



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

**CHEM-120-D02A**  
**College Chemistry 1**  
**Fall 2020**

## **COURSE OUTLINE**

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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.*

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### **1. Instructor Information**

<b>(a) Instructor</b>	Neil Meanwell	
<b>(b) Office hours</b>	Tues, 3.30 pm– 4.30 pm; Wed, 11.30 am – 12.30 pm; Thurs, 3.30 pm - 4.30 pm; Fri, 9.30 am - 10.30 am and 11.30 am – 12.30 pm	
<b>(c) Location</b>	F 348 B	
<b>(d) Phone</b>	(250)-729-3838	<b>Alternative:</b> (250)-729-3838
<b>(e) E-mail</b>	meanwen@camosun.bc.ca	
<b>(f) Website</b>	N/A	

### **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, 3<sup>rd</sup> Edition (2014). Publisher: Pearson.

Available from the Camosun Bookstore:

(i) Custom Chemistry with Mastering Rvp (Pearson). ISBN: 9781269996914 (\$161.80)

or

(ii) Custom Chemistry with Mastering Rvp and Molecular Model Kit (Pearson). ISBN: 9781269978613 (\$179.10)

or

(iii) Chemistry: The Central Science Ebook and Mastering Chemistry 24 Month Access (Pearson). ISBN: 9781442563889 (\$115.00)

Or

(iv) Mastering Chemistry for Chem 110, 120, 121 18 Month Access (\$49.99)

(b) Lab Experiments: Chemistry 120 Laboratory Manual (In-house), 2020 Edition. An electronic copy is available on D2L or hard copy at the Camosun Bookstore (\$8.45)

#### 4. Course Content and Schedule

a) Lectures: Tuesday, Wednesday and Thursday:9.30 am – 10.20 am (online).

b) Laboratory: Monday: 1.30 pm – 4.20 pm (online)

c) Worksheets for in class problem solving.<sup>1</sup>

d) End of chapter assignment questions.<sup>2</sup>

e) Online quizzes .<sup>3</sup>

f) Three term tests.<sup>4</sup>

g) A three-hour written final examination at the end of the course on all the material in the course.<sup>5</sup>

#### 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 (D2L). Most worksheets also have list of end-of-chapter questions which you are strongly recommended to try. Solutions are also posted online. Note that you are not asked to submit solutions for marking.

2. These are identified by numbers at the top of each worksheet. You are **not** required to submit these for marking. Solutions to these questions will be posted on D2L.

3. There will be about ten short answer quizzes assigned periodically during the semester. These are on the MyLab and Mastering website and require you to purchase access.

4. Tentatively scheduled for **weeks five, nine and thirteen** of the semester.

5. The final will be set for the exam period following the end of classes and covers all of the course material.

#### 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.

### 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. Limitations of ideal gas law, real gases.

### 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.

## Laboratory Schedule

Week Number and Date (Wednesday)	Experiment # and Title
1. (7 <sup>th</sup> September)	<b>No Lab – Labour Day</b>
2. (14 <sup>th</sup> September)	Lab Safety Orientation/Lecture
3. (21 <sup>st</sup> September)	#3 Stoichiometry of Chemical Compounds
4. (28 <sup>th</sup> September)	#4 The Spectroscopic Determination of Nickel
5. (5 <sup>th</sup> October)	<b>No Lab – Test 1</b>
6. (12 <sup>th</sup> October)	<b>No Lab – Thanksgiving Day</b>
7. (19 <sup>th</sup> October)	#5 Colorimetric Determination of Iron in a Vitamin Tablet using 1,10-Phenanthroline
8. (26 <sup>th</sup> October)	#6 Determination of Copper using Atomic Absorption Spectroscopy
9. (2 <sup>nd</sup> November)	<b>No Lab – Test 2</b>
10. (9 <sup>th</sup> November)	#8 Molecular Shapes (VSEPR)
11. (16 <sup>th</sup> November)	#9 The Preparation of Potassium Tris(oxalato)ferrate(III)
12. (23 <sup>rd</sup> November)	#10 Analysis of Potassium Tris(oxalato)ferrate(III)
13. (30 <sup>th</sup> November)	<b>No Lab – Test 3</b>
14. (7 <sup>th</sup> December)	#11 The Molar Volume of a Gas

**Important Dates:** Thanksgiving Day: Monday, 12<sup>th</sup> October; Remembrance Day: Wednesday, 11<sup>th</sup> November; Last Day to Withdraw Without an Academic Penalty: Thursday, November 12<sup>th</sup>.

## 5. Basis of Student Assessment (Weighting)

- (a) Online quizzes: 20%
- (b) Tests: three term tests: @ 13% = 39%
- (c) Final exam: 26%
- (d) Lab work: 15%

### Notes:

- 1) You must pass the lecture and lab portions **separately** in order to pass the course.
- 2) You must submit a minimum of **seven** lab reports in order to pass the lab portion of the course.
- 3) If it is advantageous to the student one term test or a quiz mark which is inferior to the final exam mark will be replaced by an equal weighting from the final exam.

## 6. Grading System

- Standard Grading System (GPA)
- Competency Based Grading System

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

The science help centre (SHC), which offers support for students in biology, chemistry and physics, will be running again this semester in an online format using Blackboard Collaborate Ultra as the platform. The link for you to access it is:

<https://ca.bbcollab.com/guest/26ea0383a00444b39291183944267d53>

The scheduled hours of operation will be posted on D2L during the first week of the semester.

## 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.