COURSE SYLLABUS

COURSE TITLE: CHEM-120-College Chemistry 1
CLASS SECTION: 004

TERM: 2024F

COURSE CREDITS: 3

DELIVERY METHOD(S): In-person lectures and laboratories

Camosun College respectfully acknowledges that our campuses are situated on the territories of the Lək̓ʷəŋən (Songhees and Kosapsum) and WSÁNEĆ peoples. We honour their knowledge and welcome to all students who seek education here.

INSTRUCTOR DETAILS

NAME: Neil Meanwell

EMAIL: meanwen@camosun.ca

OFFICE: F 348 B

OFFICE HOURS: Mon, Tues, Wed, Thurs: 1.30 – 2.30 pm. Thurs: 4.30 – 5.30 pm.

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 Chemistry 12 Camosun Alternative

CO-REQUISITE(S): None

EQUIVALENCIES: None

COURSE LEARNING OUTCOMES / OBJECTIVES

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

Utilize nomenclature rules to name ionic and covalent compounds.

Demonstrate an understanding of stoichiometry by balancing chemical equations and performing mathematical calculations involving chemical reactions.

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.

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.

Apply knowledge of intermolecular interactions to rationalize many important physical properties of bulk matter in the gas, liquid and solid phases.

Use standard chemistry lab equipment, including burets, pipets, Buchner filters, and volumetric glassware in the correct manner.

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

Texts	The required text is: **Chemistry: The Central Science in SI Units, Expanded Edition, Global Edition** Theodore Brown, H. Eugene LeMay, Bruce Bursten, Catherine Murphy, Patrick Woodward and Matthew Stoltzfus. It is only available as an eTextbook. Purchase the 24 month access option with Mastering: Mastering Chemistry with Pearson eText for Chemistry: The Central Science in SI Units, Expanded Edition, Global Edition ISBN-13: 9781292408804 Please go to https://www.camosuncollegebookstore.ca/buy_access_codes.asp Also purchase online at: https://www.pearson.com/en-ca/subject-catalog/p/chemistry-the-central-science-in-si-units-expanded-edition-global-edition/P200000007544/9781292408804

Other	Chem 120 Lab Manual (Eye protection and a lab coat is mandatory) Scientific calculator [If you are taking math courses at Camosun, you need to buy certain Sharp model (scientific calculator with statistic functions). Please check with our Math Department or Bookstore. Technological Requirements: http://camosun.ca/services/orientation/online-learning.html

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

Lectures: Tues: 3.30 – 4.20 pm (WT 103), Wed: 12.30 – 1.20 pm (F 306), Thurs: 3.30 – 4.20 pm (F336).
Laboratory: Wed: 2.30 – 5.20 pm (F 356)

TOPICS

The following is a brief summary of the 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.

WEEK or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
1	Chapter 1 (Review) Matter and Measurement	
2	Chapter 2 (Review) Atoms, Molecules and Ions Chapter 3 (Review) Chemical Stoichiometry	
3	Chapter 3 (Review) Chemical Stoichiometry Chapter 4 (Review) 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	Term Test 1
7	Chapter 8 Basic Concepts of Chemical Bonding/ Ionic Bonding	
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

noticed is required. Deadlines can be reviewed on the CAL exams page.
https://camosun.ca/services/academic-supports/accessible-learning/academic-accommodations-exams

LABORATORY SCHEDULE

Date of Lab (Wednesdays)	Experiment	Lab Report Due Date*
Week #1 Sept. 4th	Laboratory Safety Talk/Quiz	N/A
Week #2 Sept. 11th	Experiment 2 The Densities of Solids and Liquids	Sept. 18th
Week #3 Sept. 18th	Experiment 3 Stoichiometry of Chemical Compounds	Sept. 25th
Week #4 Sept. 25th	**No Lab - Lecture**	N/A
Week #5 Oct. 2nd	Experiment 4 The Spectroscopic Determination of Nickel	Oct 16th
Week #6 Oct. 9th	**No Lab – Term Test 1**	N/A
Week #7 Oct. 16th	Experiment 5 Colorimetric Determination of Iron in a Vitamin Tablet using 1,10-Phenanthroline	Oct 23rd
Week #8 Oct. 23rd	Experiment 6 Determination of Copper using Atomic Absorption Spectroscopy	Oct 30th
Week #9 Oct 30th	Experiment 7 Determination of the Total Hardness of Water using EDTA	Nov 6th
Week #10 Nov. 6th	Experiment 8 Molecular Shapes (VSEPR)	Nov. 13th
Week #11 Nov. 13th	Experiment 9 The Preparation of Potassium Tris(oxalato)ferrate(III)	Nov 27th
Week #12 Nov. 20th	**No Lab -Term Test 2**	N/A
Week #13 Nov 27th	Experiment 10 Analysis of Potassium Tris(oxalato)ferrate(III)	Dec. 4th
Week #14 Dec. 4th	**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]	10%
Laboratory work [2]	25%
Test 1[3]	15%
Test 2[3]	15%
Final Exam[4]	35%
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.

https://camosun.ca/sites/default/files/2021-05/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-helpcentres. Tutors are available in Fisher 264 to assist you in chemistry, biology and physics. The schedule will be posted on D2L.

Student Learning Success Guides: All Guides
https://camosun.libguides.com/CSSCHome/Images_HOME?preview=8c8156761f510434e998e6240e396088

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 camosun.ca/services.

Support Service	Website
Academic Advising	camosun.ca/services/academic-supports/academic-advising
Accessible Learning	camosun.ca/services/academic-supports/accessible-learning
Counselling	camosun.ca/services/health-and-wellness/counselling-centre
Career Services	camosun.ca/services/co-operative-education-and-career-services
Financial Aid and Awards	camosun.ca/registration-records/financial-aid-awards
Help Centres (Math/English/Science)	camosun.ca/services/academic-supports/help-centres

Support Service	Website
Indigenous Student Support	camosun.ca/programs-courses/iecc/indigenous-student-services
International Student Support	camosun.ca/international
Learning Skills	camosun.ca/services/academic-supports/help-centres/writing-centre-learning-skills
Library	camosun.ca/services/library
Office of Student Support	camosun.ca/services/office-student-support
Ombudsperson	camosun.ca/services/ombudsperson
Registration	camosun.ca/registration-records/registration
Technology Support	camosun.ca/services/its
Writing Centre	camosun.ca/services/academic-supports/help-centres/writing-centre-learning-skills

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 Integrity

Students are expected to comply with all College policy regarding academic integrity; which is about honest and ethical behaviour in your education journey. The following guide is designed to help you understand your responsibilities: https://camosun.libguides.com/academicintegrity/welcome
Please visit https://camosun.ca/sites/default/files/2021-05/e-1.13.pdf for Camosun's Academic Integrity policy and details for addressing and resolving matters of academic misconduct.

Academic Accommodations for Students with Disabilities

Camosun College is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging appropriate academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a documented disability and think you may need accommodations, you are strongly encouraged to contact the Centre for Accessible Learning (CAL) and register as early as possible. Please

visit the CAL website for more information about the process of registering with CAL, including important deadlines: https://camosun.ca/cal

Academic Progress

Please visit https://camosun.ca/sites/default/files/2023-02/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 https://camosun.ca/sites/default/files/2021-05/e-2.2.pdf for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit https://camosun.ca/registration-records/tuition-fees#deadlines.

Grading Policy

Please visit https://camosun.ca/sites/default/files/2021-05/e-1.5.pdf for further details about grading.

Grade Review and Appeals

Please visit https://camosun.ca/sites/default/files/2021-05/e-1.14.pdf for policy relating to requests for review and appeal of grades.

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 (see Medical/Compassionate Withdrawals policy). Please visit https://camosun.ca/services/forms#medical to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence

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 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 Policy: https://camosun.ca/sites/default/files/2021-05/e-2.9.pdf and camosun.ca/services/sexual-violence-support-and-education.

To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-370-3841

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 https://camosun.ca/sites/default/files/2021-05/e-2.5.pdf to understand the College's expectations of academic integrity and student behavioural conduct.

Looking for other policies?

The full suite of College policies and directives can be found here: https://camosun.ca/about/camosun-college-policies-and-directives

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.