GRANDE PRAIRIE REGIONAL COLLEGE DEPARTMENT OF SCIENCE AND TECHNOLOGY 2005/2006

CHEMISTRY 3710: Energetics of Chemical Reactions 3(3-1-3)

- CONTACT HOURS: 3 Lecture hours per week; 1 Seminar hour per week; 3 Laboratory hours per week; Total of 105 contact hours
 - PREREQUISITE: CH1020 or equivalent and MA1130 or equivalent
 - INSTRUCTOR: Les Rawluk Office J214 539-2738

EMAIL: lrawluk@gprc.ab.ca

WEBSITE: http://blackboard.gprc.ab.ca

- OFFICE HOURS: Unrestricted
 - TEXT BOOK: *Physical Chemistry* by K.J. Laidler, J.H.Meiser, B.C.Sanctuary Houghton Mifflin Company ©2003
 - LABORATORY Required: <u>Chemistry 371 Laboratory Manual</u> University of Alberta, 2005 Lab coats and safety glasses Hard cover Physics Laboratory Note Book A Laboratory Breakage Deposit of \$30 per Chemistry course must be paid to the Cashier (Room C315), and the receipt must be shown to the Laboratory Technician (Mrs. Omana Pillay) during the first Laboratory class.
 - SEMINAR: Seminars consist of problem solving and discussion of lecture materials.

COURSE EVALUATION

Midterm Exam	20%
Final Exam	5%
Assignments	0%
Laboratory Reports	5%
Laboratory Exam1	.0%

Alpha Grade	Approximate Percentage Conversion
A+	90-100
A	85-89
A-	80-84
B+	76–79
В	73–75
B-	70–72
C+	67–69
C	64–66
C-	60–63
D+	55 - 59
D	50 - 54
F	0-49

Attendance to all lectures and seminars is strongly recommended. Laboratory attendance to each specific experiment is compulsory; a passing grade in the laboratory component is required to pass the course. A doctor's medical note is required for **all** excused absences!

Students must obtain an overall average of 50% or better to pass the course. Students are encouraged to participate in class discussions, and help is available outside the classroom. Appointments are not necessary.

CH3710 COURSE OUTLINE

I. Gases

- Equations of state, Ideal Gas Law, Dalton's Law of Partial Pressures
- Temperature and the Zeroth Law of Thermodynamics
- Kinetic Molecular Theory and the its Basis for the Ideal Gas Law
- Nonideal Gases, the Van der Waals Gas

II. The First Law of Thermodynamics

- Work, Heat, Energy, State Functions and Exact Differentials
- Stating the First Law
- Enthalpy, Heat Capacity, Thermochemistry, Calorimetry
- Bond Enthalpies, Born-Haber Cycle, Solubilities of Ionic Salts
- Temperature dependence of Enthalpy
- Work, Heat, Energy changes in Processes Involving Gases

III. The Second and Third Laws of Thermodynamics

- Entropy and the Direction of Spontaneous Change, Interconversion of Heat and Work
- Stating the Second Law
- Entropy Changes in Reversible and Irreversible Processes
- Conditions for Equilibrium
- Standard Entropies and the Third Law of Thermodynamics
- Gibbs Energy, Helmholtz Energy, Chemical Potential, Maxwell Relations

IV. Chemical Equilibrium

- Equilibria Involving Ideal and Nonideal Gases, Gas Fugacity, Activity and the Chemical Potential
- Solution Equilibria, Solute and Solvent Activities
- Heterogeneous Equilibria, Activities of Solids and Liquids
- Temperature and Pressure Dependence of Equilibrium Constants

V. Phase Equilibria

- Pure Substances: Gas-Liquid, Gas-Solid, Liquid-Solid Equilibria
- Ideal Solutions of Non-electrolytes, Enthalpy and Entropy of Mixing, Raoult's Law, Henry's Law, Boiling Point Elevation, Freezing Point Depression
- Phase Diagrams for One and Two Component Systems