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

CHEMISTRY 2710: Chemical Thermodynamics — Energetics of Chemical Reactions

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

TRANSFER CREDITS: CH2710 to U. of Alberta CHEM 371, 3 credits
CH2710/2730 to U. of Calgary CHEM 371, 3 credits

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: Chemistry 371 Laboratory Manual
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	45%
Assignments	10%
Laboratory Reports	15%
Laboratory Exam	10%

Alpha Grade	Approximate Percentage Conversion
A+	90–100
A	85–89
A−	80–84
B+	76–79
B	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.**

CH2710 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