CME 312 Material and Energy Balance (Required)

Course Instructor: *Dr. William Calvo*

Website: none

Course Goals:

Introduction to analysis of chemical processes using the laws of conservation and energy as they apply to non-reacting and reacting systems. Integration of the concepts of equilibrium in physicochemical systems, and utilization of basic principles of thermodynamics. Numerical methods used in the design and optimization of chemical engineering processes. Solution of complex chemical engineering problems. [3 credits]

Pre- or Corequisite(s): ESG 111, CHE 132/134, AMS 261, CME 304: minimum of B- in CME 304

Text(s): Richard M. Felder and Ronald W. Rousseau. Elementary Principles of Chemical Processes, 3rd edition, 1999. John Wiley & Sons, Inc.

Class/ Laboratory Schedule:

Fall: Lecture, Thursday, 6:20-9:10 pm

Topics Covered:

Week 1: Basic engineering calculations

Week 2: Introduction to process and process variables: mass composition, temperature, pressure

Week 3: Concepts of steady-state, recycle, purge, limited conversion, yield, selectivity. Fundamental of material balance

Week 4: Single-phase systems. Single-component vapor pressure using Clausius-Clapeyron Equation, Antoine Equation

Week 5: Behavior and description of systems. Quiz 1

Week 6: Understand multi-component systems: vapor-liquid equilibrium. Roult's Law and Henry's Law

Week 7: Set up and solve steady-state mass balance problem

Week 8: Review/Make-up/ Midterm

Week 9: Fundamentals of energy balances

Week 10: Energy balance on closed systems

Week 11: Energy balance on open systems Quiz 2

Week 12: Energy balance on non-reactive processes

Week 13: Set up and solve steady-state energy balance problem

Week 14: Block-flow diagram construction for a chemical process

Week 15: Review/Make-up/Final Exam

Contribution of course to meet professional component:

Relationship of course to program outcomes:

CTPC "3a-k" Outcomes	% contribution
A. Ability to apply knowledge of math, engineering, and science	17%
B. Ability to design and conduct experiments, analyze data	26%
C. Ability to design system, component or process to meet needs	9%
D. Ability to function on multi-disciplinary teams	9%
E. Ability to identify, formulate, and solve engineering problems	13%
F. Understanding of professional and ethical responsibility	5%
G. Ability to communicate effectively	
H. Broad education	2%
I. Recognition of need an ability to engage in life-long learning	2%
J. Knowledge of contemporary issues	2%
K. Ability to use techniques, skills, and tools in engineering practice	15%
Any other outcomes and assessments?	
	100%

Prepared by _____

Date Prepared: _____