EFFECTIVE: SEPTEMBER 2004
CURRICULUM GUIDELINES

A. Division: **Instructional**

Effective Date: September 2004

If Revision, Section(s) Revised: **G, K**, **P**

Date of Previous Revision: **May 16, 1994**

Date of Current Revision: **November 27, 2003**

C: CHEM 2310 **D**: **Physical Chemistry** **E: 5**

Subject & Course No.	Descriptive Title	Semester Credits

F:t 10.02 0 0 10.02 120.0141 442.4402 Tm(j)Tj 10.02 0 0 10.02 127.7978 442.4402 Tm(cs i)Tj 10.02 0 0 10.02 141.4503 442.4402 T

M: Course Objectives / Learning Outcomes:

With the aid of tables of thermodynamic data, a periodic table, an equation sheet and a calculator the student will be able to:

1. solve problems of the following types:

    a) ideal gas law and equations of state for non-ideal gases
    b) First Law problems involving gases (ideal and real)
    c) thermochemical problems (e.g., finding φU, φq and w for a given chemical or physical change)
    d) entropy changes in physical and chemical changes
    e) calculation and use of thermodynamic equilibrium constants at various temperatures and pressures for homogeneous and heterogeneous equilibria
    f) calculation of Gibbs and Helmholtz energy changes for physical and chemical processes
    g) application of thermodynamics to solutions (eg. Raoult's Law, chemical potential, mixing, activities and colligative properties)

2. give mathematical and written statements of the first, second, and third laws of thermodynamics

3. define or explain any of the terms used in the course (eg. State function, reversible process)

4. given the balanced equation for a reaction, predict whether the reaction is spontaneous or not. 0 10.98 550

4. Application of the First Law: Thermochemistry
   Standard states, measurement of φH, calorimetry, relationship between φU and φH, temperature dependence of φH, enthalpies of formation, bond strengths.

5. The Second and Third Laws of Thermodynamics
   Carnot cycle, efficiency of heat engines, entropy, calculation of φS, temperature and volume dependence of S, molecular interpretation of S; the Third Law and absolute entropies.

6. The Gibbs Energy
   Gibbs and Helmholtz functions, Gibbs energies of formation, pressure and temperature dependence of φG, fugacity, thermodynamic limits to energy conversion.

7. Chemical Equilibrium
   Thermodynamic equilibrium constant, K_c,K_p, calculations involving equilibrium in homogeneous and heterogeneous systems, degree of dissociation, temperature dependence of K.

8. Phases and Solutions
   Phase equilibria in one-component systems, Clapeyron, and Clausius-Clapeyc

P: Textbooks and Materials to be Purchased by Students:

Text: Laidler, K.J., Meiser, J.H., and Sancturary, B.C. *Physical Chemistry 4*