CAMOSUN COLLEGE	***School of Arts & Science*** ***CHEMISTRY AND GEOSCIENCE DEPARTMENT*** **CHEM 120-006** **College Chemistry 1** **2006 Fall**

COURSE OUTLINE

The Approved Course Description is repeated here from College website

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:	Dr. Tark Hamilton			
(b)	Office Hours:	M,W: 1:30-2:20 PM, T,Th: 9:30-10:20 AM			
(c)	Location:	Fisher 344A			
(d)	Phone:	370-3331	Alternative Phone:		
(e)	Email:	hamilta@camosun.bc.ca			
(f)	Website:	Under construction			

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)	Texts	**Chemistry: The Central Science, T.L. Brown, H.E. LeMay and B.E. Bursten, 10th edition. Prentice Hall**
(b)	Other	Chem 120 Laboratory Manual Fall 2006 edition (Meanwell), Lab glasses or goggles for all labs, no contact lenses permitted in labs. Must attend lab safety videos in class or other lab section before 1st lab on Sept 11.

4. Course Content and Lab Schedule

- (4 credits) F, W (3,3,0,0)

For both university and technology students, this course starts with atomic structure and periodic properties and leads to a discussion of chemical bonding, thermochemistry, molecular structure, intermolecular structure, colligative properties, intermolecular forces of attraction and their role in environmental issues. The experiments include chemical synthesis and analysis by titration and spectroscopy. (T)

Lectures: Mon(F336), Tues(F360), Wed(F360), (12:30-1:20)
Lab Thursday, 2:30-5:20 Lab Period, in F354, computers F358

Lecture Schedule by chapter and topic:

Topics:	**Chapters:**	**# Lect. Hours**	**Finish**
1.) Introduction & Review	1-4	5-6	(mid-week 3)
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	(end wk 4)
Midterm Exam 1 – 2 hours: Week 6 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 (end of week 6)	
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 (mid wk 8)

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.

5.) Introduction to Chemical Bonding	8	4-5 (end wk 9)

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 (mid wk11)

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 11 in Lab ***Midterm 2***

7.) Intermolecular Forces in Liquids and Solids	11	6 (end week 13)

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 (end wk 14)

Solution processes, saturation, solubility, factors affecting solubility, Concentration units. Henry's Law. Colligative properties and colloids

9.) Chemistry of the Environment	18	3 (end wk 14)

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.

Lab Schedule, due dates for pre-labs, lab reports and Midterm Exams

Chem 120-05: Lab Thurs 2:30-5:20 in F356, computers F358
Note: Pre lab exercises are due at beginning of lab. Sept 11 both groups do Lab 3 stoichiometry questions.

Week beginning		Activity
I	Tues 09/05	Course Info & Lab Orientation (Attendance Mandatory)
II	Sept. 7	**Expt. 2 & 3 Group A** Densities & **Gp B** Stoichiometry #3 Q's
III	Sept. 14	**Expt. 2 & 3 Group B** Densities & **Gp A** Stoichiometry
IV	Sept. 21	**Expt. 4** Spectroscopic Determination of Nickel #4 Q's
V	Sept. 28	**Expt. 5** Colorimetric Determination of Iron #5 Q's
VI	Oct. 5	**Test I in Lab (2 hours)**
VII	Oct. 12	**Expt. 6** Determination of Copper Using A.A. Spec. #6 Q's
VIII	Oct. 19	**Expt. 7** Determination of the Total Hardness of Water #7 Q's
IX	Oct. 26	**Expt. 9** Preparation of $K_3[Fe(ox)_3]$ #9 Q's
X	Nov. 2	**Expt. 9** Work-Up & Exam II review lecture in lab
XI	Nov. 9	**Test II in Lab (2 hours)**
XII	Nov. 16	**Expt. 10** Analysis of $K_3[Fe(ox)_3]$ #10 Q's
XIII	Nov. 23	**Expt. 8** Molecular Shapes & VSEPR Lecture #8 Q's
XIV	Nov. 30	Lecture, demonstration **Expt. 11** & Exam Review #11 Q's
XV	Dec 7	**Final Exam review in lab period, both sections –05, -06**

No rescheduling of finals. **Do not** book travel or plan to leave campus until after Dec 19, last day of final exams.

Grading of Your Lab Work:
Due dates for lab assignments, at beginning of lab period.

Expt.	Prelab	Report	Total
2, Densities	X	Sept 14 or 21	
3, Stoich.	Sept 14	Sept 21 or 14	
4, Nickel	Sept 21	Sept 28	
5, Iron	Sept 28	Oct 12	
6, Copper	Oct 12	Oct 19	
7, Hard H_2O	Oct 19	Oct 26	
9, $K_3[Fe(ox)_3]$	Oct 26	Nov 23 (combined 9+10)	
10, $K_3[Fe(ox)_3]$	Nov 16	Nov 23 (combined 9+10)	
8, VSEPR	Nov 23	Checked and Due by end of lab Nov 23	
11, Colligative Properties	Nov 30	Dec 7	

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

(a)	Lab Assignments	25% plus a minimum lab mark of 50% to pass the course
(b)	Quizzes	Optional depending on readings currency and attendance.
(c)	Exams	Midterm 1 – 15%, Midterm 2 – 25%, Final - 35%
(d)	Other (eg, Attendance, Project, Group Work)	*Lab attendance is mandatory to hand in a lab. All data sheets are to be signed by the instructor before you leave the lab.*

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	*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 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	*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.

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(s): Chemistry 12.