**Chemical Engineering Thermodynamics I**

**ChBE 2110**

**Fall Semester, 2012**

**Credit Hours:** 3

**Instructor:** Prof. Yulin Deng

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Office Hours: Tuesday 3:00 – 4:00 pm, or other times by appointment

**Textbook:** Smith, Van Ness, and Abbott, *Introduction to Chemical Engineering*

*Thermodynamics*, Seventh ed., McGraw-Hill,

**Course Prerequisites:**

Chem Proc Principles (ChBE 2100) with a minimum grade of “C”

Biological Principles (Biol 1510) with concurrency

**Course Objective:** This course focuses on three parts: (1) first and second

thermodynamic laws and analyses of problems using these laws in open, close and

isolated systems; (2) thermodynamic relationships among thermodynamic properties

(energy, heat, work, enthalpy, entropy, free energy, fugacity, temperature, pressure,

volume, etc.); (3) Analyze typical thermodynamic devices and units (turbine, pump,

nozzles, compressor, heat pump, refrigerator, etc) using thermodynamic principles.

**Learning Outcomes:**

At the end of this course, students should be able to:

1. Extend the systems analysis method to define complex thermodynamic system

including transient materials and energy balances for open and closed systems.

2. Be able to correctly use the general First Law of Thermodynamics to find heat,

work and changes in internal energy, and enthalpy for the analysis of any system,

open or closed, undergoing irreversible processes.

3. Apply the Second Law of Thermodynamics and the concept of entropy

production to the analysis of reversible and real systems.

4. Use equations of state for gases and liquids to determine changes in PVT

properties. Understand the molecular concepts.

5. Understand the relationships among the internal energy, enthalpy, heat capacities,

entropy, Gibbs and Helmholtz Free Energies. Be able to calculate these energy

functions from equations of state and heat capacity data.

6. Conduct thermodynamic analysis of Carnot, Rankine, Brayton, Otto and Diesel cycles.

Be able to calculate ideal efficiencies for these cycles.

7. Design and analyze refrigeration cycles and gas liquefaction processes.

**Course Grade:**

Homework: 25%

Exams: Pop Quizzes (5): 15%, Random

Tests (2): 30% (October 3rd, November 9th)

Final Exam: 30%

**Tentative Course Schedule**

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