

Chemical Engineering Thermodynamics II – CHEE 2330

Spring 2016; MWF, 2.00-2.50 PM; PL 3170

Aims: The objective of this class is to implement and extend the basic thermodynamic principles of single phase closed systems (CHEE 2230: Thermodynamics I) to study open systems involving fluid mixtures. Topics covered include phase and chemical equilibria that constitute the unique domain of “chemical engineering thermodynamics”. These topics play a central role in unit operations and chemical reactor design.

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Office hours: M,W,Th 4.00 – 5.00 PM

Textbook: Fundamentals of Chemical Engineering Thermodynamics
By Kevin D. Dahm, and Donald P. Visco, Jr., CENGAGE Learning, 2015.

<u>Grading:</u>	Class Participation:	5 %
	Weekly Home Assignments	10 %
	Test 1	25 %
	Test 2	25 %
	Final	35 %

Class participation includes attending class and playing an active role in class discussions. Homework will be assigned on a weekly basis.

All tests are *Open Text only*.

The final exam is a comprehensive test on all the material covered during the semester.

Class policies

All homework must be turned in during the class on the day it is due; No credit will be given for late homework.

If you believe a test is graded incorrectly, you must inform me at the end of the class on the day it is returned; otherwise no grade adjustment will be made.

Course syllabus.

Chapter 8: Modeling Phase Equilibrium for Pure Components

Mathematical Models of Phase equilibrium

Phase rule

The Clapeyron Equation

The shortcut equation

The Antoine equation

Fugacity and its use in Modeling phase equilibrium

Calculating changes in Gibbs Energy

Mathematical definition of fugacity

Poynting Method of Estimating Liquid and Solid Fugacity

Chapter 9: An introduction to mixtures

Ideal Solutions

Properties of Mixing

Mathematical framework for solutions

Ideal gas mixtures

Chapter 10: Vapor-liquid equilibrium (VLE)

Raoult's Law and the presentation of Data

Lever rule and Flash Problem

Chapter 11 : Theories and models of VLE.

Phase equilibrium for mixtures

Fugacity in mixtures

Gamma-Phi modeling

Modified Raoult's law

Excess Molar Gibbs free energy

Van Laar Equation and Regular Solution Theory

Chapter 14: Fundamentals of Chemical-Reaction Equilibrium

Chemical Reaction Stoichiometry

The equilibrium criterion applied to chemical reaction

The equilibrium constant: effect of pressure and temp on equilibrium

Multiple reaction equilibrium