

Departmental Syllabus

Prepared by the Department of Engineering Sciences and Applied Technology

Date of Departmental Approval: August 28, 2017

Date approved by Curriculum and Programs: October 11, 2017

Effective: Fall 2018

1. **Course Number:** ENR208
Course Title: Thermodynamics
2. **Description:** Thermodynamics (a branch of physics) is a study of heat and temperature and their relation to energy and work. The laws of thermodynamics describe how fundamental physical quantities (temperature, energy, and entropy) behave under various circumstances. The course focuses on concepts of thermodynamics, the laws of thermodynamics, work, heat, energy, the Carnot Cycle, energy conservation, enthalpy, specific heat, efficiency, entropy, phase, phase change, heat engines, and heat transfer.
3. **Student Learning Outcomes** (instructional objectives, intellectual skills):
Upon successful completion of this course, students are able to do the following.
 - Demonstrate an understanding of thermodynamics, pressure, volume, temperature, systems of measure, ideal gasses, work, heat, energy, and how they apply to open and closed systems.
 - Explain the First and Second Laws of Thermodynamics
 - Explain the Carnot Cycle for an ideal gas.
 - Demonstrate an understanding of energy conservation, enthalpy, and specific heat by applying them using the Energy Equation.
 - Explain efficiency and entropy and how they apply to reversible and irreversible cycles.
 - Demonstrate an understanding of phase, phase change, and vapor power cycles.
 - Explain specific heat, gas constraints, and partial pressure and apply them to a variety of processes using the Ideal Gas Law.
 - Demonstrate an understanding of heat engines, refrigeration, heat pumps, and their efficiencies.
 - Explain heat transfer through conduction, convection, and radiation.
4. **Credit(s):** 3 credits
5. **Satisfies General Education Requirement:** No
6. **Prerequisite(s):** CHM151 (General Chemistry I) and MAT250 (Calculus II)
7. **Semester(s) Offered:** Varies
8. **Suggested General Guidelines for Evaluation:** The course grade is based on homework assignments; class work and participation; one-hour exam(s); and a final examination.
9. **General Topical Outline** (Optional):
 1. Pressure, volume, temperature, systems of measure, ideal gasses.
 2. The First and Second Laws of Thermodynamics
 3. Work, heat, energy and how they apply to open (flow) and closed (non-flow) systems.
 4. Carnot Cycle for an ideal gas.
 5. Energy conservation, enthalpy, specific heat and how they apply using the Energy Equation.
 6. Efficiency and entropy and how they apply to reversible and irreversible cycles.
 7. Phase, phase change (vaporization), vapor power cycles.
 8. Specific heat, gas constraints, partial pressure and how they are used by the Ideal Gas Law.
 9. Heat engines, refrigeration, heat pumps and their efficiencies.
 10. Heat transfer: conduction, convection, and radiation.