Introductory University Chemistry II

CH 1050 A3 (Winter 2009)

INSTRUCTOR:	Dr. Som K. Pillay (Office: J210; Tel: 539-2985)
PREREQUISITE:	CHEM 1030 or equivalent and MATH 1000 or equivalent (Engineering Students only)
COREQUISITE:	MATH 1010 or equivalent
TRANSFER CREDITS:	U. of Alberta: CHEM 105, 3.8 Credits U. of Calgary: CHEM 209, 3 Credits
LECTURES:	Mondays & Wednesdays 10:00 - 11:20 A.M. (J 203)
SEMINARS:	Tuesdays & Thursdays 1:00 - 1:50 P.M. (J 203)
LABORATORY:	Fridays 2:30 - 5:20 P.M. (J 119)
TEXT BOOKS AND LABORATORY ITEMS:	Steven S. Zumdahl, *Chemical Principles*, Fifth Edition, Houghton Mifflin Company, 2005. *Introductory University Chemistry Laboratory Manual, Chemistry 105*, 2008 – 2009 Edition, Department of Chemistry, University of Alberta, 2008. A Hard-Covered Laboratory Notebook, Lab Coat, and Safety Glasses.
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Web Pages:	*http://blackboard.gprc.ab.ca/*

COURSE EVALUATION

THEORY

Assignments/Quizzes:	*10.0 %*
Mid-term Examinations:	25.0 %
Final Examination (Week of April 18):	50.0 %
	85.0 %

***Notes*: 1.** *Mid-term examinations may be scheduled in the evenings or weekends.*

2. *Students must obtain a minimum of 50 % in the **t**heory Component to pass the course. There will be no supplemental or re-examination.*

LABORATORY

General Competence in the Laboratory, Experimental Results, Lab Reports, and Lab Quizzes:	9.0 %
Lab Exam:	6.0 %
	15.0 %

Note: *Students must obtain a minimum of 50 % in the laboratory component to pass the course.*

Descriptor	*Grade*	*Points*	*Descriptor*	*Grade*	*Points*
Excellent 84 – 100%	*A+*	*4.0*	***Satisfactory 60 – 71 %***	*C+*	*2.3*
	A	*4.0*		*C*	*2.0*
	A-	*3.7*		*C-*	*1.7*
Good 72 – 83 %	*B+*	*3.3*	***Poor***	*D+*	*1.3*
	B	*3.0*	***Minimal Pass***	*D*	*1.0*
	B-	*2.7*	***Fail***	*F*	*0*

Note: *Other institutions may not consider grades of D (or D+) sufficient to award transfer credit.*

COURSE OUTLINE

EMPHASIS IS PLACED ON UNDERSTANDING OF PRINCIPLES AND THE ABILITY TO USE PRINCIPLES TO SOLVE PROBLEMS.

1. APPLICATIONS OF EQUILIBRIUM

A. GENERAL: *Gas Phase Equilibria, Heterogeneous Equilibria, Le Chatelier's Principle*

Chapter: 6; Problem Set: 1

B. ACID-BASE EQUILIBRIA: *Review of Fundamentals, Bronsted-Lowry Acid-Base Theory, The Lewis Theory, Dissociation Constant, Levelling Effect, pH of Simple and Complex Acids and Bases in Water, Indicators, Titration Curves, Buffer Solutions, Hydrolysis, Polyprotic Acids*

Chapters: 7 & 8; Problem Set: 2

C. IONIC EQUILIBRIA: *Solubility of Ionic Compounds, Ksp, Common-Ion Effect, The Effect of Complexing Ligands, The Effect of pH on Solubility Equilibria, Selective Precipitation of Ions, Extraction and Separation*

Chapter: 8; Problem Set: 3

2. *THERMODYNAMIC PROCESSES AND THERMOCHEMISTRY*

Reversible and Irreversible Processes, Internal Energy, PV Work, The First Law of Thermodynamics, Heat Capacity, Enthalpy, Processes Involving Ideal Gases, Thermochemistry.

Chapter: 9; Problem Set: 4

3. SPONTANEOUS CHANGE AND EQUILIBRIUM

Spontaneous Processes, Entropy, the Second and Third Laws of Thermodynamics, Free Energy and Chemical Equilibrium, Temperature Dependence of K.

Chapter: 10; Problem Set: 5

4. ELECTROCHEMISTRY

Review of Redox Reactions, Chemistry of Electrolytic and Galvanic Cells, Faraday's Law, Electrode Potentials, emf, Free Energy and emf, Concentration Effects, The Nernst Equation, Commercial Cells, Fuel Cells, Corrosion.

Chapters: 4 & 11; Problem Set: 6

5. CHEMICAL KINETICS

Rate Laws, Order of Reactions, Differential and Integrated Rate Equations for Zero, First and Simple Second Order Reactions, Half-life, Reaction Mechanisms, Arrhenius Law, Catalysis.

Chapter: 15; Problem Set: 7

6. CO-ORDINATION CHEMISTRY

Co-ordination Compounds, Crystal Field Theory, Complex ions.

Chapter: 20; Problem Set: 8

LECTURE SESSION

Regular attendance of lectures/seminars is essential to achieve a good understanding of the course material. You are encouraged to ask questions and to participate in class discussions. Help is also available outside the classroom. ***NO APPOINTMENTS ARE NEEDED.***

TENTATIVE LECTURE SCHEDULE

Week of	***Monday***	***Wednesday***	***Tuesday & Thursday (Tutorial)***
Jan. 5	-	*Equilibrium*	*Equilibrium*
12	*Equilibrium*	*Acids & bases*	*Acids & bases*
19	*Acids & bases*	*Acids & bases*	*Acids & bases*
26	*Acids & bases*	*Ionic Equilibria*	*Ionic Equilibria*
Feb. 2	*Ionic Equilibria*	Thermodynamics I	*Thermodynamics I*
9	*Thermodynamics I*	*Thermodynamics I*	*Thermodynamics I*
16	***Winter break***		
23	*Thermodynamics II*	*Thermodynamics II*	*Thermodynamics II*
Mar. 2	*Thermodynamics II*	*Thermodynamics II*	*Thermodynamics II*
9	*Electrochemistry*	Electrochemistry	*Electrochemistry*
16	*Electrochemistry*	Electrochemistry	*Electrochemistry*
23	*Electrochemistry*	*Kinetics*	*Electrochemistry*
30	*Kinetics*	*Kinetics*	*Kinetics*
April 6	*Kinetics*	*Kinetics*	*Kinetics*
13	*Coordination Chemistry*	*Coordination Chemistry*	*Coordination Chemistry*
20	***FINAL EXAM***		

READING AND PROBLEM ASSIGNMENTS

Problem solving is an essential part of this course. It will guide your study in the right direction and also will help you to monitor your performance in the course.

Approximately ten questions will be assigned as homework every week. However, you are encouraged to solve as many additional problems as you can. It is important that you work out these problems independently. Seek help with the ones you cannot solve yourself. Unless instructed otherwise, assignments are due on Mondays, Wednesdays, and Fridays at 10:00 A.M. ***NO LATE ASSIGNMENTS ARE ACCEPTED. DON'T ASK!***

LABORATORY SESSION

Laboratory sessions start at 2:30 P.M. sharp. All students are expected to come to the laboratory well prepared for the experiment that is to be performed and on time.

Students are required to attend all laboratory periods. Absences due to illness must be substantiated by presenting suitable evidence to the Instructor/Lab Technician. An opportunity to make up a lab will be given only for ***excused absences****.*

The laboratory experiments are designed to allow a well-prepared student to finish all the work within the allotted time. ***IT IS YOUR RESPONSIBILITY TO COMPLETE THE LAB ON TIME.***

Students are responsible for keeping the lab tidy. Failure to keep the workbench and common areas tidy will result ***in demerits up to 5 marks*** *each lab period.*

LABORATORY REPORT

You must record everything you do and observe as you carry out your experiment. Use a hardcover laboratory notebook for this purpose. Do not copy the procedure from the laboratory manual. Keep your notebook neat. Your notebook will be checked periodically.

Formal lab reports should be written using the format given in your laboratory manual. The lab reports are due at the end of the lab. ***NO LATE LAB REPORTS ARE ACCEPTED.***

TENTATIVE LABORATORY SCHEDULE

DATE	*EXPERIMENT**	
Jan. 16	*N*	***Equilibrium Constant***
Jan. 30	*O.*	***Titration of a Weak Acid***
Feb. 13	*Q.*	***Hess's Law***
Feb. 27	*S*	***The Nernst Equation***
March 13	*M.*	***Effect of Temperature on Rate of Reaction***
March 27	*X.*	***Lab Exam***
April. 3	**	***Check-out*** **

***TEXT:** ***Introductory University Chemistry Laboratory Manual, Chemistry 105, 2008 – 2009 Edition, Department* of Chemistry, University of Alberta, 2008.**

Back to the Top

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