Camosun College
Department of Chemistry and Geoscience
Chemistry 121 – Course Outline (Sec 03)

Instructor: Dr. Larry Lee – Uvic (Ell 306) – Email: lalee@uvic.ca

Prerequisites: Chemistry 12 and Chem 120

Lectures: Tuesday (6:30- 9:20 p.m.) Fisher 302
Labs: Thursday (6:30 – 9:20 p.m.) Fisher 356

Office hours: 5:30 p.m. – 6:30 p.m. (Tuesday and Thursday). Any other special requirements can be made by appointment through e-mail.

Textbook: CHEMISTRY, *the Central Science* 9th edition, *Brown, Lemay, and Bursten*. *The Essentials of Organic Chemistry, George, Field, and Hambley.*

Course Material

TOPIC **CHAPTER**

1. **ORGANIC CHEMISTRY** (Approx. 14 hours) – Chapter 25. Material may not be available in textbook.

-Hydrocarbons, alkanes, alkenes, alkynes, and aromatics
-Nomenclature (systematic), structural isomerism, stereoisomers, Z/E nomenclature
-Chemical properties of hydrocarbons, including mechanism or addition reactions to alkenes (Markonikov'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** (Approx. 6 hours) (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 mechanism, rate determining step, deducing the rate law from the mechanism
-Catalysis and enzymes, industrial catalysis, ozone layer depletion

3. **CHEMICAL EQUILIBRIUM (3 hours)**

-Equilibrium condition, Kc, Kp, heterogeneous equilibria, reaction quotient, relation between Kp and Kc.
-Calculating unknown equibrium concentrations and\or equilibrium constants.
-Le Chatelier's principle, the Haber Process

4. **THERMOCHEMISTRY AND CHEMICAL THERMODYNAMICS** (9 hours) (Chapter 5 and 19)

-Nature of energy, First Law of Thermodynamics, enthalpy, enthalpies of reaction
-Calorimetry, bomb calorimeter.
-Hess's law, enthalpy of formation
-Fuels
-Spontaneous processes, reversible and irreversible processes.
-Entropy and Second Law or Thermodynamics, molecular interpretation of entropy
-Third Law of Thermodynamics third law entropies, calculating entropy changes
-Free Energy and temperature and equilibrium, free energy and work, driving nonspontaneous processes

5. **ACIDS and BASES** (6 hours) (Chapter 16 and 17)

-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, Ka and Kb
-pH calculations for strong acids 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** (3 hours) (Chapter 20)

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

*note: the organic chemistry will be supplemented by additional notes and problems which will be hander you at the appropriate intervals.

**note: You will be given a more detailed summary of the material (either as learning objectives or a complete summary of the topics to be covered at the appropriate intervals). Because of time constraints we may not be able to cover all the topics listed above.

Course Content
The course includes
a) The scheduled lectures
b) Weekly Laboratory work (1 lab per week)
c) Biweekly problem sets[1]
d) Four end of chapter exams, (one hour each)[2]
e) One three hour final exam at the end of the course on **ALL** the material in the course

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 in a folder outside F 358 at regular intervals during the term.

2. Term Tests #1 will cover organic chemistry –**Feb 3, 2005.**
   Term Test #2 will cover Kinetics and Chemical Equibrium - **Feb 25, 2005**
   Term Test #3 will cover Thermochemistry –**March 17, 2005**
   Term Test #4 will cover Acids and Bases and Electrochemistry- **March 31, 2005**

Term exams are compulsory and the mark for any single test or combination of tests is **not** replaced by the final exam mark except as described below. The mark for any test or final exam not written and for which no official medical excuse is provided is zero. . The medical excuse must be dated within the week of the exam and must be handed in within two weeks of the exam date. **The medical excuse must provide sufficient information to establish that the student was not able to write the exam due to his/her medical condition. Students will also be required to give written consent for information about their medical condition to be disclosed to the instructor**. Any such information obtained is treated as confidential.

Laboratory work

Experiments are performed on a weekly basis (apart from week 1 and week 14). Reports are not required for all experiments, Only three experiments will require a full report.

Course Mark

Term tests (10% each)	40%
Final	35%
Laboratory	25%

Note: If it is advantageous to the student, the theory mark will be solely derived from the Final exam.

The Letter Grade

The following scale is used:

>95%	A+	80-84	B+	65-69	C+	50-59	D
90-94	A	75-79	B	60-64	C	0-49	F
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 the lab to be permitted to take the final exam.

2. You must past both the lecture portion and the laboratory portion in order to pass the course.