CAMOSUN COLLEGE	***School of Arts & Science*** ***CHEMISTRY AND GEOSCIENCE DEPARTMENT*** **CHEM 110-03** **General College Chemistry I** **2013W**

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

- *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:	John Owen		
(b)	Office Hours:	M, W, Th 9:030-10:30		
(c)	Location:	P 327a		
(d)	Phone:	250 208 1066		
(e)	Email:	johnWowen@gmail.com		
(f)	Website:	www.johnowen.info		

Prerequisite: Chem 100 (C minimum)

Important Dates: Family Day: February 11th (Monday), Reading Break: February 21st – 22nd (Thursday and Friday), last day to withdraw without a failing grade: March 12th (Tuesday), Good Friday: March 29th, Easter Monday: April 1st.

2. Intended Learning Outcomes

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.

3. Required Materials (Available from the Camosun Bookstore)

(a) Texts: *Chemistry: The Central Science. A Broad Perspective, 2nd Custom Edition for Camosun College,* by Brown, LeMay, Bursten, Murphy, Langford, Sagatys. Publisher: Pearson Learning Solutions.

(b) Chem 110 Lab Manual, In-house.

(c) Safety glasses

4. Course Content and Schedule

(a) Scheduled lectures: (Mon F210) (T, Th E344) 10:30 – 11:20

(b) Scheduled labs: Wed (F 354), 10.30 - 13.20 .

(c) In-class worksheets. These contain questions which we will generally use as examples as we progress through the course. Solutions will be e-mailed to you periodically.

(d). Textbook questions. These will be assigned to you periodically to keep pace with the course material. They are end-of-chapter questions from the text. It is important that you do these questions as they relate closely to the type questions that you will face in the exams. They are **not marked** but solutions will be distributed to you.

(e) Marked assignments. A total of five assignments will be handed out during the semester. They will be taken in and marked.

(f) A 50-minute test on review material. This will be scheduled for Tuesday (22nd January) of week #3.

(g) A Midterm which will be on material covered in the first seven weeks of the course. It is scheduled for Tuesday (26th February) of week #8.

(h) Final Exam: A three-hour written exam on **all** the lecture material presented in the course. Scheduled for the week immediately following the end of the semester.

5. Basis of Student Assessment (Weighting)

(a) Review Test: 5%

(b) Five assignments (@ 3%): 15%

(c) Midterm: 20%

(d) Final: 40%

(e) Laboratory work: 20%

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.

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

Temporary Grade	Description
I	*Incomplete*: 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	*In progress*: 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 3rd course attempt or at the point of course completion.)*
CW	*Compulsory Withdrawal:* 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.

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

i. Review (Chapters 1, 2, 3, 6, 7 and 8)
Selected topics to include:
Types of matter, units of measurements, uncertainty in measurements,
atoms, protons, neutrons, electrons, atomic numbers, mass numbers, isotopes, atomic mass, molecules and ions, ionic compounds, formulas, naming compounds
atomic mass, mole concept, molar mass, stoichiometry, chemical reactions, reaction stoichiometry, solutions, concentrations of solutions, electronic structure of atoms, ionization energy, covalent bonding, electronegativity, Lewis structures and molecular shapes.

ii. Thermochemistry (Chapter 4)
-Energy, temperature
-Specific heat, calculations
-Enthalpy concept
-Endothermic and exothermic processes
-Phase changes
-Calorimetry
-Entropy concept

iii. Gases, liquids, and solids (Chapters 9 and 10)
-typical properties of gases, definition of gas pressure
-Boyle's law, Charles's law, and the ideal gas law
-Daltons law of partial pressures
-properties of liquids and solids
-Ionic forces
-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

iv. Solutions (Chapter 11)
-Energy changes and solution formation
-Dynamic equilibrium
-Factors affecting solubility
-Solubility of ionic and covalent compounds
-Low solubility salts, precipitation reactions
-Colligative properties of solutions

v. Reaction Rates: (Chapter 12)
-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

vi. Equilibrium: (Chapter 13)
-Reversibility of reactions
-Dynamic equilibrium
-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
-Solubility product constant, K_{sp} expressions and calculations

vii. **Acids and Bases: (Chapters 3, 14 and 15)**
-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
-K_w , autoprotolysis of water
-pH and pOH scales
-Acid dissociation (ionization) constant, K_a
-Base dissociation constant, K_b
-Salt hydrolysis, the pH of a salt solution
-Indicators, acid-base titrations, end point
-Buffers, blood buffers
-Lewis acids and bases

viii Oxidation and Reduction/ Electrochemistry: (Chapters 3 and 16)
-Definition of oxidation and reduction
-Assigning oxidation numbers, balancing redox equations
-Half-reactions, couples, balancing with half-reactions
-Redox titrations
-Electrochemical cells, E^o values
-Standard reduction potentials
-Electrolytic cells, electrolysis
-Fuel cells

9. Laboratory Schedule

Week Number (Date of Lab)	Experiment	Hand-in Date for Lab Report (by 1.30 pm)
1. (8th January)	No Lab - Lecture	
2. (15th January)	No Lab - Lecture	
3. (22nd January)	Review Test/Safety Talk	
4. (29th January)	#1 Energy Changes for Reactions	4th February
5. (5th February)	#2 Reaction Rates	12th February
6. (12th February)	#3 Shifting Equilibria	18th February
7. (19th February)	#4 Precipitation Reactions	4th March
8. (26th February)	No Lab - Midterm	
9. (5th March)	No Lab - Lecture	
10. (12th March)	#6 Acid-Base Titrations	18th March
11. (19th March)	#7 Vitamin C, Aspirin and Milk of Magnesia	25th March
12. (26th March)	#11 Oxidation of Iron	2nd April
13. (2nd April)	#12 Electrochemistry	8th April
14. (9th April)	No Lab - Lecture	