1. *Course number and name*

**ENGR 463 : Thermal Power Systems**

1. *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).

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

Instructor: Dr. Douglas Codron

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

* Yunus A. Cengel and Michael A. Boles, Thermodynamics, Engineering Approach, 9th Ed., McGraw Hill, 2018.
* Laboratory Manual developed by Dr. Ahmad R. Ganji
* Class handouts

1. *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.

1. *Specific course information*
2. *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.

1. *prerequisites or co-requisites*

ENGR. 302 and ENGR. 467

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

Required for Mechanical Engineering

1. *Specific goals for the course*
2. *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.

1. *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): 1, 2, 3, 4, 6.

1. *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
* Jet and Rocket Engine Thermodynamics
* Fuel Cells
* Economic Aspects of Thermal Power Systems