

Department of Mechanical Engineering Technology

Course number/name:

MECH 2430 Thermodynamics

Credits/contact hours:

3 credits, 3 class hours

Instructor/coordinator:

Malek Brahim, Assistant Professor of Mechanical Engineering Technology

Text book/title/author/year

Thermodynamics and Heat Power 6th edition, Kurt C. Rolle, Prentice Hall, 2005, ISBN: 0131139282

Specific course information

Catalog description:

Basic concepts of thermal energy conversion. Dual use of S.I. and English engineering units, gas laws, fluid processes, first and second laws of thermodynamics, theoretical cycles, internal combustion engines, gas turbines and jet engines, refrigeration cycles and the heat pump. Heat transfer through radiation, conduction and convection. Computer problem-solving.

Pre/Corequisites:

MECH 1233, MAT 1375, PHYS 1433 / MAT 1475, PHYS 1434

Required/elective/selected elective:

Required for Mechanical Engineering Technology

Course learning objectives:

1. Use units in both SI and US engineering units for thermodynamic applications.
2. Identify open closed and isolated systems, and apply the first law of thermodynamics.
3. Do air standard analysis for an ideal Otto engine.
4. Understand gas turbine, and jet engine.
5. Apply the three modes of heat transfer; conduction, convection, and radiation to solve heat transfer problems.
6. Use integration, and area under curve to determine energy.
7. Identify, analyze and solve thermodynamic system problems.
8. Use computer programs (MATLAB) to solve thermodynamic problems, and develop an understanding of the implication of the results.

Course addresses ABET student outcomes: 3a, 3b, 3e, 3f, 3i, and PC-3

Brief list of topics to be covered:

- Introduction. Basic Dimensions and Unit Systems, Thermodynamic Calculations and Unit Cancellations. Numerical Calculations. Pressure, and Temperature.
- Thermodynamic Systems. System Property. State of a System. Process. Cycles. Volume, Density, Energy, Power, Heat, and Work

- First Law of Thermodynamics. Conservation of Mass and Energy. Steady Flow. Uniform Flow. Flow Energy and Enthalpy.
- Perfect Gas Law. Specific Heat. Properties of Pure Substances. And Thermodynamic Tables.
- Basic Thermodynamic Processes. Second Law of Thermodynamics. Heat Engine and Carnot Cycles.
- The internal combustion engine and the ideal Otto Cycle. Start of Term Project.
- Gas Turbine and Jet propulsion.
- Refrigeration cycles and heat pump.
- Jet engine
- Computer use for problem solving