

1. *Course number and name*

ENGR 463 : Thermal Power Systems

2. *Credits and contact hours*

3 Credits; Class work, two units (two one hour lectures per week); laboratory, one unit (three hour lab work per week).

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

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

Course coordinator: Dr. Ahmad R. Ganji

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

- Yunus A. Cengel and Michael A. Boles, Thermodynamics, Engineering Approach, 8th Ed., McGraw Hill, 2014.
- Laboratory Manual developed by Dr. Ahmad R. Ganji
- Class handouts

a. other supplemental materials

- Bernard D. Wood, Applications of Thermodynamics, 2nd Ed. Waveland Press, 1982.
- Richard E. Sonntag, Claus Borgnakke and Gordon J. Van Wylen, Fundamentals of Thermodynamics, 6th Ed., John Wiley, 2003.
- Weston, Energy Conversion, West Pub. Co., 1992.

5. *Specific course information*

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

Application of thermodynamics, fluid mechanics, and heat transfer to design of energy systems. Economics and environmental aspects stressed as design criteria. Class work, two units; laboratory, one unit.

b. prerequisites or co-requisites

ENGR. 302 and ENGR. 467

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

Required for Mechanical Engineering

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 students will demonstrate that they have an understanding of the principle of operation of thermal power and refrigeration systems.
- The students will demonstrate that they have an understanding of the basics of

- combustion process and the combustion generated air pollutants.
- The students will demonstrate the ability to apply the basic conservation principles to analysis and design of thermal power systems.
 - The students will demonstrate familiarity with some typical thermal power systems through performing lab experiments
 - The students will demonstrate the ability to design, and perform experiments on selected thermal power systems.
 - The students will demonstrate their skill in written communication by writing technical memos and formal reports for reporting lab experiments and design projects.
 - The students will demonstrate their skill in oral communication by making a presentation on a research topic of their interest in thermal power systems.
- 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 Outcome(s): [a, b, c, e, g, h, i, j, k].

7. *Brief list of topics to be covered*

- Review of the basic principles of:
 - Conservation of Mass
 - Conservation of Energy
 - 2nd Law of Thermodynamics
 - Properties of Substances
- Thermodynamics of Air Conditioning Systems
- Refrigeration Cycles, Heat Pumps and Chillers
- Thermodynamics of Combustion Processes and Air Pollution from Combustion Processes
- Steam Power Plant Cycles
- Gas Turbine Cycles
- Reciprocating Engines
- Co-generation Systems
- Economic Aspects of Thermal Power Systems