COLLEGE OF ENGINEERING
THE UNIVERSITY OF TOLEDO

University of Toledo
Mechanical Engineering Technology
Master Syllabus

Course Title: *Applied Thermodynamics* **Course Code & Number:** *MET 3100*

Credit Hour Total: *4*

Lecture Contact Hours: *3* **Lab Contact Hours:** *2*

Prerequisite(s): *MET 2210, MATH 2460*

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

Software: *Microsoft Office*

Course Description: (Approved Catalog Description)
Basic principles and laws of classical thermodynamics, equations of state, reversibility and entropy applied to processes and cycles for ideal and non-ideal substances. Special attention will be given to gas power cycles, vapor and combined power cycles, refrigeration cycle. Air conditioning processes. Mechanics of heat transfer.

Related Program Outcomes:
Outcome a. An appropriate mastery of knowledge, techniques, and skills that relates to the thermodynamic cycles analysis.
Outcome c. An ability to conduct, analyze and interpret experiments as evidenced by the laboratory reports.
Outcome e. An ability to function effectively as a member of a team or leader of a team.
Outcome g. An ability to communicate effectively in written oral, and graphical communication, as evidenced by written reports.
Outcome j. An ability to identify the impact of ET solutions to societal context, as evidenced by a written article.

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

1. Use appropriate tables and diagrams to determine the state of the working fluid
2. Calculate thermal efficiencies, heat transfer in & out, work in & out, etc. for ideal thermodynamic cycles, as Otto, Diesel, Brayton, Rankine, and refrigeration cycles

3. Calculate / investigate actual engine cycles and compare them with the idealized ones as well as identifying viable ways to improve the thermal efficiencies of the engine cycles as Otto and Diesel and power cycles as Brayton and Rankine
4. Conduct laboratory experiments, analyze and interpret experimental data
5. Produce written technical and laboratory reports

Course Outline:

- Gas power cycles: ideal, actual and improved
- Vapor and combined power cycles
- Isentropic efficiencies of steady-flow devices
- Refrigeration cycles and heat pumps
- Gas-vapor cycles and air-conditioning
- Heat transfer in thermodynamic systems

Major Laboratory Topics:

- Otto Cycle
- Jet Engine Cycle
- Rankine Cycle
- Vapor Compression Refrigeration Cycle
- Bryton Cycle
- Heat transfer using Shell & Tube heat exchanger