*1. Course number and name*

 **ENGR 303: Thermodynamics**

*2. Credits, contact hours, and categorization of credits in Table 5-1 (math and basic science, engineering topic, and/or other).*
3 credits; two 75-minute lectures or three 50-minute lectures per week; engineering topic

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

 Ed Cheng

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

 Cengel, Y. A. and M. A. Boles. Thermodynamics: An Engineering Approach, 9th Edition,

McGraw-Hill, 2018.

 *a. other supplemental materials*

 Supplemental online content (animations, videos, web-based tools, etc.) delivered via course webpage

*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*

PHYS 240: General Physics with Calculus III

*c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program*

 Required for Mechanical Engineering program.

*6. Specific goals for the course*

*a. specific outcomes of instruction (e.g. 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.*

ABET student outcomes: 1, 2, 4, 7

*7. Brief list of topics to be covered*

* Thermodynamics: Introduction and Basic Concepts;
* Energy, Energy Transfer, and General Energy Analysis
* Properties of Pure Substances
* Energy Analysis of Closed Systems
* Mass and Energy Analysis of Closed Volumes
* The Second Law of Thermodynamics
* Entropy
* Gas Power Cycles
* Vapor and Combined Power Cycles
* Refrigeration Cycles