

1. *Course number and name*

ENGR 303: Thermodynamics

2. *Credits and contact hours*

3 Credits; two 75 minutes lectures/sessions per week.

3. *Instructor's or course coordinator's name*

Course Coordinator: Dr. Ahmad R. Ganji

Course Instructor : Dr. Ahmad Ganji and Dr. Douglas Codron

4. *Text book, title, author, and year*

Yunus A. Cengel and Michael A. Boles, Thermodynamics, Engineering Approach, 8th Ed., McGraw Hill, 2014.

a. other supplemental materials

Any other basic course in Thermodynamics, such as: Michael J. Moran and Howard N. Shapiro, *Fundamentals of Engineering Thermodynamics*, John Wiley & Sons, any edition.

5. *Specific course information*

a. brief description of the content of the course (catalog description)

Application of thermodynamics to a wide variety of energy exchanging devices; properties of the pure substance, ideal gases and mixtures; power and refrigeration cycles.

b. prerequisites or co-requisites

PHYSICS 240 - General Physics with Calculus III

c. indicate whether a required, elective, or selected elective course in the program

The course is required for Mechanical Engineering and can be taken as elective by Civil and Electrical Engineering students.

6. *Specific goals for the course*

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

- The student will demonstrate basic understanding and knowledge of thermodynamic properties of substances;
- The student will demonstrate basic understanding and knowledge of first law of thermodynamic and its application to open and closed systems;
- The student will demonstrate basic understanding and knowledge of the second laws of thermodynamic and its application to open and closed systems.

- The student will demonstrate basic understanding and knowledge of conservation of mass and its application to engineering systems;
- The student will demonstrate the ability to perform basic thermal analysis of power and refrigeration cycles, and calculate the properties of gas mixtures.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Course addresses ABET Student Outcomes: a, e

7. *Brief list of topics to be covered*

- Subject of Thermodynamics: Basic Concepts and Definitions (1 week);
- Properties of Pure Substances: Vapor, Perfect Gas, Liquid and Solid Phases, and Phase Mixtures; (2 weeks).
- Work, Heat, and Energy (1 week);
- Conservation of Energy (First Law of Thermodynamics), Internal Energy, and Their Application to Engineering Systems (3 weeks);
- Second Law of Thermodynamics (2 weeks);
- Entropy and Its Applications to Engineering Systems (2 weeks);
- Thermodynamic Cycles; Gas and Vapor Power and Refrigeration Cycles; (2 weeks)