CME 304 **and** Chemical Engineering Thermodynamics 1

Credits and Contact Hours: 3 credits; 2 hours and 40 minutes/wk

Course Instructor: AG Tobin

Text(s): Introduction to Chemical Engineering Thermodynamics, J.M. Smith, H. C. Van Ness, M.M.Abbott(7th Ed,) 2005

Specific course information

a. First and Second Laws of Thermodynamics,PVT behavior of pure substances,equations of state for gases and liquids, volumetric properties of supercritical fluids, phase equilibria in pure systems, mass and energy balances of open and closed systems, heat effects in pure substances and during chemical reactions and combustion, application of thermodynamics to flowing systems

b. PHY132, CHE132

c. Required course with minimum of 80 average

Specific goals for the course:

a. student will be able to solving quantitative engineering problems related to application of thermodynamics to chemical engineering processes

b. student will understand basic laws of thermodynamics and their relation to chemical engineering process

b. Criterion 3 a-k: Outcomes	**% contribution**
a. Ability to apply knowledge of math, engineering, and science	10%
b1. Ability to design and conduct experiments	0%
b2. Ability to analyze and interpret data	10 %
c. Ability to design system, component or process to meet needs	0%
d. Ability to function on multi-disciplinary teams	0%
e. Ability to identify, formulate, and solve engineering problems	65%
k. Ability to use techniques, skills, and tools in engineering practice	15%
Any other outcomes and assessments?	
	100%

Brief list of topics to be covered (including exams/quizzes):

Week 1: Intro to chemical engineering thermodynamics and definition of thermodynamic terms

Week 2 : Definitions and applications of pressure, temperature, work and energy to engineering processes

Week3: Introduction to 1st Law and basic concepts of internal energy, enthalpy, isometric, isothermal, adiabatic and isobaric processes

Week4: Mass and energy balances in open and closed systems; short quiz

Week 5: PVT behavior of pure substances; process calculations for ideal gases
Week 6: Volumetric properties of non-ideal fluids;cubic and virial equations of state
Week 7: Generalized correlations for non-ideal fluids; Midterm review; Midterm exam
Week 8: Sensible heat effects in pure substances;
Week 9: Latent heats and heats of reaction in chemical reacting systems; temperature dependence of chemically reacting systems ; combustion in organic systems
Week 10: Introduction to 2^{nd} law of thermodynamics; Carnot heat engine concept
Week 11: Entropy concept as measure of loss; entropy changes in ideal gases; combination of 1^{st} and 2^{nd} Laws
Week 12: Entropy balances in open systems; concept of ideal work; short quiz
Week 13: Calculation of ideal and lost work in open and closed systems
Week 14: Introduction to auxiliary thermodynamic functions; applications of free energy to ideal work ;
Week 15: Maxwell relations for pure materials; review for final exam