CAMOSUN COLLEGE	***School of Arts & Science*** ***CHEMISTRY AND GEOSCIENCE DEPARTMENT*** **CHEM 221-001** **Physical Chemistry** **Winter 2009**

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

Ω *Please note: this outline will be electronically stored for five (5) years only.*
It is strongly recommended students keep this outline for your records.

1. Instructor Information

(a)	Instructor:	Neil Meanwell		
(b)	Office Hours:	Mon, 9.30 to 10.30 am and 1.30 to 2.30 pm; Tues, 9.30 to 10.30 am; Wed, 9.30 to 10.30 am and 12.30 to 1.30 pm; Thurs, 3.30 to 4.30 pm.		
(c)	Location:	F 348B		
(d)	Phone:	(250)370-3448	Alternative Phone:	
(e)	Email:	meanwen@camosun.bc.ca		
(f)	Website:	N/A		

2. 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. Determine the quantitative and qualitative changes in the rate of a chemical reaction produced by changes in concentration, temperature and ionic strength and apply the energy of activation concept to the problems of catalysis.
2. Derive reaction mechanisms from experimental data and describe the major methods for following fast reactions and determining the presence of reaction intermediates.
3. Use the steady state approximation to explain the mechanisms for reactions in the gas phase and in solutions and apply the same procedures to competitive enzyme kinetics; and distinguish between chain reaction explosions and thermal explosions.
4. Outline the differences between heat and work, reversible and irreversible changes, state and non state functions, adiabatic and isothermal changes.
5. Apply the enthalpy concept to the net energy change in a chemical reaction and Use the principles of energy conservation and thermodynamic cycles to calculate changes in any state function.
6. Calculate the work done by a gas when it expands and use the Carnot cycle.
7. Define entropy and predict the conditions under which the reaction would be spontaneous.

8. Derive the Clausius - Clapeyron equation and apply it to the problems of volatile organic liquids and apply the concept of partial molar volumes to the problem of dissolving one liquid in another.
9. Define and use chemical potentials to explain the drive to equilibrium in both the quantitative and qualitative terms.
10. Outline the concepts of an ionic atmosphere, the ionic strength of a solution and the activity of an ion.
11. Derive and use the Nernst equation for the four major types of electrode.
12. Calculate thermodynamic data from voltage measurements at different concentrations and temperatures and describe and explain the processes of energy conversion with reference to the operation of a fuel cell and the role of hydrogen as a fuel.
13. Apply the laws of Raoult and Henry to liquid-vapour equilibria and comment on ideal and non-ideal solutions and predict their behaviour when they are distilled.
14. Construct phase diagrams and apply the lever rule at particular points to determine the proportion of a component in each phase and describe and explain the unique properties of azeotropes and eutectic mixtures.
15. Summarize the drive to equilibrium by the evaporation and condensation of volatile solvents.
16. Predict the change in vapour pressure of a volatile solvent with the addition of non-volatile solutes and use the relationship to explain the elevation of the boiling point and the depression of the freezing point of the solvent.
17. Differentiate between the behaviour of ionic and molecular solutes in a solution and explain the production of osmotic pressure across a membrane and the role of reverse osmosis in desalination.

3. Required Materials

(a) Texts: *The Elements of Physical Chemistry, Fourth Edition,* **by Peter Atkins and Julio de Paula,** is the recommended text. There is also a laboratory manual which all students must have. Both the text and the manual can be obtained from the bookstore. There are several physical chemistry texts kept in the library on reserve which can be signed out at the front desk

(b) Other Safety glasses. A lab coat is recommended.

4. Course Content and Schedule

1. Three lectures per week.

2. In-class worksheets. These contain questions which we will generally use as examples as we progress through the course. Solutions will be posted outside my office.

3. Assignments. These will be handed out to keep pace with the course material. Include my own questions and end-of-chapter questions from the text. It is essential that you do these questions as they are typical of the questions that you will face in the exams. They are not marked but answers posted periodically.

4. Weekly laboratory work (first experiment is in week #2). A lab schedule will be handed out in the first week of classes.

5. Review assignment of Chemistry 121 principles (handed out in week #2 and due on Monday of week #6).

6. Midterm on Kinetics and first part of Thermodynamics (lab period, week #8).

7. Midterm on second part of Thermodynamics, Phase Equilibria and Mixtures (lab period, week #12)

8. Final examination (three hours) after the end of the course. The final exam covers **ALL** the

course material.

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)
The course mark is obtained using the following formula:

a. Laboratory reports 25%

b. Review Assignment 10%

c. Two Midterms (@15%) 30%

d. Final examination: 35%

6. Grading System

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO 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	*Incomplete*: 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	*In progress*: 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. *(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)*
CW	*Compulsory Withdrawal:* 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 on the College web site in the Policy Section.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED