Grande Prairie Regional College

DEPARTMENT OF SCIENCE & TECHNOLOGY

CHEMISTRY 1050 (Winter 2002)

INSTRUCTOR: Dr. Som K. Pillay
(Office: J 210; 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
1:00 - 2:20 P. M. (J 227)

SEMINARS: Tuesdays
11:30 - 12:20 A. M. (J 229)

LABORATORY: Thursdays
8:30 - 11:20 A. M. (J 119)

TEXT BOOKS AND LABORATORY ITEMS:

Steven S. Zumdahl, *Chemical Principles*, Fourth Edition, Houghton Mifflin Company, 2001.

R. S. Boikess and C. H. Sorum, *How to Solve General Chemistry Problems*, Seventh Ed., Prentice-Hall Inc., 1987 (Optional).

Introductory University Chemistry II Laboratory Manual, Chemistry 105, Department of Chemistry, University of Alberta, 2001.

A Hard-Covered Laboratory Notebook, Lab Coat, and Safety Glasses.

Web Pages: http://www.pillai.ca/som/
http://spillay/

COURSE EVALUATION

THEORY:

Quizzes:	*12.0 %*
Mid-term Examination (Week of February 4):	15.0 %
Mid-term Examination (Week of March18):	20.0 %
Final Examination (Week of April 15):	38.0 %
	85.0 %

Note: *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:	6.0 %
	15.0 %

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

Grade	*Marks (%)*	*Grade*	*Marks (%)*
9	*90-100*	*5*	*56-65*
8	*80-89*	*4*	*50-55*
7	*74-79*	*3*	*45-49*
6	*66-73*	*2*	*36-44*

COURSE OUTLINE

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

1. *PROPERTIES OF GASES*

Equation of State for Ideal Gases, Dalton's Law of Partial Pressures, Kinetic Theory of Gases, Effusion and Diffusion, Molecular Speeds, Van der Waals Equation of State, Critical Phenomena.

Chapter: 5; Problem Sets: 1 & 2

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, The Carnot Cycle, Heat Engines & Refrigerators.

Chapter: 9; Problem Sets: 3 & 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 Sets: 5 & 6

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 Sets: 7, 8 & 9

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 Sets: 10 & 11

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 7	*Introduction*	*Gases*	*Gases*
14	*Gases*	*Gases*	*Gases*
21	*Gases*	*Gases*	*Gases*
28	*Thermodynamics I*	*Thermodynamics I*	*Thermodynamics I*
29	*Thermodynamics I*	*Thermodynamics I*	*Thermodynamics I*
Feb. 4	*Thermodynamics I*	*Thermodynamics I*	*EXAM I*
11	*Thermodynamics II*	*Thermodynamics II*	*Thermodynamics II*
18	*No Lecture*	*Thermodynamics II*	Thermodynamics II
25	*	***Winter break***	*
Mar. 4	*Thermodynamics II*	*Thermodynamics II*	*Thermodynamics II*
11	*Electrochemistry*	*Electrochemistry*	*Electrochemistry*
18	*Electrochemistry*	*Electrochemistry*	*EXAM II*
25	*Electrochemistry*	*Kinetics*	*Kinetics*
Apr. 1	*Kinetics*	*Kinetics*	*Kinetics*
8	*Kinetics e*	*Kinetics*	*Kinetics*
15	-	*FINAL*	-

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!***

PROBLEM SET #	*CHAPTER**	*PROBLEMS*
1	*5*	*94, 96, 98, 102, 112, 114 & Questions 1-8, Gases Pages, 1-2*
2	*5*	*104, 116, 118, 123-125, 128 & Questions 9-17, Gases, Pages 2-3*
3	*9*	*Questions 1-10, Thermodynamics I, Pages 1-2*
4	*9*	*79, 81 & Questions 11-21, Thermodynamics I, Pages 2-4*
5	*10*	*Questions 1 - 11, Thermodynamics II, Pages 1 - 2*
6	*10*	*Questions 12 - 23, Thermodynamics II, pages 3 - 6*
7	*4*	*Redox Equations, Page 1*
8	*11*	*Question 1 - 9, Electrochemistry, Pages 1- 3*
9	*11*	*Questions 10 - 17, Electrochemistry, Pages 3 - 5*
10	*15*	*Questions 1 - 11, Kinetics, Pages 1 - 4*
11	*15*	*Questions 12 - 25, Kinetics, Pages 5 - 8*

**TEXT:* Steven S. Zumdahl, *Chemical Principles*, Fourth Edition, Houghton Mifflin Company, 2001.

LABORATORY SESSION

Laboratory sessions start at 8:30 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 Mondays at 1:00 P.M. ***NO LATE LAB REPORTS ARE ACCEPTED.***

TENTATIVE LABORATORY SCHEDULE

DATE	*EXPERIMENT**	
Jan. 10	*M.*	***Bonding and Chemical Properties***
Jan. 24	*O.*	***Qualitative Analysis***
Feb. 7	*P.*	***Calorimetry***
Feb. 21	*R.*	***Voltaic Cells and Redox Reactions***
Mar. 14	*S.*	***The Nernst Equation***
Mar. 28	*X.*	***Lab Exam***
Apr. 3	**	***Check-out*** **

TEXT:* ***Introductory University Chemistry II Laboratory Manual, Chemistry 105,* **Department of Chemistry, University of Alberta, 2001.**

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Send mail to pillay@gprc.ab.ca with questions or comments about this web site.

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