DEPARTMENT OF CHEMICAL ENGINEERING

Syllabus

CHE I2800: Advanced Chemical Thermodynamics

Designation: Graduate Course (Elective)

Catalogue Description: Classical thermodynamics; batch and flow systems; homogeneous and heterogeneous systems, physical and chemical equilibria, energy effects. Correlation and approximation methods.

Prerequisites: CHE 43000 or ME 33100

Text:

1) "Introductory Chemical Engineering Thermodynamics", J. R. Elliott & C. T. Lira, Prentice Hall PTR, 1999.
2) "Thermodynamics and Introduction to Statistical Mechanics" B. Lindner, Wiley-Interscience, 2004

Course Objectives:

After completing this course, students should:

1) be familiar with the structure of engineering materials (metals, polymers, ceramics, and composites) at the atomic and microstructural levels.
2) be familiar with the relationships between structure and properties for engineering materials.
3) be able to locate materials selection data and information about the cost and availability of materials.
4) be familiar with the rationale for selecting materials based on materials and process selection charts.
5) be able to apply their knowledge of materials science to the selection of metals and alloys, polymers, ceramics and composites.

Topics Covered:

1) Basic Concepts of Thermodynamics
2) 1^{st}, 2^{nd}, and 3^{rd} Law of thermodynamics
3) Free Energy Functions
4) Equilibrium and Stability Conditions
5) Thermodynamics of Gases, Liquids and Solids
6) Phase and Chemical Equilibrium
7) Nonelectrolyte Solutions
8) Phase Transitions and Critical Phenomena
9) Principles of Statistical Mechanics
10) Statistical Mechanics in Thermodynamics
11) Molecular Partition Functions

Course Schedule: This class meets once a week for a total of three academic hours over a fourteen-week semester.
Grading: 40% Homework, 30% in-class exam (the lowest one will be dropped), 30% final exam.

Contribution of course to meeting the professional component:
This is a core subject for Chemical Engineering. The primary purpose of the course is to provide the student with a mastery of the fundamental concepts and applications of thermodynamics as related to unit operations and unit processes.

Relationship of course to program outcomes:
The outcomes for this course contribute to the following departmental educational outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering
d. an ability to function on multidisciplinary teams.
e. an ability to identify, formulate, and solve engineering problems
g. an ability to communicate effectively.
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Instructor (person who prepared this description) and date of preparation.
Ilona Kretzschmar, kretzschmar@ccny.cuny.edu, 212-650-6769, January 29, 2008