



**School of Arts & Science**  
**CHEMISTRY AND GEOSCIENCE DEPARTMENT**

**CHEM 120-02**  
**College Chemistry 1**  
**2016F**

## COURSE OUTLINE

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

⚡ Please note: this outline will be electronically stored for five (5) years only.  
It is strongly recommended students keep this outline for your records.

### 1. Instructor Information

(a)	Instructor:	Neil Meanwell		
(b)	Office Hours:	Mon: 3.00 pm – 4.00 pm. Tues, Wed, Thu, Fri: 12.30 pm – 1.30 pm.		
(c)	Location:	F 348B		
(d)	Phone:	370-3448	Alternative Phone:	(250)729-3838
(e)	Email:	meanwen@camosun.bc.ca or chemhelp@shaw.ca		
(f)	Website:	N/A		

**Prerequisite:** Chem 12 or Chem 110 (minimum C grade)

**Important Dates:** Thanksgiving Day, Monday, October 10<sup>th</sup>; last day to withdraw without receiving a failing grade for the course Tuesday, November 8<sup>th</sup>; Remembrance Day, Friday, 11<sup>th</sup> November.

### 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. 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 (available from the Camosun Bookstore, Lansdowne Campus)

(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.

- (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, Wednesday and Friday (E 344), 11.30 am to 12.20 pm.
- b) Laboratory: Thurs (F 356), 9.30 am to 12.20 pm.
- c) Worksheets for in class problem solving.<sup>1</sup>
- d) Online problem sets (Mastering Chemistry).<sup>2</sup>
- e) Two term tests (each 2 hours).<sup>3</sup>
- f) A three-hour written final examination at the end of the course on all the material in the course.<sup>4</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. 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 five** and **ten** 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.

#### 5. Basis of Student Assessment (Weighting)

- (a) Online problem sets: 15%
- (b) Tests: two term tests: 15% each.
- (c) Final exam: 30%
- (d) Lab work: 25%.

- Notes:** 1) If it is advantageous to the student any term test 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)

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	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	1
0-49	F	Minimum level has not been achieved.	0

## 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 E-1.5 at [camosun.ca](http://camosun.ca) 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, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. (For these courses a final grade will be assigned to either the 3 <sup>rd</sup> course attempt or at the point of course completion.)
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.

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

### LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services or the College web site at [camosun.ca](http://camosun.ca).

### STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services and on the College web site in the Policy Section.

## **8. 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.

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## 9. Laboratory Schedule

<b>Week Number and Date (Thursday)</b>	<b>Experiment # and Title</b>
1. (8 <sup>th</sup> September)	Lab Safety Talk/Lecture
2. (15 <sup>th</sup> September)	#2 The Densities of Liquids and Solids
3. (22 <sup>nd</sup> September)	#3 Stoichiometry of Chemical Compounds
4. (29 <sup>th</sup> September)	<b>No Lab – Lecture</b>
5. (6 <sup>th</sup> October)	<b>No Lab – Test 1</b>
6. (13 <sup>th</sup> October)	#4 The Spectroscopic Determination of Nickel
7. (20 <sup>th</sup> October)	#5 Colorimetric Determination of Iron in a Vitamin Tablet using 1,10-Phenanthroline
8. (27 <sup>th</sup> October)	#6 Determination of Copper using Atomic Absorption Spectroscopy
9. (3 <sup>rd</sup> November)	#7 Determination of the Total Hardness of Water using EDTA
10. (10 <sup>th</sup> November)	<b>No Lab – Test 2</b>
11. (17 <sup>th</sup> November)	<b>No Lab – Lecture</b>
12. (24 <sup>th</sup> November)	#9 The Preparation of Potassium Tris(oxalato)ferrate(III)
13. (1 <sup>st</sup> December)	#10 Analysis of Potassium Tris(oxalato)ferrate(III)
14. (8 <sup>th</sup> December)	#8 Molecular Shapes (VSEPR)

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