an Access Code, please follow the instructions given in the handout for Mastering Chemistry registration.

(b) Lab Experiments: Chemistry 120 Laboratory Manual (In-house), 2022 Edition. Hard copy available at the Camosun Bookstore.

(c) Lab safety glasses.

(d) Lab coat

TOPICS

Brief Summary of Course Material with Chapter References

1. Introduction and Review (6 Lectures) (Chapters 1, 2, 3 and 4)

Classification of matter, units of measurement, significant figures, atoms, protons, neutrons, electrons, isotopes, atomic masses. Compounds, stoichiometry, formulas, nomenclature formula weights, molecular weights, percent composition by mass, the mole, molar mass, chemical equations, reaction stoichiometry, limiting reagent, percent yield. Reactions in aqueous solution including precipitation, acid-base and oxidation-reduction, solution concentration and solution reaction stoichiometry.

Note: these topics will be covered at a faster pace than later material in the course. A few of the topics will be assigned as self-study.

2. Electronic Structure of Atoms and the Periodic Properties of the Elements (8 Lectures) (Chapters 6 and 7)

Light, quanta and photons, atomic spectra and energy levels, wave properties of electrons. Atomic orbitals, quantum numbers, electron spin, electronic structure of the hydrogen atom. Many-electron atoms, electron configurations of atoms and ions, relationship to the periodic table. Periodicity of atomic properties, atomic and ionic radius, ionization energy, inert pair effect, electron affinity. Chemistry and the periodic table, s-block, p-block, and d-block.

3. Chemical Bonding (8 Lectures) (Chapters 8 and 9)

Ionic bonds, Lewis symbols, lattice enthalpies, properties of ionic compounds. Covalent bonds, atoms to molecules, octet rule and Lewis structures. Polyatomic species, Lewis structures, resonance and formal charge. Exceptions to the octet rule. Ionic versus covalent bonds, correcting the ionic and covalent models. Molecules: shape, size, and bond strength. Shapes of molecules and ions, VSEPR theory.

Charge distribution in molecules, polar bonds and polar molecules. Bond strengths and bond lengths. Orbitals and bonding theories (Valence Bond theory and Molecular Orbital Theory).

4. Gases (4 Lectures) (Chapter 10)

Nature of gases, states of matter, molecular nature of a gas, pressure. Gas laws, ideal gas law, reaction stoichiometry, gas density, Gas mixtures. Molecular motion, diffusion, effusion, kinetic model of gases, molecular speeds. Limitations of ideal gas law, real gases.

5. Intermolecular Forces, Liquids and Solids (7 Lectures) (Chapters 11 and 12)

Comparison of liquids and solids, intermolecular forces, ion-dipole, dipole-dipole, London dispersion forces, hydrogen bonding. Properties of liquids, phase changes, heating curves, critical temperature and pressure, vapour pressure, boiling point. Phase diagrams, structures of solids.

6. Solutions (3 Lectures) (Chapter 13)

Solution process, solubility, factors affecting solubility, Henry's law, colligative properties.

7. Chemistry of the Environment (3 Lectures) (Chapter 18)

Structure of Earth's atmosphere, ozone layer and its depletion, tropospheric pollution, greenhouse effect and photochemical smog. Oceans and freshwater.

The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

Lectures: Mon, Wed: 11.30 am – 12.20 pm (F 306) and Tues: 2.30 pm – 4.20 pm (E 344)

Laboratory: Fri: 11.30 am – 2.20 pm (F 356)

The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

WEEK or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
1	Chapter 1 Matter and Measurement	
2	Chapter 2 Atoms, Molecules and Ions Chapter 3 Chemical Stoichiometry	
3	Chapter 3 Chemical Stoichiometry Chapter 4 Reactions in Aqueous Solution	
4	Chapter 6 Electronic Structure of Atoms	
5	Chapter 6 Wave Mechanical Model of the Atom and Electron Configurations	
6	Chapter 7 Periodic Properties of the Elements	
7	Chapter 8 Basic Concepts of Chemical Bonding/ Ionic Bonding	Term Test 1
8	Chapter 8 Covalent Bonding and Lewis Structures	
9	Chapter 9 Molecular Geometry and Bonding Theories	
10	Chapter 10 Gases	
11	Chapter 10 Gases and Chapter 11 Intermolecular Forces	
12	Chapter 11 Intermolecular Forces, Liquids	Term Test 2
13	Chapter 11 Solids and Chapter 12 Solutions	
14	Chapter 13 Environmental Chemistry	
15	Final Exam Period	

Students registered with the Centre for Accessible Learning (CAL) who complete quizzes, tests, and exams with academic accommodations have booking procedures and deadlines with CAL where advanced notice is required. Deadlines can be reviewed on the [CAL exams page](http://camosun.ca/services/accessible-learning/exams.html). <http://camosun.ca/services/accessible-learning/exams.html>

LABORATORY SCHEDULE

Date of Lab (Fridays)	Experiment	Lab Report Due Date*
Week #1 Sept. 8 th	Laboratory Safety Talk/Quiz	N/A
Week #2 Sept. 15 th	Experiment 2 The Densities of Solids and Liquids	Sept. 22 nd
Week #3 Sept. 22 nd	Experiment 3 Stoichiometry of Chemical Compounds	Sept. 29 th
Week #4 Sept. 29 th	Experiment 4 The Spectroscopic Determination of Nickel	Oct. 6 th
Week #5 Oct. 6 th	Experiment 5 Colorimetric Determination of Iron in a Vitamin Tablet using 1,10-Phenanthroline	Oct 20 th
Week #6 Oct. 13 th	No Lab – Term Test 1	N/A

Week #7 Oct. 20 th	No Lab-Lecture	N/A
Week #8 Oct. 27 th	Experiment 6 Determination of Copper using Atomic Absorption Spectroscopy	Nov 3 rd
Week #9 Nov 3 rd	Experiment 7 Determination of the Total Hardness of Water using EDTA	Nov 10 th
Week #10 Nov. 10 th	Experiment 8 Molecular Shapes (VSEPR)	Nov. 17 th
Week #11 Nov. 17 th	Experiment 9 The Preparation of Potassium Tris(oxalato)ferrate(III)	Dec 1 st
Week #12 Nov. 24 th	No Lab -Term Test 2	N/A
Week #13 Dec 1 st	Experiment 10 Analysis of Potassium Tris(oxalato)ferrate(III)	Dec. 8 th
Week #14 Dec. 8 th	No Lab – Lecture/Review	N/A

* Lab reports must be submitted by 5.00 pm on the date stated.

EVALUATION OF LEARNING

DESCRIPTION	WEIGHTING
Mastering Assignments ¹	15%
Laboratory Work ²	25%
Term Tests (@ 15%) ³	30%
Final Exam ⁴	30%
TOTAL	100%

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the [Grade Review and Appeals](#) policy for more information.

<http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf>

Notes

1. Online assignments will be posted periodically and must be completed by the posted deadline.
2. Additional information supplied at the first laboratory meeting.
3. Both term tests are fully written and scheduled for the laboratory periods in weeks 6 and 12.
4. The final exam is a comprehensive, fully written, three hour exam, scheduled the exam period following the end of classes.

COURSE GUIDELINES & EXPECTATIONS

- a. Students must attend the first laboratory meeting which is on safety in the laboratory and general laboratory procedure.
- b. You must wear safety glasses and a laboratory coat at all times while an experiment is in progress. You will not be allowed to perform an experiment if you are not wearing the required safety equipment.

- c. If you miss an experiment you will be given a mark of zero for the experiment unless you have a valid medical reason or family emergency.
- d. You must submit a minimum of SIX laboratory reports in order to pass the laboratory portion of the course.
- e. You must pass both the lecture and laboratory portions of the course separately in order to obtain a passing grade overall.
- f. If you miss a term test the weighting from that test will be transferred to the final exam. The only exception will be for a valid medical problem or family emergency.
- g. If it is advantageous to the student, if any of the term test marks are inferior to the final exam mark, the weighting will be replaced by an equal weighting from the final exam.
- h. Late submissions of laboratory reports and/or assignments will be penalized and none accepted if more than five days past the deadline.

SCHOOL OR DEPARTMENTAL INFORMATION

Science Help Centres (SHC): <https://camosun.ca/services/academic-supports/help-centres/science-help-centres>. Tutors are available in Fisher 264 to assist you in chemistry, biology and physics. The schedule will be posted on D2L.

STUDENT RESPONSIBILITY

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

SUPPORTS AND SERVICES FOR STUDENTS

Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit <http://camosun.ca/students/>.

Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/

Learning Skills	http://camosun.ca/learningskills
Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the [Centre for Accessible Learning](#) (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started:

<http://camosun.ca/services/accessible-learning/>

Academic Integrity

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf> for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

Academic Progress

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf> for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

Course Withdrawals Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf> for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit <http://camosun.ca/learn/fees/#deadlines>.

Grading Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf> for further details about grading.

Grade Review and Appeals

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf> for policy relating to requests for review and appeal of grades.

Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the “Attendance” section under “Registration Policies and Procedures” (<http://camosun.ca/learn/calendar/current/procedures.html>) and the Grading Policy at <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf>.

Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf> to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun’s Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student’s right to choose what is right for them. For more information see Camosun’s Sexualized Violence and Misconduct Policy: <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.9.pdf> and camosun.ca/sexual-violence. To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-3703841

Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College’s Student Misconduct Policy at <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf> to understand the College’s expectations of academic integrity and student behavioural conduct.

Changes to this syllabus: Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.