

**CAMOSUN COLLEGE - Department of Chemistry and Geoscience
CHEMISTRY 120 - 02 - Winter Term 2002**

Instructor: Dr. Tark S. Hamilton Office Fisher 344-A

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Office Hours: as posted Mon- (3:30 - 4:20) Tues- (2:30 - 5:20) Thurs (4:30-5:20)

Lecture: Tues - F 302 (6:30 - 9:20) Lab: Thurs - F 356 (6:30 - 9:30)

**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.

Lab Book: Chemistry 120 Lab Manual Fall 2002 edition required.

Lab Glasses or goggles required by Mon. Jan 15 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 Thursday Sept 5 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 of Chapters 1-4 or 5 at about week #5
Midterm Exam 2	25% Chapters 5-7
Final Exam	35% Chapters 7-11 & 18 plus selected materials from earlier. This is comprehensive and <i>to pass you must get at least 50% on the final.</i>

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. If you have a problem it is easier to get permission than forgiveness! Ask first!

<u>Topics:</u>	<u>Chapters:</u>	<u># Lecture Hours</u>
Review	1-4	~8
Electronic Structure of Matter	6	6
Periodic Properties of the Elements	7	3
Introduction to Chemical Bonding	8	4
Molecular Geometry - Bonding Theories	9	2
Gases	10	3-4
Intermolecular Forces in Liquids and Solids	11	4
Chemistry of the Environment	18	3

Labs:

0. Lab safety is paramount. Learn safe procedures or ask for help. Bold chemists die young!
1. Prelab assignments are due on my desk when you walk into the lab.
2. There will be a lab most weeks.
3. The lab report is due one week later at the beginning of the lab. Hand in only the lab for that week, not your 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 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, a partner, ***an objective in your own words not just a reiteration of the lab manual***, a brief description of the procedure in your own words and a reference to a page in the lab manual, a data table presenting all measurements and background data, calculations including an explanation of what the calculation accomplishes along with a sample calculation for each part but not all the data, all reduced and calculated data, error analysis and discussion, and a short conclusion: eg. Unknown #36 had 1679.33 ppm Ca and the water was unfit for horses to drink.
11. Lab assignments will vary week to week as to what is required. Most single labs marked out of 10.

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

TOPIC OUTLINE:

1. Introduction and Review (2 to 3 classes = 6 Lectures)

Classification of matter, units of measurement, significant figures, atoms, protons, neutrons, electrons, Parts of chapters: 1, 2, 3 and 4; isotopes, atomic masses. Compounds, stoichiometry, formulas, chemical 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 (1 class = 3 Lectures) (Don't miss this class, it's a real gas!)

Chapter 10: Nature of gases, states of matter, molecular nature of a gas, pressure. Gas laws, equations of state, ideal gas law, reaction stoichiometry, gas density, gas mixtures. Molecular motion, diffusion, effusion, kinetic model of gases, molecular speeds. Real gases, limitations of ideal gas law, van der Waals equation and coefficients, Joule-Thomson effect..

(Midterm Test #1 in lab Oct 3: Review and Gases)

3. Electronic Structure of Atoms and the Periodic Properties of the Elements (3 classes = 9 Lectures)

Chapters 6 & 7: 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, d-block and f block elements

4. Chemical Bonding (3 Classes = 9 Lectures)

Chapters 8 & 9: Ionic bonds, Lewis symbols, lattice enthalpies, properties of ionic compounds. Covalent bonds, atoms to molecules, octet rule and Lewis structures. Polyatomic species, Lewis structures, resonance and formal charge. Exceptions to the octet rule. Ionic versus covalent bonds, correcting the ionic and 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.

(Midterm Test #1 in lab Nov 14 Electronic structure and properties of atoms)

5. Intermolecular Forces, Liquids and Solids (2 Classes = 6 Lectures)

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. 11

6. Solutions (1 class = 3 Lectures)

Chapter 13: Solution process, solubility, factors affecting solubility, Henry's law, colligative properties.

7. Chemistry of the Environment (1 class = 3 Lectures)

Chapter 18 and outside materials. Structure of 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:

- a) The scheduled lectures, Tuesday evenings 6:30 - 9:30 PM. Fisher 302.
- b) Weekly laboratory work, Thursday evenings 6:30 - 9.30 PM in F 356.
- c) Weekly problem sets¹ (assigned in class, on your own with answer manual)
- d) Midterm test #1 Review and Gases (Oct 3 in place of lab)²
(Tuesday Nov 5th is the last day to withdraw)
- e) Midterm test # 2 . November 14 in place of lab).³
- f) A three-hour written cumulative final examination at the end of the course as scheduled Dec 9 - 17.

Notes

1. These are set from the questions found after each chapter. These problem sets will not be marked but solutions will be posted outside my office at regular intervals during the term.
2. The first will take place during the lab period of **week #5**. It will sample review concepts from Ch 1-4 as multiple guess questions in addition to problems and essays from Chapter 10.
3. Tentatively scheduled for Nov 14. The second test will cover material studied from **week 5 to week 10** again as a mixture of multiple guess, short conceptual essays and short numerical problems.

4. The final will be ~40% on the last 3rd of the course material & ~60% review from the 1st portion of the course. If it is advantageous to the student the theory mark will be solely derived from the final examination.

Notes

1. You must score a minimum of 50 % on laboratory work to be permitted to take the final exam and submit a minimum of 75 % of lab work for marking to pass the course. This is a lab course. Most people have their lab mark bring up their total course mark. Do not omit the labs or it will not become real & you will not pass.

2. You must pass both the lecture portion and the laboratory portion in order to pass the course. If you only pass the lab portion you may repeat the lecture portion alone to complete the course. It is far easier to get into the lectures than to get into the labs.

E. 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, Registrar's Office or the College web site at <http://www.camosun.bc.ca>

ACADEMIC CONDUCT POLICY

There is an Academic Conduct Policy. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, Registration, and on the College web site in the Policy Section.

www.camosun.bc.ca/divisions/pres/policy/2-education/2-8