THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Chemical Engineering Thermodynamics II

CBE 3509

Credit Hours:
3.00 - 3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
Focus on the use of thermodynamics concepts to analyze systems or processes including energy conversion processes, reactions, and properties of mixtures, e.g., obtaining the equilibrium composition of coexisting phases.

Prerequisites and Co-requisites:
Prereq: 3508, and enrollment in CBE, FABEng, or EngPhysics major; or permission of instructor.

Course Goals / Objectives:
- Upon completion of this course, a student should be able to: Have mastered the application of the first and second laws of thermodynamics
- Apply pertinent mathematical concepts required to develop general thermodynamic equations of change
- Understand concepts of phase equilibrium, stability, reversible and irreversible processes
- Use equations of state and activity coefficient models (by hand or using software) to describe multicomponent phase equilibria (we'll focus primarily on vapor-liquid equilibrium
- Determine reaction equilibrium constants and predict effects of temperature, pressure, and composition on equilibrium conversion

Course Topics:
- Review Equilibrium criteria; fugacity and pure component VLE
- Thermodynamic of Mixtures
- Partial Molar Properties; Gibbs-Duhem
- Experimental measurement of partial molar properties
- Criteria for phase equil for multicomponent; Gibbs Phase Rule
- Ideal gas mixtures and Ideal mixtures
- Calculating fugacity for gas, liquid, solid mixtures
- Activity coefficient models (Matlab)
- Vapor-Liquid Equilibrium (VLE)
- VLE with cubic EOS (Matlab)
- Gas Solubilities in liquids
- Liquid-Liquid Equilibrium
- Vapor-Liquid-Liquid Equilibrium
- Solid-Liquid equilibrium
- Freezing Point Depression
- Osmotic Equil & Pressure
- Phase Behavior of Solid Mixtures
- Chemical Equil in a single phase
- Heterogenous Chemical Reactions
- Multiple Chemical Reactions
- Chemical Reactions and Phase equilibria
- Electrochemical reactions or biochemical applications

Designation:
Required