



School of Arts & Science
CHEMISTRY AND GEOSCIENCE DEPARTMENT
CHEM 110-05
General College Chemistry 1
2006F

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:	N.J. Meanwell		
(b)	Office Hours:	Mon, 12.30 pm to 2.30 pm; Tues, 12.30 pm to 1.20 pm; Wed, 12.30 pm to 2.30 pm, Thurs, 9.30 am to 10.20 am and 1.30 pm to 2.20 pm.		
(c)	Location:	F348B		
(d)	Phone:	370-3448	Alternative Phone:	
(e)	Email:	meanwen@camosun.bc.ca (work) and meanwell@islandnet.com (home)		
(f)	Website:			

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. Identify, describe and account for the general characteristics of gases, liquids and solids - interionic and intermolecular forces; vaporization and condensation; melting and freezing; specific characteristics of water.
2. Utilize solution terminology, account for and compare the solubilities of ionic and molecular compounds, and describe the impact of temperature and pressure on solubility.
3. Describe the characteristics of solubility equilibria and use mathematical techniques employed in dealing with this phenomenon.
4. Describe and account for the colligative and osmotic properties of aqueous solutions.
5. Account for differences in the rates of chemical reactions, apply Le Chatelier's Principle to equilibrium processes, and explain how catalysts influence reaction rates.
6. Apply mathematics and equilibrium constant expressions to descriptions of reversible reactions and chemical equilibria.
7. Identify Arrhenius, Bronsted and Lewis acids and bases, and describe the chemical properties of each type of substance.
8. Describe the ionization of water, the pH scale, weak and strong acids and bases, neutralization and the actions of buffer solutions.

9. Perform mathematical calculations involving pH, hydronium ion concentrations and acid-base titrations.
10. Define oxidation and reduction and assign oxidation numbers to the elements of substances involved in oxidation-reduction reactions. Demonstrate the ability to use oxidation numbers in balancing redox reactions.
11. Demonstrate an understanding of electrochemistry and account for the characteristics and uses of the standard hydrogen electrode, standard reduction potentials, electrolytic and voltaic cells.
12. Describe the characteristics of the major types of organic compounds – alkanes, alkenes, alkynes, aromatic hydrocarbons, alcohols, ethers, aldehydes and ketones, carboxylic acids and esters, amines and amides.

3. Required Materials

(a)	Texts	<i>Chemistry, Principles and Reactions</i> , by William Masterton and Cecile Hurley (Thomson-Brookes/Cole) Chem 110 lab manual (in-house). Both texts are available from the college bookstore)
(b)	Other	

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.)

Lectures: Mon (F 216), Tues (F 216), Wed (F 216), 11.30 am to 12.20 pm; Thurs (WT 101), 10.30 am to 11.20 am.

Laboratory: Thurs, 11.30 am to 1.20 pm in F356.

1. Review

- types of matter, measurements, properties of substances (**Chapter 1**)
- atoms, protons, neutrons, electrons, molecules and ions, ionic compounds, formulas, naming compounds (**Chapter 2**)
- atomic mass, mole concept, stoichiometry (**Chapter 3**)
- electronic structure of atoms (**Chapter 6**)
- covalent bonding, Lewis structures and molecular shapes (**Chapter 7**)

2. Thermochemistry (**Chapter 8. Omit sections 8.6, 8.7**)

- Energy, temperature
- Specific heat, calculations
- Enthalpy and entropy changes
- Endothermic and exothermic processes
- Phase changes (and cool concerts)
- Calorimetry

3. Gases, liquids, and solids (**Chapters 5 and 9. Omit sections 5.6, 5.7, calculations involving Clausius-Clapeyron equation, section on phase diagrams, section 9.5**)

- typical properties of a gas, definition of gas pressure
- Boyle's law, Charles's law, and the ideal gas law
- Dalton's law of partial pressures, each gas counts
- properties of liquids and solids
- Ionic forces (opposites attract)
- Intermolecular forces (dispersion and dipole-dipole)
- Hydrogen bonding, a special type of bond
- Liquids: viscosity and surface tension

- Evaporation, vapor pressure, dynamic equilibrium, boiling points
- The solid state: amorphous and crystalline
- Types of crystalline solids, how about those diamonds?

4. Solutions (Chapter 10. Omit calculations involving Fpt. lowering and Bpt. elevation)

- What is a solution?
- Hydrophilic and hydrophilic interactions, local attractions
- Solubility of ionic and covalent compounds
- Low solubility salts, precipitation reactions, solubility product constant
- Molarity, percent concentrations
- Dynamic equilibrium
- Factors affecting solubility
- Colligative properties of solutions

5. Reaction Rates: (Chapter 11. Omit sections 11.3, 11.5,)

- Measuring rates of reactions, determining rate expressions
- Collision theory of reaction rates
- Reaction mechanisms, rate-determining step
- Activation energy, potential energy and ΔH
- Energy diagrams
- Factors affecting rate, effects of temperature, concentration, and catalysts on rates

6. Equilibrium: (Chapter 12.)

- Reversibility of reactions
- Dynamic equilibrium, evaporation and condensation
- Factors affecting equilibrium, a balancing act
- Le Chatelier's principle (minimizing the effects)
- Equilibrium constant, K expressions
- Dependence of K on T
- Mathematical applications of K
- Equilibrium applications
- Solubility equilibrium, solubility and precipitation (**Chapter 16.1**)
- Qualitative analysis, K_{sp} expressions and calculations

7. Acids and Bases: (Chapter 13, 14)

- Acid-base definitions, Arrhenius acids and bases, Bronsted acids and bases
- Conjugate acid-base pairs, neutralization reactions
- Strong and weak acids and bases, amphiprotic substances
- Vinegar and baking soda: a fizzy affair
- Antacids: from chalk to tums (or how do they spell relief?)
- K_w , autoprotolysis of water
- pH and pOH scales
- Acid dissociation (ionization) constant, K_a
- Base dissociation constant, K_b
- Salt hydrolysis, acids or bases? the pH of a salt solution
- Indicators, acid-base titrations, end point (it comes in color)
- Buffers (omit calculations involving buffer systems), blood buffers
- Lewis acids and bases

8. Oxidation and Reduction/ Electrochemistry: (Chapter 18. Omit sections 18.3, 18.4)

- Definition of oxidation and reduction
- Assigning oxidation numbers, balancing redox equations
- Half-reactions, couples, balancing with half-reactions
- Redox titrations
- Electrochemical cells, E° values
- Standard reduction potentials
- Electrolytic cells, electrolysis
- Fuel cells

9. Hydrocarbons (Chapter 22. Omit section 22.6)

- Why carbon?
- Alkanes, straight and branched
- Isomers, same formula but different build
- Unsaturated hydrocarbons
 - geometric isomerism
- Aromatic compounds

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

METHOD OF EVALUATION

The course mark is obtained using the following formula:

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|------------------------------------|-----|
| a. Laboratory reports | 25% |
| b. Review test (50 minutes) | 10% |
| c. Two term tests (50 minutes) | 20% |
| c. Midterm (110 minutes) | 15% |
| d. Final examination (180 minutes) | 30% |

Notes

1. You must pass (50% or more) both the lecture and laboratory portions of the course independently in order to pass overall.
2. If a student is ill and unable to take a test then the student should notify me as soon as possible and preferably before the scheduled time of the test. In order to have the test rescheduled the student must supply me with a doctor's note. If the test cannot be rescheduled then the weighting from that test will be transferred to the Final exam.
3. Any mark obtained from either Midterm test, review test, or a term test will be replaced by an equal weighting from the Final exam if the Final exam has a superior mark.
4. The review test is scheduled for week #3. The first term test is scheduled for week #6. The second term test is scheduled for week #12. The midterm test is scheduled for week #9 and will take place during the lab period.

6. Grading System

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Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
95-100	A+		9
90-94	A		8
85-89	A-		7
80-84	B+		6
75-79	B		5
70-74	B-		4
65-69	C+		3

60-64	C		2
50-59	D		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 at camosun.ca or 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.

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 for information on conversion to final grades, and for additional information on student record and transcript notations.

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.

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.

Prerequisite: Chem 11 (C grade minimum)