

Camosun College
Department of Chemistry and Geoscience
Chemistry 121 - Syllabus - Spring 2005
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A. General Information

Prerequisites: Chem 120

Lectures: Monday (F 310), Wednesday (F 310), Friday (F 310), 11:30 am to 1:20 pm

Labs: Tuesday, Thursday, 11:30 to 2.20 pm (F 354/F 358)

Office Hours: Monday, Tuesday, Wednesday, and Thursday: 10:30 am to 11:30 am.
Other times available by appointment.

Textbooks: *Chemistry, the Central Science* 9th Edition, *Brown, Lemay, and Bursten*. *The Essentials of Organic Chemistry*, *George, Field, and Hambley*. Chemistry 121 Lab Manual, In-house.

B. Course Material:

1. Organic Chemistry (14 lectures)* (Chapter 25 + The Essentials of Organic Chemistry)

- Hydrocarbons, alkanes, alkenes, alkynes and aromatics.
- Nomenclature. Structural isomerism, stereoisomers, *Z/E* nomenclature.
- Chemical properties of hydrocarbons including mechanisms of addition reactions to alkenes (Markovnikov's rule) and aromatic substitution.
- Functional group chemistry including alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, amides and alkyl halides. Synthesis, properties, chemical reactivity, and nomenclature.
- Optical isomerism, enantiomers, Cahn, Ingold, Prelog nomenclature.
- Biological compounds, amino acids, proteins, carbohydrates, fats.
- Polymers.

2. Kinetics (6 lectures) (Chapter 14)

- Reaction rates, measuring reaction rates, factors influencing reaction rates.
- Rate laws, types of rate laws, determining the form of the rate law, method of initial rates.
- Integrated rate laws, zero order, first order, and second order, half-life.
- Temperature and rate, models for chemical kinetics, collision theory, activated complex theory. – Arrhenius equation, Arrhenius parameters.

- Reaction mechanisms, rate-determining step, deducing the rate law from the mechanism.
- Catalysis, enzymes, industrial catalysis, ozone layer depletion.

3. Chemical Equilibrium (3 lectures)

- Equilibrium condition, K_c , K_p , heterogeneous equilibria, reaction quotient, relation between K_p and K_c .
- Calculating unknown equilibrium concentrations and/or equilibrium constants.
- Le Chatelier's principle, the Haber process.

4. Thermochemistry and Chemical Thermodynamics (Chapters 5 and 19) (9 lectures)

- Nature of energy, first law of thermodynamics, enthalpy, enthalpy of reaction.
- Calorimetry, bomb calorimeter.
- Hess's law, enthalpy of formation.
- Fuels.
- Spontaneous processes, reversible and irreversible processes.
- Entropy and the 2nd law, molecular interpretation of entropy.
- Third law of thermodynamics third law entropies, calculating entropy changes.
- Gibbs free energy, standard free energy,
- Free energy and temperature and equilibrium, free energy and work, driving nonspontaneous processes.

5. Acids and Bases (Chapters 16 and 17) (6 lectures)

- Nature of acids and bases, Arrhenius and Bronsted-Lowry models, conjugate acids and bases.
- Autoionization of water, the pH scale, strong and weak acids, strong and weak bases, K_a and K_b .
- pH calculations for strong acid and base solution, weak acid and base solutions.
- Relating structure to acid/base strength, acid/base properties of salts.
- Lewis acids and bases, common ion effect, buffers, Henderson-Hasselbalch equation.
- Solubility equilibria, formation of complex ions.

6. Electrochemistry (Chapter 20) (3 lectures)

- Review of redox reactions, balancing redox equations
- Galvanic cells, electrical energy, standard electrode potentials, cell emf, free energy and electrical work,
- Nernst equation

*The organic chemistry will be supplemented by additional notes and problems which will be handed to you at appropriate intervals.

Note: You will be given a more detailed summary of the material covered in the course

towards the end of the term.

C. COURSE CONTENT

The course includes:

- a) The scheduled lectures
- b) Laboratory work (typically two labs per week)
- c) Weekly problem sets¹
- d) Two 80-minute term tests.²
- e) One 120-minute midterm exam³
- f) A three-hour written final examination at the end of the course on **ALL** the material in the course⁴.

Notes

1. These are picked from the questions found after each chapter. These problem sets **will not be marked** but it is essential that you do them to keep pace with the material. This is especially important in an accelerated course such as this. Solutions will be posted outside my office and in a folder in F 358 at regular intervals during the term.
2. **Term Test #1** will be on material covered in the first two weeks of the course and is scheduled for **Wednesday** (25th May) of **Week 3**. **Term Test #2** will be on material covered from **Week 5** to **Week 7** and is scheduled for **Wednesday** (22nd June) of **Week 7**.
3. The **Midterm Exam** will be on material covered in the first four weeks of the course and is scheduled for **Tuesday** (2nd June) of **Week #5** .
4. The **Final Exam** will be scheduled during the week following **Week 7**.

D. Laboratory Work

We will be doing two labs per week most weeks. Students will work in pairs but will submit individual reports. Details of report writing are given in the lab handout.

E. Course Mark

The course mark will be derived in the following manner:

Term Tests(@15%)	30 %
Midterm	20 %
Final	25%
Laboratory	25 %

NOTE: If it is advantageous to the student the theory mark will be solely derived from

the final examination.

F. The Letter grade

The following scale is used:

>95 A+ 80-84 B+ 65-69 C+ 50-59 D 0-49 F

90-94 A 75-79 B 60-64 C

85-89 A- 70-74 B-

Notes

1. You must hand in a **minimum** of 75 % of the lab work and score a **minimum** of 50 % on lab marks to be permitted to take the final exam.
2. You must pass both the lecture portion and the laboratory portion in order to pass the course.

G. 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

