

 CAMOSUN COLLEGE	School of Arts & Science CHEMISTRY AND GEOSCIENCE DEPARTMENT CHEM 121-003 College Chemistry 2 Winter 2016
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COURSE OUTLINE

The course description is online @ <http://camosun.ca/learn/calendar/current/web/chem.html>

Ω Please note: the College electronically stores this outline for five (5) years only.
 It is **strongly recommended** you keep a copy of this outline with your academic records.
 You will need this outline for any future application/s for transfer credit/s to other colleges/universities.

1. Instructor Information

(a)	Instructor:	Hugh Cartwright		
(b)	Office Hours:	TBA		
(c)	Location:	TBA		
(d)	Phone:		Alternative Phone:	
(e)	Email:	CartwrightH@camosun.bc.ca		
(f)	Website:	http://web.uvic.ca/~hughcart/chem121w2016/chem121resources.html		

2. Intended Learning Outcomes

(No changes are to be made to these Intended Learning Outcomes as approved by the Education Council of Camosun College.)

Upon completion of this course the student will be able to:

- 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.
- Write chemical reactions to illustrate numerous transformations between organic functional groups.
- Draw structural and stereoisomers of organic compounds and name stereoisomers based upon the IUPAC system of nomenclature.
- 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.
- Apply the laws of thermodynamics and account for the factors that lead to spontaneous physical and chemical changes.
- Explain how and why reactions attain equilibrium positions and perform calculations pertaining to equilibrium systems.
- Describe redox reactions, use electrochemical data to predict the spontaneity of redox reactions, and comprehend the structures of electrochemical cells.
- Describe various acid-base theories and apply these theories to acid-base reactions in aqueous solution.
- Perform experiments in the areas of preparative organic, preparative inorganic, physical and analytical chemistry and use the various associated pieces of laboratory equipment.

3. Required Materials

- Chemistry 121 Laboratory Manual, available from the College bookstore.
- It is strongly recommended that you purchase a (new or used) copy of Chemistry, The Central Science, by Brown, Le May, et. Al., *Custom Camosun Edition*. The cost is \$145 for hard copy, Ebook access and My lab Mastering Chemistry course code, or \$114 for Ebook and My lab Mastering Chemistry course code only (from the Pearson Website: <http://www.pearson.com.au/9781442563902>). The 2nd and 1st Australian editions of this textbook are also acceptable. **Note: New textbooks come with a My Lab Mastering Chemistry Code. If you have recently (2013/2014) purchased a second edition textbook you may be eligible to receive an upgraded course code, from John Lee.**

Other Recommended Materials

Course notes and ancillary material on website.

4. Course Content and Schedule

Lecture class: Wednesdays 05.30 – 08.20 p.m., Fisher 334; also some Mondays 05.30 – 08.20, location TBA, when no experiments are scheduled

Lecture content (content and ordering subject to minor change)

Weeks 1 - 3 (Jan 13, 20, 27): organic chemistry

Hydrocarbons: alkanes, alkenes, alkynes, Structural isomerism, Naming of organic compounds, Reactions of alkanes: combustion, substitution, Reaction mechanism, Free radical reactions, Cyclic hydrocarbons, Addition to alkenes, Stereoisomerism, 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, Polymers

Weeks 4, 5 (Feb 03, 10): kinetics

Reaction rate as determined by change in concentration, Factors that influence reaction 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

Week 6 - 8: (Feb 17, 24, Mar 2): thermochemistry/thermodynamics

Energy, 1st law, Enthalpy; enthalpy of combustion, fuels, Calorimetry, Enthalpy of reaction, Hess's Law, Calculations. Spontaneity; reversibility, Entropy and the direction of time, Gibbs Energy, 2nd law, 3rd law; 3rd law entropy, Free energy and temperature, Non-spontaneous processes, Calculations

Weeks 9 - 11 (Mar 09, 16, 23): equilibrium

Homogeneous and heterogeneous equilibria, Reaction quotient, Condition of equilibrium, Equilibrium constants; K_c , K_p , Le Chatelier, Link between equilibrium and free energy, Calculating K from experimental data; Haber process, Calculating K from Free Energy changes, Hess's law revisited. Definitions of acids and bases: Arrhenius, Lewis, Bronsted-Lowery, Weak and strong acids and bases, Conjugate acids/bases, pH; calculations for weak and strong acids, K_a and K_b , Relationship between strength and structure, Auto-ionization of water, Titration

Week 12 (Mar 30): solutions

Solubility of ionic compounds, Acid/base nature of salts, Common ion effect, Complex ions, Buffers

Week 13 (Apr 06): electrochemistry

Redox reactions, Electrochemical cells, batteries, Half cells, Balancing redox reactions, Standard electrode potential, Nernst equation, Connection between Free Energy and cell voltage

Week 14 (Apr 13): review

Laboratory schedule: Mondays 05.30 – 08.20 p.m., Fisher 356

Week / date	Activity
Week I, Jan. 11	Lab orientation & Review
Week II, Jan. 18	Expt. 1, Xylene sulfonic acid
Week III, Jan. 25	Expt. 3, Benzoic acid, Group A
Week IV, Feb. 1	Expt. 3, Benzoic acid, Group B
Week V, Feb. 8	Family Day, College closed
Week VI, Feb. 15	Midterm 1
Week VII, Feb. 22	Expt. 2 Analysis of an Unknown Acid
Week VIII, Feb. 29	Expt. 6, Kinetics
Week IX, Mar. 7	Expt. 4, Banana Oil
Week X, Mar. 14	Expt. 10, Thermochemistry
Week XI, Mar. 21	Midterm 2
Week XII, Mar. 28	Easter Monday, College closed
Week XIII, Apr. 4	Expt. 8, Silver chloride
Week XIV, Apr. 11	Review

5. 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 you miss a midterm due to illness or unavoidable commitments, the weight of the missed test will be carried over to the final. If you are sick enough to miss an experiment or an exam you are sick enough to visit a doctor; accordingly, a doctor's note will be expected if you miss a class for medical reasons. There are no make-up dates for the midterm tests or the final exam.

If it is advantageous, the mark from the final examination may be more heavily weighted than as shown above in calculating an overall lecture mark. Students must achieve a passing grade in both the laboratory and the lecture portion to gain an overall pass in the course.

The Laboratory Mark

Ensure that you reach the laboratory on time, since there may be important safety or procedural information presented at the start of the session. You must bring appropriate safety gear (lab coat and safety glasses). If you do not have safety glasses you will not be permitted to work in the laboratory.

The reporting requirements and marks per experiment will depend upon the nature of each experiment. The detailed requirements will be explained in advance of the experiment.

No more than 2 laboratory experiments may be missed during the course. If you are unable to attend a laboratory class you should attempt to obtain data from a partner or perform the class with another section. It is essential that you immediately contact your lab instructor via email in the event that you are unable to attend a laboratory class.

Students are responsible for obtaining their own safety glasses and laboratory coat (from the bookstore or other safety supply source). It is not the responsibility of the College to provide you with safety equipment.

6. Grading System

(No changes are to be made to this section unless the Approved Course Description has been forwarded through the Education Council of Camosun College for approval.)

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	<i>Incomplete:</i> 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	<i>In progress:</i> 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. <i>(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)</i>
CW	<i>Compulsory Withdrawal:</i> 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 the College web site in the Policy Section.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED

8. Winter 2015– Chem 121-003 Provisional Lab Schedule

Wednesdays, 17.30 – 20.20 pm in Fisher 356

Note: This is a preliminary lab schedule, changes may be necessary to address equipment and/or scheduling issues. Lab coat and eye protection are both mandatory and **ARE NOT PROVIDED BY THE DEPARTMENT.**

Week Number Begins on	Activity & Experiment Number	Actual Date of Lab Wednesday
I Jan 5 th	Lecture class	Jan 7 th
II Jan 12 th	Expt. 1 Preparation of Xylene Sulfonic acid	Jan 14 th
III Jan 19 th	Group A Expt. 3 Preparation of Benzoic acid	Jan 21 st
IV Jan 26 th	Group B Expt. 3 Preparation of Benzoic acid	Jan 28 th
V Feb 2 nd	Expt. 2 Analysis of an unknown acid	Feb 4 th
VI Feb 9 th	Class instead of Lab	Feb 11 th
VII Feb 16 th	Midterm test	Feb 18 th
VIII Feb 23 rd	[Expt. 6 The rate of bromination of acetone]	Feb 25 th
IX Mar 2 nd	Expt 4 Banana Oil	Mar 4 th
X Mar 9 th	Expt 10 Thermochemistry	Mar 11 th
XI Mar 16 th	Expt 8 Gravimetric Chloride Analysis	Mar 18 th
XII Mar 23 rd	Midterm test	Mar 25 th
XIII Mar 30 th	Lecture class	Apr 1 st
XIV Apr 6 th	Material Review	Apr 8 th
Final Exam Period	Final Exams	