CME 304 Thermodynamics I (Required)

Course Instructor: *Dr. Al Tobin*

Website: none

Course Goals:

An introduction to First and Second laws of thermodynamics, PVT behavior of pure substances, equations of state for gases and liquids, phase equilibria, mass and energy balances for closed and open systems, reversibility and equilibrium, application of thermodynamics to flow processes, heat effects during chemical reactions and combustion. [3 credits]

Pre- or Corequisite(s): PHY 132; CHE 132; CSE 130 or ESG 111 or MEC 112 or ESE 124

Text(s): Introduction to Chemical Engineering Thermodynamics (6^{th} ed.) J.M. Smith, H.C. Van Ness, M. M. Abbott, McGraw Hill Publications

Class/ Laboratory Schedule:

Spring: Lecture, Monday/Wednesday 3:50-5:10 pm

Topics Covered:

Week 1: First and Second laws of thermodynamics

Week 2: PVT behavior of pure substances

Week 3: Equations of state for gases and liquids. Phase equilibria.

Week 4: Liquid equilibrium and the Phase rule, Duhem's theorem

Week 5: Models for vapor-liquid equilibria, Henry's & Raoult's Law

Week 6: Concept of chemical potential and phase equilibria, fugacity and fugacity coefficients for pure species and species in solution.

Week 7: Review and Midterm

Week 8: Property changes due to mixing, ideal solutions and models for excess properties

Week 9: Heat Effects of Industrial Processes

Week 10: Applications of thermodynamics to the steam power plant, Internal combustion and jet engines, Heat pumps, Refrigeration and liquefaction processes

Week 11: Property relations for homogeneous phases, Concept of residual properties

Week 12: Thermodynamic Properties of 2-Phase Systems

Week 13: Review and 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	23%
B. Ability to design and conduct experiments, analyze data	16%
C. Ability to design system, component or process to meet needs	13%
D. Ability to function on multi-disciplinary teams	
E. Ability to identify, formulate, and solve engineering problems	17%
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	20%
Any other outcomes and assessments?	
	100%

Prepared by _____

Date Prepared: _____