

# Inver Hills Community College

## ENGR 2000: Thermodynamics

### A. COURSE DESCRIPTION

Credits: 4

Lecture Hours/Week: 4

Lab Hours/Week: 0

OJT Hours/Week: \*.\*

Prerequisites:

This course requires both of these prerequisites

CHEM 1061 - Principles of Chemistry I

MATH 1133 - Calculus I (Minimum grade: 2.0 GPA Equivalent)

Corequisites: None

MnTC Goals: None

Provides a foundation in the fundamental concepts of thermodynamics using a macroscopic approach. Topics include: Properties, equations of state, processes, cycles for reversible and irreversible thermodynamic systems. Modes of energy transfer. Equations for conservation of mass, energy, and entropy balances. Application of thermodynamic principles to engineering systems. Prereq: Grade of C or higher in MATH 1133 and CHEM 1061. PHYS 1081 strongly recommended.

**B. COURSE EFFECTIVE DATES:** 04/02/2010 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. Introductory concepts (8%)
2. Energy and Energy Analysis, First Law of Thermodynamics (10%)
3. Properties, Equation of State (10%)
4. Open (control volume) Analysis (8%)
5. Second Law of Thermodynamics (10%)
6. Entropy (14%)
7. Vapor Power Cycles (8%)
8. Gas Power Cycles (8%)
9. Refrigeration and Heat Pump systems (8%)
10. Ideal gas mixtures. Reactive gas mixtures (16%)

### D. LEARNING OUTCOMES (General)

1. Demonstrate an understanding of thermodynamic properties and equations of state. Calculate the heat and work transfer rates as applicable for the system under consideration.
2. Apply the first and second law of thermodynamics to engineering processes for open (control volume) and closed systems.
3. Demonstrate an understanding of entropy and the second law of thermodynamics.
4. Analyze reversible and irreversible systems, steady state open systems, and applications such as vapor power systems, gas power systems, refrigeration, and heat pumps.

### E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

**F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

**G. SPECIAL INFORMATION**

None noted