



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 (Lectures), Blair Surridge (Lab course)		
(b)	Office Hours:	Hugh Cartwright: Mon 1.00-1.20, 3.30-4.00; Tues: 1.00-1.20, 3.30-4.00; Wed 11.00-11.20; Thurs: 12.30-1.20. Note that these times are subject to change; for up-to-date times, check office door		
(c)	Location:	Fisher 106E		
(d)	Phone:	(250) 370-3374	Alternative Phone:	
(e)	Email:	CartwrightH@Camosun.bc.ca		
(f)	Website:			

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:

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.

3. Required Materials

The recommended text for Chem 121 is "Chemistry: The Central Science" by Brown, LeMay et al. It is not essential that you buy this particular text, but during the course you will need

access to a 1st-year-level University Chemistry textbook. There are multiple editions of Brown available; any of these, including the “Camosun” editions, is likely to cover almost all that you need.

The laboratory manual for Chem 121 is available through the College bookstore.

4. Course Content and Schedule

Lecture classes: In Fisher 336: Monday 1.30 – 2.20 p.m.; Tuesday 1.30 – 2.20 p.m.; Thursday 1.30 – 2.20 p.m.

Lecture content (content, timing and ordering subject to change)

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, Polymers.

Kinetics

Reaction rates 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.

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.

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

Solutions

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

Electrochemistry

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

Draft Laboratory schedule: Wednesday 1.30 – 4.20 p.m., Fisher 356

Week / date	Activity
Week I, Jan. 11	Aspirin, Group A
Week II, Jan. 18	Aspirin, Group B
Week III, Jan. 25	Benzoic acid, Group A

Week IV, Feb. 1	Benzoic acid, Group B
Week V, Feb. 8	Midterm 1
Week VI, Feb. 15	Reading break
Week VII, Feb. 22	Expt. 2, Analysis of an Unknown Acid
Week VIII, Mar 1	Expt. 6, Iodination of acetone
Week IX, Mar. 8	Tutorial: HPLC of organic compounds
Week X, Mar. 15	Expt. 10, Thermochemistry
Week XI, Mar. 22	Midterm 2
Week XII, Mar. 29	Expt. 8, silver chloride
Week XIII, Apr. 5	Expt. 9, copper chloride
Week XIV, Apr. 12	Review

5. Basis of Student Assessment (Weighting)

The course mark will be calculated as follows:

Problem sets	5%
2 Midterm tests	(15 % each) = 30 %
Final exam	40 %
Laboratory work	25 %

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. You must achieve a passing grade in both the laboratory and the lecture portion to gain an overall pass in the course.

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