

**DEPARTMENT OF SCIENCE****CHEMISTRY 1050 (Winter 2005)**

- INSTRUCTOR:** Dr. Som K. Pillay
(Office: E308; 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
1:00 - 2:20 P. M. (J 203)
- LABORATORY:** Fridays
10:00 A.M. - 12:50 P. M. (J 119)
- TEXT BOOKS AND LABORATORY ITEMS:** Steven S. Zumdahl, *Chemical Principles*, Fourth Edition, Houghton Mifflin Company, 2002.
- Introductory University Chemistry II Laboratory Manual, Chemistry 105, Department of Chemistry, University of Alberta, 2004.*
- A Hard-Covered Laboratory Notebook, Lab Coat, and Safety Glasses.
- Web Pages:** <http://www.pillai.ca/Chemistry105/>
<http://blackboard.gprc.ab.ca/>

COURSE EVALUATION

THEORY

Assignments:	2.0 %
Quizzes:	5.0 %
Mid-term Examinations (Three to Four Tests):	40.0 %
Final Examination (Week of April 18):	<u>38.0 %</u> 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 theory 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:	<u>6.0 %</u> 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 sufficient to award transfer credit.*

COURSE OUTLINE

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

1. 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: 1

2. APPLICATIONS OF EQUILIBRIUM

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

Chapter: 6; Problem Set: 2

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: 3

C. IONIC EQUILIBRIA: *Solubility of Ionic Compounds, K_{sp} , 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: 4

3. 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: 5

4. **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: 6

5. **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: 7

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 (Tutorial)
Jan 3	No Lecture	Kinetics	Introduction
10	Kinetics	Kinetics	Kinetics
17	Kinetics	Equilibrium	Kinetics
24	Equilibrium	Equilibrium	Equilibrium
31	Acids & bases	Acids & bases	Acids & bases
Feb. 7	Acids & bases	Acids & bases	Acids & bases
14	Ionic equilibria	Ionic equilibria	Ionic equilibria
21	*	Winter break	*
28	Thermodynamics I	Thermodynamics I	Thermodynamics I
Mar. 7	Thermodynamics I	Thermodynamics I	Thermodynamics I
14	Thermodynamics II	Thermodynamics II	Thermodynamics II
21	Thermodynamics II	Thermodynamics II	Thermodynamics II
28	Thermodynamics II	Electrochemistry	Thermodynamics II
Apr. 4	Electrochemistry	Electrochemistry	Electrochemistry
11	Electrochemistry	Electrochemistry	Electrochemistry
18	*	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 Fridays at 10:00 A.M. **NO LATE ASSIGNMENTS ARE ACCEPTED. DON'T ASK!***

LABORATORY SESSION

Laboratory sessions start at 10:00 A.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.***

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 on Fridays at 1:00 P.M. **NO LATE LAB REPORTS ARE ACCEPTED.***

TENTATIVE LABORATORY SCHEDULE

<i>DATE</i>	<i>EXPERIMENT*</i>	
<i>Jan. 14</i>	<i>M.</i>	<i>Effect of Temperature on Rate of Reaction</i>
<i>Jan. 28</i>	<i>O.</i>	<i>Equilibrium Constant</i>
<i>Feb. 11</i>	<i>P.</i>	<i>Titration of a Weak Acid</i>
<i>Mar. 4</i>	<i>R.</i>	<i>Hess's Law</i>
<i>Mar. 18</i>	<i>S.</i>	<i>The Nernst Equation</i>
<i>Apr. 1</i>	<i>X.</i>	<i>Lab Exam</i>
<i>Apr. 8</i>	**	<i>Check-out</i> **

***TEXT:** *Introductory University Chemistry II Laboratory Manual, Chemistry 105, Department of Chemistry, University of Alberta, 2004.*

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