King Fahd University of Petroleum & Minerals
Department of Chemical Engineering
CHE 303 – Chemical Engineering Thermodynamics II
First Semester 2009-2010 (091)

Course Instructors:

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Office Hours: SUMTW 9:30 to 10:30 P.M.

Catalog Data:

Review of 1st and 2nd laws. Thermodynamic relations. PVT properties. Thermodynamic diagrams. Properties of mixtures. Ideal and real mixtures. Phase equilibria, calculation concepts. The concept of fugacity and activity in liquid phase models. Chemical reaction equilibria concepts and criteria. The steam power plants.

Textbook:

Introduction to Chemical Engineering Thermodynamics, 7/e, by J.M. Smith, H.C. Van. Ness, and M.M. Abbot, McGraw-Hill 2005.

Ref. Book:

Chemical and Engineering Thermodynamics, 2/e, by S. I. Sandler, J. Wiley, 2000.

Objectives:

The objectives are: to provide an introduction to chemical engineering thermodynamics as a fundamental component of chemical engineering, to acquire the students with the knowledge for thermodynamic treatment of pure fluids as well as fluid mixtures and solutions and to understand the thermodynamics of phase equilibria and chemical reaction equilibria.

Outcomes:

Upon successful completion of this course, students will be able to:

1. Find thermodynamic information for pure fluids as well as fluid mixtures and use it to perform thermodynamic calculations oriented to the analysis and design of chemical processes [1]
2. Understand the procedures for estimating the thermodynamic properties, such as enthalpies, entropies, Gibbs energies, fugacity coefficients, and activity coefficients of pure fluids as well as fluid mixtures [1, 3].
3. Choose a reasonable model to estimate the physical properties of a substance or a mixture of substances [1, 4].

4. Predict equilibrium compositions of mixtures under phase and chemical-reaction equilibria [1, 3].
5. Evaluate changes in different thermodynamic properties of pure fluids using different techniques such as equations of state (EOS), tables, charts, databases, and software among others [1].

Prerequisites: CHE 203, MATH 202.

Course Outline:

Topic	Chapter	Lectures
Introductory Lecture		1
Review 1st and 2nd Laws of Thermodynamics	1 to 5	6
Applications of Thermodynamics to Flow Processes	7	3
Production of Power from Heat	8	3
Major Exam 1 (Sunday: 8-November-2009 @ 7:30 PM)		
Thermodynamics Properties of Fluids	6	7
Introduction Vapor/Liquid Equilibrium	10	5
Solution Thermodynamics: Theory	11	7
Major Exam 2 (Sunday: 27-Decemberber-2009 @ 7:30 PM)		
Solution Thermodynamics: Applications	12	5
Chemical-Reaction Equilibria	13	6
Final Exam		

Grading System:

Class Attendance	3 %
Homework's and Computer Assignments	10 %
Quizzes	7 %
Major Exam 1	20 %
Major Exam 2	25 %
Final Exam	35 %
Total	100 %

Notes:

- Exams and quizzes are open-book and closed-notes. One page formula sheet is allowed.
- Class attendance is important for this course. The university policy regarding class attendance will be applied in this regard.
- Solving homework assignments is extremely important for this course.