COLLEGE OF ENGINEERING
THE UNIVERSITY OF TOLEDO

University of Toledo
Mechanical Engineering Technology
Master Syllabus

Course Title: *Technical Thermodynamics* **Course Code & Number:** *MET 2210*

Credit Hour Total: *4*

Lecture Contact Hours: *4* **Lab Contact Hours:** *0*

Prerequisite(s): *PHYS 2010, MET 1050, MATH 2450*

Text: *Thermodynamics, Cengel, 8thEdition, 2015*

Software: *none*

Course Description: (Approved Catalog Description)
Analysis of thermodynamic concepts as they apply to heating and power production; conservation of energy, work and heat, engines and refrigeration. Includes laboratory experiences.

Related Program Outcomes:
Outcome a. An ability to apply the knowledge and techniques to understand the relationship between pressure, temperature, and specific volume in a thermodynamics process and the work or heat that is necessary to accomplish it, as evidenced by the ability to perform a complete thermodynamics analysis.
Outcome b. An ability to select and apply knowledge of engineering tools to design and specify the thermodynamics aspects of hydronic heating systems, air compressors, and thermodynamics manufacturing processes.
Outcome f. An ability to identify, analyze and solve technical problems associated with the steady flow engineering problems, Carnot cycle, etc.

Course Objectives:
Upon completion of this course, the students will be able to:

1. To understand the relationship between pressure, volume / specific volume, and temperature for a gas.
2. To use gas tables to determine the properties of gases and gas-liquid combinations.

3. To use graphs and charts to find the properties of gases and apply them to machine cycles.
4. To understand the design and function of air compressors.
6. To apply thermodynamics to manufacturing processes.
5. To perform an energy analysis of closed systems
6. To calculate the thermodynamics efficiency of Carnot cycles

Course Outline:

- First Law of Thermodynamics
- Phases of a pure substance; P-v diagram,
- Ideal Gas Law
- Energy analysis of closed systems: moving boundary work: Constant Volume Processes, Constant Pressure Processes, Constant Temperature Processes, Polytropic Processes
- Conservation of mass
- Steady flow engineering devices: nozzles and diffusers, turbines and compressors, mixing chambers, heat exchangers, pipe and duct flow
- Second law of thermodynamics: heat engines, refrigerators and heat pumps
- Carnot cycle: principle, Carnot heat engine, Carnot refrigeration and heat pump