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**
   - Laboratory Manual developed by Dr. Ahmad R. Ganji
   - Class handouts

   **a. other supplemental materials**

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