

	<p style="text-align: center;">SCHOOL OF ARTS & SCIENCE CHEMISTRY AND GEOSCIENCE DEPARTMENT CHEM 121-003 2013 Winter</p>
---	--

A. General Information

Instructor: Hugh Cartwright

Office: Fisher 342B, Phone: local 3465

E-mail: CartwrightH@camosun.bc.ca

Email is a much better method of communication than phone and should always be used for non-urgent matters. Minor queries can often be dealt with via email, or at the start or end of a class. For more substantial problems, arrange a time to see me in person.

Lectures: Thursday, (F 302) 6.30 pm – 9.20 pm

Labs: Tuesday (F 356): 6.30 pm – 9.20 pm

Office Hours: Regular office hours as discussed in the first class; other times by appointment.

Important Dates: <http://camosun.ca/learn/calendar/current/pdf/important-dates.pdf>

January 21st Fee deadline; February 11th Family Day (College closed); February 21st & 22nd Reading Break/Connections Day (College closed); March 12th Last day to withdraw without a failing grade; Good Friday March 29th (College closed); Easter Monday April 1st (College closed); April 15th - 20th and April 22nd -23rd Exam period.

B. Required Materials for the Course

Required Text: CHEMISTRY, The Central Science: a Broad Perspective, by Brown, Lemay, Bursten, Langford, Sagatys, and Duffy. Prentice Hall. Australian edition 2nd edition (blue).

The 1st edition (purple/green) is acceptable, as are the 10th and 11th US editions if you already have a copy.

Lab Manual: Chemistry 121 Laboratory Manual, Fall 2007 Edition (from the bookstore).

C. Course Exams and Problem Sets

There will be two 2 hour written midterm tests (dates and content to be advised) and a 3 hour written final examination covering material in the whole course.

There are questions at the end of each chapter. Your answers to these problems will not be marked but solutions to the red questions are given at the end of the textbook and on the accompanying CD. Answers to any of the questions in black may be given on request.

In addition to the two midterm exams, there will be frequent in-class questions that relate to the lecture material. Answers to these questions will not be marked, but you should take note of any difficulties that you have in completing them so that you can review the relevant topics, and if necessary ask for help, once the class is over.

D. Summary of Lecture Material with Chapter References

Area	Topics	Classes (approx)	Textbook chapters*
Organic Chemistry	Hydrocarbons: alkanes, alkenes, alkynes, Structural isomerism, Naming of organic compounds, Reactions of alkanes: combustion, substitution, Meaning of a reaction mechanism, Free radical reactions, Cyclic alkanes, Alkenes, alkynes, Mechanism of addition of HCl to alkenes, Stereoisomerism, Cyclic alkenes, Simple functional groups: alcohols, ethers, carboxylic acids, aldehydes, halogen compounds, Optical isomerism, Synthesis and typical reactions of alcohols and acids, Aromatic compounds: structure and naming, Reactions of aromatic compounds, Biologically-significant compounds: amino acids, carbohydrates, proteins, DNA, Polymers	3	21 to 26. Selected topics.
Chemical Kinetics	Reaction rate as measured by change in concentration, Factors that influence reaction rate, Why concentration affects rate; Collision theory, Rate law: meaning, types, examples, Half-life, Determining a rate law from experimental data, Activation energy, Activated complex theory, Why temperature affects rate, Arrhenius equation, Catalysts, enzymes, Reaction mechanism and the link to rate laws; rate-determining step	2	12
Thermo-chemistry	Energy, 1 st law, Enthalpy; enthalpy of combustion, fuels, Calorimetry, Enthalpy of reaction, Hess's Law, calculations	1	4

Thermo-dynamics	Spontaneity; reversibility , Entropy and the direction of time, Gibbs Energy, 2 nd law, 3 rd law; 3 rd law entropy, Free energy and temperature, Non-spontaneous processes, Calculations	1	4
Equilibrium	Homogeneous and heterogenous equilibria , Reaction quotient, Condition of equilibrium, Equilibrium constants; Kc, Kp, Le Chatelier, Link between equilibrium and free energy, Calculating an equilibrium constant from experimental data; Haber process, Calculating an equilibrium constant from Free Energy changes, Hess's law (again)	1 - 1.5	13
Acids and Bases	Definitions of acids and bases: Arrhenius, Lewis, Bronsted-Lowery, Weak and strong acids and bases, Conjugate acids/bases, pH; calculation for weak and strong acids, Ka and Kb, Relationship between strength and acid structure, Auto-ionization of water, Titration	1.5 - 2	14
Aqueous equilibria	Solubility of ionic compounds, Acid/base nature of salts, Common ion effect, Complex ions, Buffers	1	15
Electrochemistry	Redox reactions, Electrochemical cells, batteries, Half cells, Balancing redox reactions, Standard electrode potential, Nernst equation, Connection between Free Energy and cell voltage	1	3, 16

***textbook chapters are from Brown, LeMay, Bursten; 2nd Australian edition**

E. Basis of Student Assessment (Weighting)

The course mark will be calculated as follows:

2 Midterm tests	(12.5 % each) = 25 %
Final exam	45 %
Laboratory work	30 %

If a midterm test is missed due to illness or other unavoidable commitments, the weight of the missed test will be carried over to the final. There are no make-up dates for the midterm tests.

F. The Laboratory Mark

The Laboratory mark breakdown is as follows:

Arriving punctually, prepared for the experiment, familiar with the procedure and having the correct safety gear.	15 %
Ability to work competently and confidently with good attitude.	5 %
Pre-lab assignments (completed prior to starting the lab class).	10 %
Quality of Lab Reports	60 %
Leaving your workspace clean and tidy	5 %

No more than 2 laboratory classes may be missed during the course unless there are extenuating circumstances. If no reason for missing a lab is supplied you will receive a mark of zero for this lab class. If you are unable to attend a laboratory class, attempt to obtain data from a partner or perform the class with another section so that you can submit a report.

Reports are due in 1 week after you have carried out the experiment. You will lose 10% of the available marks if your report is up to 1 week late. 50% of the available marks will be docked from reports that are 1-2 weeks late. Reports not submitted within three weeks of the date the experiment was done, or by the date of the final exam if earlier, will be given a mark of zero. Reports will be marked and returned to you; please retain them.

Further information about the format of reports will be provided in the first class; you are advised to bear this information in mind as you prepare your reports.

Students must pass both the Laboratory section and the written section of the course with a minimum mark of 50 % in each part.

Students are responsible for obtaining their own safety glasses and laboratory jacket. It is not the responsibility of the College to provide Safety Glasses.

G. The Grading System

The following scale is used by Camosun College:

>90 A+ 77-79 B+ 65-69 C+ 50-59 D 0-49 F

85-89 A 73-76 B 60-64 C

80-84 A- 70-72 B-

H. 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 the specialized vocabulary and nomenclature based on the IUPAC system of organic compounds to name and draw structures for many simple organic compounds containing the common functional groups.
2. Write chemical reactions to illustrate numerous transformations between organic functional groups.
3. Draw structural and stereoisomers of organic compounds and name stereoisomers based upon the IUPAC system of nomenclature.
4. Demonstrate an understanding of the factors that influence the rate of a chemical reaction, deduce the rate of a chemical reaction from time/concentration data, and utilize rate laws to perform kinetic calculations.
5. Apply the laws of thermodynamics and account for the factors that lead to spontaneous physical and chemical changes.
6. Explain how and why reactions attain equilibrium positions and perform calculations pertaining to equilibrium systems.
7. Describe redox reactions, use electrochemical data to predict the spontaneity of redox reactions, and comprehend the structures of electrochemical cells.
8. Describe various acid-base theories and apply these theories to acid-base reactions in aqueous solution.
9. Perform experiments in the areas of preparative organic, preparative inorganic, physical and analytical chemistry and use the various associated pieces of laboratory equipment.

I. 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

Winter 2013 Lab Schedule for Section 3, Chem 121

Tuesdays, 6.30 - 9:20 pm in Fisher 356/358

Note that this is a draft schedule

Week	Activity/experiment	Date of lab	Report due by
1	Review and lab orientation. Attendance mandatory	Jan 8	n/a
2	Expt. 1. Preparation of xylene sulfonic acid	Jan 15	Jan 22
3	Group A Preparation of benzoic acid	Jan 22	Jan 29
4	Group B. Preparation of benzoic acid	Jan 29	Feb 5
5	Expt. 2 Analysis of an unknown acid	Feb 5	Feb 12
6	No lab – possible midterm 1	Feb 12	n/a
7	Expt. 6. Rate of bromination of acetone	Feb 19	Feb 26
8	Lecture class	Feb 26	n/a
9	Expt. 10. Thermochemistry	Mar 5	Mar 12
10	Expt. 4. Banana oil, subject to material coverage	Mar 12	Mar 19
11	No lab – possible midterm 2	Mar 19	n/a
12	Expt. 8. Gravimetric analysis of chloride ion	Mar 26	Apr 2
13	Expt. 9. Synthesis of Copper (I) chloride, subject to scheduling	Apr 2	Apr 9
14	Review class	Apr 9	n/a

A reminder: this is a provisional schedule; it may change depending on equipment availability, scheduling of tests, and other factors.