

COURSE SYLLABUS



COURSE TITLE: CHEM-070: College Prep Chemistry

CLASS SECTION: 002

TERM: 2022W

COURSE CREDITS: 4

DELIVERY METHOD(S): In person

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

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

For COVID-19 information please visit <https://legacy.camosun.ca/covid19/index.html>

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 explanation in advance, you will be removed from the course and the space offered to the next waitlisted student.

INSTRUCTOR DETAILS

NAME: Jamie Doran, Ph.D.

EMAIL: jdoran@camosun.ca

OFFICE: 350C Fisher Building

HOURS: Mondays 7:00 – 8:00 pm via Zoom

Tuesdays 7:00 – 8:00 pm via Zoom

Wednesdays 7:00 – 8:00 pm via Zoom

Thursdays 7:00 – 8:00 pm via Zoom

Fridays 7:00 – 8:00 pm via Zoom

Feel free to contact me by email, including in the evenings and on weekends, to correspond by email or to set up a Zoom chat.

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

Students will obtain the pre-requisite Chemistry knowledge that will provide a basis for further academic and career/vocational education and training. On completion of the course, students will have an appreciation for chemistry in everyday life and the role it has on the environment, society and human health. They will be able to apply the scientific method of investigation, communicate effectively in the language of chemistry, and collect and manipulate scientific data and handle chemicals in a safe and effective manner.

PREREQUISITE(S):

One of:

- C in Math 10
- B in MATH 039
- C in MATH 053
- C in MATH 057

CO-REQUISITE(S):

Not Applicable

EXCLUSION(S):

Not Applicable

COURSE LEARNING OUTCOMES / OBJECTIVES

CHEM 070 encompasses the Core Topics for Chemistry: Advanced Level (11) outlined in the 2018-2019 BC ABE Articulation Handbook.

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

- Obtain the prerequisite body of knowledge and skills that will provide a basis for further academic and career / vocational education and training
- Demonstrate an awareness of chemistry in everyday life
- Demonstrate an awareness of chemistry in solutions to environmental challenges
- Apply scientific method to investigate phenomena
- Communicate effectively using the language of chemistry
- Carry out all duties in an ethical, professional manner, including the collection and treatment of data
- Work independently and also as part of a team, where appropriate
- Handle equipment and chemicals in a safe and effective manner with regard to personal safety and the safety of others

Core Topics:

A. Measurement

- Demonstrate the concepts of precision and accuracy and how they differ, utilizing significant figures
- Perform calculations using scientific notation
- Perform conversions with the SI system

B. Properties of Substances

- Differentiate between the phases of matter
- Identify chemical or physical properties of substances
- Describe Dalton's Atomic Theory and the Law of Constant Composition

C. Periodic Trends

- Use the periodic table to determine atomic composition of isotopes
- Use the periodic table to predict electron arrangement of chemical families in order to predict trends in ion charge, reactivity, ionization energy, electronegativity, atomic radii, and ionic radii

D. Atomic Structure

- Analyze the historical development of atomic theory
- Describe the Bohr and Wave Mechanical model of the atom and cite evidence for these models including absorption and emission spectra and their use in modern technology

E. Mole Concept

- Define a mole and its significance
- Perform calculations including molar and formula mass, mole to mass conversions, and percent composition by mass of compounds

F. Bonding

- Define covalent and ionic bonding
- Construct the formulas of compounds
- Use electronegativity to predict bond types
- Draw Lewis structures, predict molecular shapes, and determine polarity

G. Nomenclature

- Write names for compounds given the formulae and write formulae for compounds given the names for the following types of compounds: Covalent compounds, ionic compounds, compounds containing polyatomic ions, compounds containing transition metals and acids

H. Chemical Reactions

- Balance equations
- Classify and predict single and double replacement reactions, combustion reactions, and acid- base neutralizations
- Classify synthesis, decomposition, exothermic and endothermic reactions
- Perform stoichiometric calculations including mass-to-mass, limiting reagent, and percent yield

I. Solutions

- Predict solubility and conductivity of polar and non-polar compounds
- Define Arrhenius acids and bases
- Relate the pH scale to acids and bases
- Perform calculations involving dilutions
- Perform stoichiometric calculations involving solutions including titrations

J. Organic Chemistry

- Classify substances as organic
- Differentiate the various types of bonding between carbon atoms
- Write names and draw structures of hydrocarbons
- Categorize organic compounds based on their functional groups

K. Gases

- Account for the general characteristics of the gas, liquid, and solid states
- Perform gas law calculations

In the laboratory exercises, students will:

- List the safety and protective equipment available in a laboratory setting
- Demonstrate the appropriate procedures and techniques for dealing with particular hazards and hazardous materials
- Follow instructions and procedures
- Handle appropriate equipment for measuring mass, volume, and temperature
- Prepare solutions
- Perform titrations
- Collect and record data effectively
- Analyze and interpret data
- Communicate results and conclusions

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

Course Notes Package

Chemistry 070 Course Notes (with Additional Problem Sets), 2019 Edition. Camosun College Publications. This course package is *required* for this course. A copy is posted on D2L, yet a hardcopy is very useful during classes as this course package also serves as a workbook. A copy may be purchased from the Lansdowne Campus bookstore.

Laboratory Manual

Chemistry 070 Laboratory Manual, 2019 Edition. Camosun College Publications. This laboratory manual is *required* for this course. A copy may be purchased from the Lansdowne Campus bookstore. Also, a copy is posted on D2L.

General Materials and Supplies

Safety glasses Safety glasses are **required** when handling hazardous chemicals, and are recommended when handling laboratory glassware. Each student is required to provide her or his own pair of safety glasses. Students lacking safety glasses when they are required will not be permitted in the laboratory. Prescription eyeglasses will suffice.

Lab coats Lab coats are *highly recommended* for all experimental work in the laboratory. Each student must provide her or his own lab coat.

Latex gloves Latex or other 'non-allergenic' gloves are available if a student has certain allergies, and are to be used when appropriate to protect the skin from potentially allergenic chemicals or biochemicals.

Calculator A basic scientific calculator is required for work involving experimental procedures and lecture material, and is required during quizzes, the term tests and the final exam. Each student is required to provide her or his own calculator. Cell phone-based, tablet-based, computer-based or graphing calculators are not to be used during quizzes, the term tests or the final exam.

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

Course Times:

Tuesday 2:30 – 3:20 pm F358/F360
 Wednesday Lab 8:30 – 10:20 am F354
 Wednesday 2:30 – 3:20 pm F358/F360
 Thursday 2:30 – 3:20 pm F358/F360
 Friday 2:30 – 3:20 pm F358/F360

Course Length: 14 weeks

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
Week 1	<p>Course orientation & organization. An introduction to some common chemical elements and their names and symbols. A brief introduction to the periodic table. SI units. Other units. SI prefixes. Metric conversions. Scientific notation. Exact & inexact numbers.</p> <p><i>Lab, Wednesday, January 12th</i> Course Organization, and <i>Laboratory & Safety Orientation</i>. Lab safety Quiz.</p>	Please refer to D2L for helpful information.
Week 2	<p>Significant figures. Rounding off. Density calculations. Rearranging equations. Endothermic & exothermic reactions. Energy calculations. Scientific method. Physical & chemical changes. Elements & compounds. Mixtures. Metals and non-metals.</p> <p><i>Lab, Wednesday, January 19th</i> Experiment 1. <i>Density</i></p>	Please refer to D2L for helpful information.
Week 3	<p>Dalton's Laws of Definite Composition & Conservation of Mass, Dalton's Atomic Theory, Subatomic particles. The atomic nucleus: Protons, Neutrons, Electrons. Atomic Number. Mass Number. Isotopes. Ions. Calculation of averaged weighted atomic mass. Chemical formulae and names. Composition of a compound. Units of a compound.</p> <p><i>Lab, Wednesday, January 26th</i> Experiment 4. <i>Heat of Combustion</i></p>	Please refer to D2L for helpful information.

WEEK or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
Week 4	<p>Formulae and names for binary molecular compounds and binary ionic compounds. Names and formulae for tertiary ionic compounds containing polyatomic ions. Practice, practice, practice. Quiz 1.</p> <p><i>Lab, Wednesday, February 2nd</i> Experiment 3. <i>Separating Mixtures</i> Experiment 5. <i>Recycling Copper, Part 1 (start)</i></p>	Please refer to D2L for helpful information.
Week 5	<p>Names and formulae for binary ionic compounds containing metal ions of variable charge. Names and formulae for binary & tertiary acids. Calculating molecular and formula masses. Review for term test 1.</p> <p><i>Lab, Wednesday, February 9th</i> Term Test 1</p>	Please refer to D2L for helpful information.
Week 6	<p>Percent composition. Introduction to the Mole. Converting moles to grams, and grams to moles. Moles of molecular & ionic substances and their masses. Balancing chemical equations. Quiz 2.</p> <p><i>Lab, Wednesday, February 16th</i> Experiment 5. <i>Recycling Copper, Parts 2 to 5</i></p>	Please refer to D2L for helpful information.
Week 7	<p><i>Monday, February 21st – BC Family Day</i> <i>Tuesday to Friday, Feb. 22nd to 25th - Reading Week</i></p>	Please refer to D2L for helpful information.
Week 8	<p>Stoichiometry defined. Interpreting chemical equations. Stoichiometry moles to moles problems. Stoichiometry grams to moles problems. Stoichiometry grams to grams problems. Stoichiometry limiting reactant problems. Percent yield calculations.</p> <p><i>Lab, Wednesday, March 2nd</i> Experiment 5. <i>Recycling Copper, Part 6 (completion)</i> Experiment 7. <i>Copper & Silver Nitrate Reaction</i></p>	Please refer to D2L for helpful information.
Week 9	<p>Limiting reactant stoichiometry. Heat and chemical reactions related to stoichiometry. Organization of the periodic table. Chemical families. Electron major energy levels. Electron energy sub-levels. Electron distribution in atoms. Electron (Lewis) dot diagrams. Bohr diagrams. Trends in the Periodic Table in atomic size, ionization energy & chemical reactivity. Quiz 3.</p> <p><i>Lab, Wednesday, March 9th</i> Molecular Model Activity: <i>Molecular Geometry & Polarity</i></p>	Please refer to D2L for helpful information.

WEEK or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
Week 10	<p>Chemical bonding. Formation of ionic compounds. Introduction to the geometry of small molecular compounds. Geometry of molecular compounds & the sharing of electrons (covalent bonds). Applying electron dot diagrams to determining the geometry of small molecules. Molecular geometry and polarity of small linear molecules including molecules with multiple bonds. Determination of the geometry of small molecules with angular, pyramidal and tetrahedral geometry. Electronegativity, bond polarities, and molecular geometry & polarity of linear, planar, triangular, pyramidal and tetrahedral molecules. The nature of gases. Why gases are gaseous? Review for term test 2.</p> <p><i>Wednesday, March 16th Term Test 2</i></p>	Please refer to D2L for helpful information.
Week 11	<p>Properties of an Ideal Gas. Units of gas pressure. Boyle's law of gases. Boyle's law equation. Charles' gas law. Charles' Law Equation. Absolute Temperature and the Kelvin scale. Standard Temperature and Pressure (STP). The Combined Gas Law Equation. Quiz 4.</p> <p><i>Wednesday, March 23rd</i> Experiment 15. <i>Accuracy and Precision of Experimental Results</i></p>	Please refer to D2L for helpful information.
Week 12	<p>Dalton's Law of Partial Pressures. Gas Volume and Number of Molecules. Gases, gas laws and scuba diving. Liquids and Solutions: Why liquids are liquids? Hydrogen bonding. Vapour pressure, boiling point, & normal boiling point. Solutes & solvents. Solubility. Miscible & immiscible. Solution Concentrations: %w/w, %w/v, %v/v, ppm & ppb, molarity (mol/L, M) (9.6). Diluting a Solution ($C_1V_1=C_2V_2$).</p> <p><i>Lab, Wednesday, March 30th</i> Experiment 10. <i>Volume of a Gas</i></p>	Please refer to D2L for helpful information.
Week 13	<p>Electrolytes. Dissociation Equations & Ion Concentrations. Ionization. pH Scale. Solution Stoichiometry. Isomers of small hydrocarbons and small organic compounds containing a hydroxyl group. Quiz 5.</p> <p><i>Lab, Wednesday, April 6th</i> Experiment 12. <i>Neutralization</i></p>	Please refer to D2L for helpful information.
Week 14	<p>Naming simple organic compounds: alkanes, alkenes, alkynes, cycloalkanes & alcohols. Quiz 6. Final exam review.</p> <p><i>Lab, Wednesday, April 13th</i> Final lab report drop-off. Friday, April 15th - <i>Good Friday Holiday.</i></p>	Please refer to D2L for helpful information.

WEEK or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
Final exam period	☞ Final Exam ☞ The time and location will be published by the College during the winter semester.	

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 scan be reviewed on the [CAL exams page](http://camosun.ca/services/accessible-learning/exams.html). <http://camosun.ca/services/accessible-learning/exams.html>

EVALUATION OF LEARNING

DESCRIPTION	WEIGHTING
<p>Quizzes</p> <p>Seven quizzes of equal value will be held at appropriate times* during the lab (Safety Quiz) or lecture (Quizzes 1 to 6) periods. The best six marks from the seven quiz marks will be used to calculate a total mark out of 30. In total, the quizzes contribute 20% to the final grade.</p> <ul style="list-style-type: none"> Lab Safety Quiz (must score better than 80%) Quiz 1. Chapters 1 & 2 Quiz 2. Chapters 3 & 4 Quiz 3. Chapter 5 Quiz 4. Chapters 6 & 7 Quiz 5. Chapter 8 Quiz 6. Chapter 9 <p>*Typically, quizzes will be scheduled a few days to a week following the completion of lectures concerning the Chapter(s) from which material is to be tested. Attempts will be made to schedule quizzes on days when students do not have other tests.</p> <p><i>If any quiz is missed due to illness or similarly justifiable reason, with accompanying documentation the percentage value of that quiz will be added to the value of the final exam.</i></p>	20%

DESCRIPTION	WEIGHTING
<p>Term Test 1</p> <p>This term test covers relevant material from approximately the first four weeks of the course. The delineation of material that students are responsible for will be provided in class about one week prior to the date of the test. This test that will be written during the lab period on Wednesday , February 9th from 8:30 to 10:20 AM in F354. If this term test is missed due to illness, or a similarly justifiable reason, with accompanying documentation the percentage value of this term test will be added to the value of the final exam.</p>	15%
<p>Term Test 2</p> <p>This term test covers relevant material from approximately the second four to five weeks of the course. The delineation of material that students are responsible for will be provided in class about one week before the date of the test. This test will be written during the lab period on Wednesday, March 16th from 8:30 to 10:20 AM in F354. If this term test is missed due to illness, or a similarly justifiable reason, with accompanying documentation the percentage value of this term test will be added to the value of the final exam.</p>	15%
<p>Laboratory Experiments</p> <p>Laboratory performance and lab reports contribute 20% to the final grade. Attendance in the lab periods is mandatory. No laboratory experiment can be missed without an acceptable reason submitted in writing, such as a letter from a MD. As part of achieving the learning outcomes, students must pass the lab portion of the course in order to pass this course. <i>Please come to each lab period prepared for the experiment.</i> Creating a simple flowchart prior to each experiment is recommended. Each lab partner must hand in a separate report even though lab partners should share equally in experimental work. The lowest lab report mark will not be counted in the final grade.</p>	20%

DESCRIPTION	WEIGHTING
<p>Final exam</p> <p>The final exam is a <u>comprehensive exam</u> of the material covered in the lecture portion of the course, including the overlap between the lecture component and the laboratory component of the course. The value this exam contributes to the final grade is 30%. The time and location of the final exam will be published by the College during the semester. Attendance at the final exam is mandatory. Appropriate documentation must accompany an explanation for absence if an incomplete grade (I grade) is warranted.</p>	30%
(There are no additional assignments, such as term papers or class presentations, in this course)	
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](http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf) policy for more information.
<http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf>

COURSE GUIDELINES & EXPECTATIONS

Students may **not** use recording devices in the classroom without the prior permission of the instructor or the Centre for Accessible Learning. The instructor's permission is not required when the use of a recording device is sanctioned by the College's Centre for Accessible Learning in order to accommodate a student's disability, *and* when the instructor has been provided with an instructor notification letter which specifies the use of a recording device. Such recordings made in the classroom are for the student's personal use only, and distribution of recorded material is prohibited. Recordings made during the course would include statements, questions and comments made by students in the class, and these are not to be disseminated or repeated in any manner based on the recordings. Otherwise, **please have cell phones turned off and put away while in lectures.** *Thank you.*

SCHOOL OR DEPARTMENTAL INFORMATION

Here is a link to the Science Help Centre.
<https://camosun.ca/services/academic-supports/help-centres/science-help-centres>

The schedule for the Chem Tutors will be posted during the semester.

Camosun College is a scent-free institution. **Please refrain from wearing scents.** Thank you.

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.

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.