

CHE 2003 Principles of Chemical Engineering

Required course for ChE program

Catalog Description: Stoichiometry, material and energy balances, introduction to practical engineering problems, including computer methods.

Prerequisite: ChE 1002, ChE 1013 and Chem 1023.

Corequisite: Math 2024, ES 3053.

Prerequisites by Topic: Chemistry: balancing the stoichiometric coefficient of chemical reactions, ideal gas relationship, energy of vaporization and reaction. Mathematics: familiarity with exponential and logarithmic functions, solving systems of algebraic equations, and simple integration. Thermodynamics: unit conversions, energy balances, heat capacity and enthalpy.

Recent Textbook: *Elementary Principles of Chemical Processes, 3rd Edition*, by Richard M. Felder and Ronald W. Rousseau. John Wiley & Sons (2000). ISBN: 0-471-53478-1.

Other Required Materials: None

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

1. Make material balances on batch and flow systems including reaction, and recycle and purge streams.
2. Find physical and chemical properties using both literature and equations.
3. Make component balances on equilibrium systems (e.g., solid-liquid, liquid-liquid, and vapor-liquid)
4. Make mass and energy balances on systems with chemical reaction (e.g. combustion) and without chemical reaction (e.g. humidification).

Major Topics Covered in the Course: Review of unit & dimensions, problem solving and chemical reaction stoichiometry, Conservation of mass, Introduction to properties of multiphase systems (especially equations of state, corresponding states, Clausius equation, humidifications, VLE), Energy balances (1st thermodynamic law review, enthalpy of phase change – humidification, and enthalpy of solution, enthalpy of formation / reaction), and Combined mass and energy balances and Design project.

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

Professional Component Contribution: This course applies mathematics and chemistry to mass/energy balances. One design project is assigned in this course.