

## ChE 3063 Equilibrium Thermodynamics

(Required course for ChE program)

**Current Catalog Description:** Application of equilibrium thermodynamics to chemical engineering systems with emphasis on non-ideal behavior in chemical reactions, fluid flow, and vapor-liquid equilibrium.

**Co-requisites:** none

**Prerequisites:** ES 3053 (Thermodynamics), ChE 2003 (Stoichiometry).

**Prerequisites by Topic:** Laws of thermodynamics, mass and energy balances, Excel and Visual Basic programming

**Recent Textbook:** J. M. Smith, H. C. Van Ness, and M. M. Abbott, "Introduction to Chemical Engineering Thermodynamics", McGraw-Hill, 7<sup>th</sup> Edition, 2001, ISBN 0-07-310445-2.

**Other Required Material:** None

**Course Objectives:** By the end of the semester, the students will be able to:

1. Determine the properties of pure substances using charts and equations, including departures from ideal gas.
2. Determine the properties of ideal and non-ideal mixtures using both charts and equations.
3. Test experimental data for thermodynamic consistency.
4. Determine phase equilibrium and phase changes of mixtures, include bubble points, dew points, flashes, and liquid-vapor phase diagrams using modern computing tools where appropriate.
5. Determine equilibrium concentrations for single and multiphase reactive systems.

**Major Topics Covered in the Course :** Pure component properties; pure component phase equilibria; properties of ideal and nonideal mixtures; multicomponent phase equilibria; reaction equilibria; tests

**Class/Laboratory Schedule:** Lecture meets for three 50-minute sessions each week for 14 weeks

**Professional Component Contribution:** This course applies mathematics, chemistry and physics to engineering applications of chemical thermodynamics. Computer skills are extended in this course to numerical solution of nonlinear equations. A minimum of one design problem is assigned in this course. Throughout the course, safety and ethics are briefly emphasized.