



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

**CHEM 120-02**  
**College Chemistry 1**  
**Winter 2008**

## **COURSE OUTLINE**

The Approved Course Description is available on the web @ \_\_\_\_\_

Ω 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:	Daniel Donnecke		
(b)	Office Hours:	Mon and Tues, 11.30 -12.00 and Thurs, 12.00 – 1.30 pm		
(c)	Location:	F 344 D		
(d)	Phone:	370-3506	Alternative Phone:	
(e)	Email:	donnecked@camosun.bc.ca		
(f)	Website:	N/A		

### **2. Intended Learning Outcomes**

*(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)*

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, Langford, Sagatys and Duffy. Prentice Hall.

(b) Lab Experiments: Chemistry 120 Laboratory Manual, Winter 2008 Edn (In-house)

## 4. Course Content and Schedule

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

### 1. Introduction and Review (6 Lectures, Chapters 1, 2 and 3)

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, solution concentration and solution reaction stoichiometry.

### 2. Gases (3 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, limitation of ideal gas law, Joule-Thomson effect.

### 3. Electronic Structure of Atoms and Periodic Properties of the Elements (9 Lectures, Chapters 5,6)

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.

### 4. Chemical Bonding (9 Lectures, Chapters 7 and 8)

Ionic bonds, lattice enthalpies, properties of ionic compounds. Covalent bonds, atoms to molecules, octet rule and Lewis structure. Polyatomic species, Lewis structures, resonance and formal charge. Exceptions to the octet rule. Ionic versus covalent bonds, correcting the ionic and the 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.

### 5. Intermolecular Forces, Liquids and Solids (6 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 16)

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

## D. Course Content and Schedule

The course includes:

- Biweekly problem sets<sup>1</sup>
- Review test<sup>2</sup>
- Two 50-minute written term tests<sup>3</sup>
- A 2-hour written midterm test<sup>4</sup>
- A 3-hour written final examination at the end of the course on all material in the course.

### Notes

- These are set from the questions found at the end of each chapter. These problem sets will not be marked but solutions will be posted outside my office at regular intervals during the term.
- The review test will be on material covered in the first three weeks of the course. It will take place during the lab period of week four.
- Scheduled for weeks seven (Mo, Febr. 18<sup>th</sup>) and thirteen (Mo, March 31<sup>th</sup>) of the term. The first test will cover material studied from week four up to week seven, and the second test will cover material studied from week nine to week twelve.
- The midterm test will be given in week nine. It will cover all the material in the course covered during the first eight weeks. It will take place during the lab period of week nine.

## 5. Basis of Student Assessment (Weighting)

The course mark will be derived in the following manner:

Review test	12 %
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2 Term tests (@8%)	16 %
Midterm	17 %
Final	30 %
Laboratory	25 %

If it is advantageous to the student the theory mark will be solely derived from the final examination.

## 6. Grading System

*(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)*

### 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. <i>(For these courses a final grade will be assigned to either the 3<sup>d</sup> course attempt or at the point of course completion.)</i>
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.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED