



CAMOSUN COLLEGE
School of Arts & Science
Department of Chemistry & Geoscience

CHEM-120-001
College Chemistry 1
Winter 2019

COURSE OUTLINE

The course description is online @ <http://camosun.ca/learn/calendar/current/web/chem.html>

Ω Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.

1. Instructor Information

(a) Instructor	Neil Meanwell
(b) Office hours	Mon, Tues, Wed, Thurs: 12:30pm – 1:30pm; Tues 11:30am – 12:30pm
(c) Location	F348B
(d) Phone	250-370-3448 Alternative: 250-729-3838
(e) E-mail	meanwen@camosun.bc.ca or chemhelp@shaw.ca
(f) Website	

2. Intended Learning Outcomes

Upon completion of this course the 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.

3. Required Materials

- (a) Principal Text: CHEMISTRY, The Central Science: a Broad Perspective[©] by Brown, Lemay, Bursten, Murphy, Woodward, Langford, Sagatys and George, 3rd Edition (2014). Publisher: Pearson.
- (b) Lab Experiments: Chemistry 120 Laboratory Manual, 2016 Edition (In-house).
- (c) Safety Glasses (compulsory for laboratory work).

4. Course Content and Schedule

- a) Lectures: Monday (F 212) 1.30 pm - 2.20 pm, Wednesday (F 212) 1.30 pm - 2.20 pm and Wednesday (F 212) 2.30 pm to 3.20 pm.
- b) Laboratory: Tues (F 356), 1.30 pm to 4.20 pm.
- c) Worksheets for in class problem solving.¹
- d) Online problem sets (Mastering Chemistry).²
- e) Two term tests (each 2 hours).³
- f) A three-hour written final examination at the end of the course on all the material in the course.⁴

Notes

1. Worksheets are handed out at regular intervals during the semester. Most are worked out in class but in any case solutions are posted online. Most worksheets also have list of end-of-chapter questions which you are recommended to try. Solutions are also posted online. Note that you are not asked to submit solutions for marking.
2. You will be required to periodically complete problem sets online using Mastering Chemistry. Note that you do receive credit for these problem sets.
3. Tentatively scheduled for **weeks six** and **twelve** of the semester. These are sat during the lab period.
4. The final will be set for the exam period following the end of classes.

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, ionisation 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.

4. Gases (4 Lectures) (Chapter 9)

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. Real gases, limitations of ideal gas law, Joule-Thomson effect.

5. Intermolecular Forces, Liquids and Solids (7 Lectures) (Chapter 10)

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 11)

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

7. Chemistry of the Environment (3 Lectures) (Chapter 20)

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

Laboratory Schedule

Week Number and Date (Tuesday)	Experiment # and Title
1. (8th January)	Lab Safety Talk/Lecture
2. (15 th January)	#2 The Densities of Liquids and Solids
3. (22 nd January)	No Lab – Lecture
4. (29 th January)	#3 Stoichiometry of Chemical Compounds
5. (5 th February)	#4 The Spectroscopic Determination of Nickel
6. (12 th February)	No Lab – Test 1
7. (19 th February)	No Lab – Reading Break
8. (26 th February)	#5 Colorimetric Determination of Iron in a Vitamin Tablet using 1,10-Phenanthroline
9. (5 th March)	#6 Determination of Copper using Atomic Absorption Spectroscopy
10. (12 th March)	#7 Determination of the Total Hardness of Water using EDTA
11. (19 th March)	#8 Molecular Shapes (VSEPR)
12. (26 th March)	No Lab – Test 2
13. (2 nd April)	#9 The Preparation of Potassium Tris(oxalato)ferrate(III)
14. (9 th April)	#10 Analysis of Potassium Tris(oxalato)ferrate(III)

5. Basis of Student Assessment (Weighting)

- (a) Online problem sets: 10%
- (b) Tests: two term tests: 17.5% each.
- (c) Final exam: 30%
- (d) Lab work: 25%.

Notes: 1) If it is advantageous to the student any term test or online problem set mark which is inferior to the final exam mark will be replaced by an equal weighting from the final exam.

2) You must pass the lecture and lab portions separately in order to pass the course.

6. Grading System

Standard Grading System (GPA)

Competency Based Grading System

7. Recommended Materials to Assist Students to Succeed Throughout the Course

n/a

8. College Supports, Services and Policies



Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ <http://camosun.ca/about/mental-health/emergency.html> or <http://camosun.ca/services/sexual-violence/get-support.html#urgent>

College Services

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at <http://camosun.ca/>

College Policies

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at <http://camosun.ca/about/policies/>. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

A. GRADING SYSTEMS <http://camosun.ca/about/policies/index.html>

The following two grading systems are used at Camosun College:

1. Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://camosun.ca/about/policies/index.html> for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.