

**ME 331 Thermodynamics
Required
Every Term**

2005-2006 Catalog Data: 331 Thermodynamics (3) Energy and laws governing energy transformations; thermodynamic properties; thermodynamic cycles; ideal gas mixtures; application to engineering problems. Prereq: Chemistry 120; Coreq: Mathematics 241

Textbook: *Thermodynamics: An Engineering Approach*, Yunus A. Cengel and Michael A. Boles, McGrawHill, Fourth Edition, 2002

Other Required Material: None

Prerequisites by Topic

1. Chemistry
2. Calculus
3. Introduction to differential equations

Course Objectives

(Program Objectives supported by each course objective are indicated.)

1. To teach students how to determine relevant thermodynamic properties
[AE: A,B,D; BME: 2,4; ME: 1,2,4]
2. To prepare students to use the First and Second Laws of Thermodynamics
[AE: A,B,D; BME: 2,4; ME: 1,2,4]

Topics Covered

1. Introductory concepts and definitions
2. Energy and the First Law of Thermodynamics
3. Properties of pure and simple compressible substances
4. Control volume analysis
5. Second Law of Thermodynamics
6. Entropy
7. Gas and vapor power cycles; Refrigeration and heat pump cycles
8. Ideal Gas Mixtures

Class/Laboratory Schedule: 3 one-hour lecture sessions per week

Evaluation: Exams, short quizzes, homework.

Performance Criteria

Objective 1

- 1.1 Students will demonstrate their ability to determine thermodynamic properties of substances using tabular values and various equations of state

Objective 2

- 2.1 Students will demonstrate their ability to apply the First law of Thermodynamics to closed systems
- 2.2 Students will demonstrate their ability to apply the First Law of Thermodynamics to open systems
- 2.3 Students will demonstrate their ability to apply the Second Law of Thermodynamics to determine whether processes or cycles are reversible, irreversible, or impossible
- 2.4 Students will demonstrate their ability to apply the First and Second Laws of Thermodynamics to engineering cycle analyses of power and refrigeration cycles
- 2.5 Students will demonstrate their ability to determine properties of ideal-gas mixtures

Contribution of course to meeting the professional component: See Tables 4.3.1, 4.3.2.

The course supports the following Program Outcomes:

AE: a), e), h), k), l)

BME: a), e), h), k)

ME: a), e), h), k)

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