

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, 8<sup>th</sup> 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)