CAMOSUN COLLEGE
Department of Chemistry and Geoscience
CHEMISTRY 120 – sec 001
College Chemistry 1
Course Outline: Winter Term 2005

A. Instructor Information:

Dr. Tark S. Hamilton Office Fisher 344-A
Phone 370-3331 Email: hamilta@camosun.bc.ca (read Mon-Fri 9-1:30)
Office Hours: as posted M,T,F 10:30-11:20, W 12:30-1:20, T-Th 1:30-2:20 or by appointment
Lecture: M, T, Th (12:30 - 1:20) Mon:F334, TF360, ThF302
Lab: Fri-F356 (12:30 - 14:20)

B. Requred Materials for the Course

Text: Chemistry: The Central Science, T.L. Brown, H.E. LeMay and B.E. Bursten,
9th edition. Prentice Hall, New Jersey, 2002.
Student Study Guide available as a package deal for -$30 at the bookstore. You will need this for homework problem key/support material. It is best to buy this as a single wrapped package to receive the bookstore discount. Exam questions assume you have done and understand all of the homework problems

Lab Book: Chemistry 120 Lab Manual current edition required.

Lab Glasses or goggles required by second week to attend the first lab - No glasses - No lab
(no contact lenses to be worn in lab for eye safety even if you have goggles over the top). 1st Lab: lab acquaintance and safety discussion including videos, attendance required.

Grading:

9 labs	25% plus a ***minimum lab mark of 50% to pass the course***.
Midterm Exam 1	15% review 1-4, gases 10: (Tues Oct 14 in lab)
Midterm Exam 2	25% electrons 6, periodic properties 7, bonding 8, 9 (Tues Nov 4 or 11)
Final Exam	35% IMF 11, solutions 13 & envir.18 plus selected materials from earlier ch's. This is comprehensive and ***to pass you must get at least 50% on the final.*** If you do better on MT#2 or Final I will use that score to replace an earlier test. Final Exams as per College assigned schedule. Don't leave before exam period!

Marking Scheme:

A+	100-95	A	94-90	A-	89-85		
B+	84-80	B	79-75	B-	74-70		
C+	69-65	C	64-60	D	59-50	F	<50

There are no stupid questions. Ask for help at any time. It is easier to get help than to flounder. Ask first! It is my policy to supplement the text with real world examples of chemistry in your life and the environment to make it more relevant to you. If you have special interests let me know for examples.

Topics:	**Chapters:**	**# Lecture Hours**	
1.) Introduction & Review	1-4	5-6	
Classification of matter, units of measurement, dimensional analysis, significant figures, errors, 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 reaction stoichiometry.			
2.) Gases	10	3-4	
Midterm Exam 1 – 2 hours: Week 4 in Lab			***Midterm 1***
Nature of gases, states of matter, molecular nature of gas, pressure, gas laws: Boyle's, Charles', and Avogadro's, ideal gas law, reaction stoichiometry, gas density, gas mixtures. Molecular motion, diffusion, effusion, kinetic theory of gases, molecular speeds. Real gases, limitations of ideal gas law, Van der waals equation, Joule-Thompson effect			
3.) Electronic Structure of Matter	6	5	
Light, quanta & photons. Atomic structure & energy levels, Wave properties of electrons. Atomic orbitals, quantum numbers, electron spin, electronic structure of hydrogen atom. Many electron atoms, electronic configurations of atoms and ions, relations to periodic table.			
4.) Periodic Properties of the Elements	7	4	
Discovery of elements & development of Periodic Table. atomic properties, atomic & ionic radii, ionization energies, electron affinity. Chemistry & the periodic table: s-block, p-block, d-block elements. Metals, non-metals, metalloids. Group trends in periodic properties, effective nuclear charge, electron shielding and repulsion.			

Topics: (continued)	**Chapters:**	**# Lecture Hours**
5.) Introduction to Chemical Bonding	8	4-5
Ionic bonds: strength, size & charge. Lewis symbols, lattice enthalpies, properties of ionic compounds. Covalent bonds, atoms to molecules, octet rule, Lewis structures, resonance, formal charge. Exceptions to the octet rule. Single, double & triple bonds.		
6.) Molecular Geometry - Bonding Theories	9	4-5
Ionic versus covalent bonds, correcting ionic & covalent models. Molecular shape, size, bond strength. Orbital overlap, hybrid orbitals, multiple bonds. Shapes of molecules and ions. VSEPR theory. Charge distribution in molecules, polar bonds & polar molecules. Bond strengths & lengths. Molecular orbitals & bond order. Period 2 diatomic molecules.		
Midterm Exam 2 on chapters 6, 7, 8 – 2 hours: Week 7 in Lab ***Midterm 2***		
7.) Intermolecular Forces in Liquids and Solids	11	6
Solids versus liquids & intermolecular forces: ion-dipole, dipole-dipole, London dispersion forces, hydrogen bonding. Properties of liquids, phase changes, heating curves, critical pressure & temperature, vapour pressure, boiling point versus Molecular weight. Viscosity, surface tension. Clausius-Clapeyron, phase diagrams for H_2O and CO_2, supercritical fluid applications. Crystal lattice structures of solids, stoichiometry & properties.		
8.) Solutions	13	3
Solution processes, saturation, solubility, factors affecting solubility, Concentration units. Henry's Law. Colligative properties and colloids		
Midterm Exam 3covering chapters: 9, 11, 13 – 2 hours: Week 13 in Lab		***Midterm 3***
9.) Chemistry of the Environment	18	3
Structure of Earth's atmosphere, ozone layer & depletion. Greenhouse effect & photochemical smog, tropospheric pollution. Composition of oceanic & fresh waters. Common environmental chemical contaminants: particulates, heavy metals, organochlorines, pathways & residence. Nuclear fallout.		

D. Course Content and Schedule

The course includes:

a) scheduled lectures Monday, Wednesday and Thursday at 3:30-4:20
b) a weekly lab due at the beginning of the following lab period including the pre-lab questions due for that day's lab. Lab later than 1 week receive 0%. No late labs after labs are handed back. To pass the course you must pass the labs. It is worth 25% of the course mark and generally brings up student marks. Fewer than 6 labs turned in is an automatic failure.
c) Weekly problem sets approximately 30-100 problems per chapter, assigned for working on your own in lecture Monday of each week. While these are not collected or marked similar problems appear on the tests.
d) 3- 2 hour midterm tests comprising a review test in week 4 and 2 latter test covering topics up to week 7 & 13
e) a 3 hour comprehensive final. To pass the course you must receive 50% or better on the final.

E. Basis for student assessment

Midterm 1 review	**15%**
Midterm 2	**15%**
Midterm 3	**15%**
Final	**30%**
Laboratory	**25%**

If it is to the student's advantage, an improved score on a later test will stand for an earlier one with a lower mark. For example if your second midterm mark is higher it counts for both the first and second test marks or if your final beats your 3rd midterm. This is to reward students who show improvement during the course and demonstrate that they have learned the new material.

Labs:

0. Lab safety is paramount. Learn safe procedures or ask for help. Bold chemists die young!
1. Prelab assignments for current week are due on my desk when you walk into the lab**. (10% of lab)**
2. There will be a lab most weeks. There will be periodic lab quizzes at the beginning of lab period.
3. The lab report is due one week later at the beginning of the lab. Hand in only the lab for that week, *not you entire collection of labs!* Content counts. Neatness counts. The boss wants the right answer. The client has to be able to read it and make sense of your work. Pretend it has to stand up in court both as analytical work and a document.
4. Read each new lab thoroughly before you come to lab. Pay attention to additional instructions on theory, objectives, methods, materials, concentrations, volumes, weights, significant figures, procedure, data, sample calculations, units, reporting, interpretation, error analysis.
5. Lab will start with an explanation of the set up, technique, safety and disposal instructions.
6. You will get a data page for each lab that must be ***initialled by Tark*** in lab before you leave, every time. Real labs are no different, there must be accountability. Keep all your work for review and proof.
7**.** Let me know if you need to miss a lab to arrange for you to make it up in another section. Some labs require 2 weeks to complete and if you miss part 1 you can't complete it.
8. If you do not attend a lab, do not hand in a report. This is your own data and your own work, not your partner's.

9. All reports are to be in ink or typed, concise, organized and self explanatory. Some labs have the calculations set out on a special sheet or on the computers in the student computer lab.
10. Every lab has: a title and number, a date, **your partner's name(s)**. This is important because I grade both reports together and assign the highest mark to each pair or group. Late labs get docked for marks and do not benefit from the group best mark. Write ***an objective in your own words for each experiment or analysis not just a reiteration of the lab manual. e.g. The lab was to calibrate the response of the spectrometers to a standard solution and to determine the preferred wavelength for analysing Cu.*** Give a brief description of the procedure in your own words and a reference to a page in the lab manual, eg. we oxidized Cu wire with molten Sulfur and determined the stoichiomentry of the resulting compound gravimetrically. Provide a data table presenting all measurements and background data as an appendix. This is your rough lab sheet and a signed document. Give a sample calculations of each type, including an explanation of what the calculation accomplishes along with a sample calculation for each part, *but not all the data*. This is a written portion. Show a table of all reduced and calculated data with an error analysis as to how good the numbers are compared to accuracies used and theoretical proportions. Provide a discussion, and a short conclusion: eg. Unknown #36 had 1679.33 ppm Ca and the water was unfit for horses to drink. A typical marking scheme is: 1 mark prelab problems, 1 mark objective, 1 mark for procedure, 2 marks for theory drawings or equations describing reaction or analysis, 1 mark for data, 2 mark for calculations, 1 mark for purity, yield or low % error, 1 mark for conclusions, 2 week duration labs marks are doubled for the single report.

Ask for help in understanding at any time from me or from any of the other faculty. Get help early on from the student learning centre as needed. Also seek help from other faculty, or upperclassmen in the Chemistry computer room on the third floor of Fisher.

H. Learning Support Services for Students and Academic Conduct

There are scheduled short seminars to improve your academic skills. See the college website http://www.camosun.bc.ca.

Familiarize yourself with the academic conduct policy at www.camosun.bc.ca/divisions/pres/policy/2-education/2-8

Additionally as a courtesy to the class turn off cell phones during lecture and lab, be prompt and considerate of the class learning environment.