

**J. Sargeant Reynolds Community College
Course Content Summary**

Course Prefix and Number: EGR 248

Credits: 3

Course Title: Thermodynamics for Engineering

Course Description: Studies formulation of the first and second law of thermodynamics. Presents energy conversion, concepts of energy, temperature, entropy, enthalpy, and equations of state of fluids. Covers reversibility and irreversibility in processes, closed and open systems, cyclical processes, and problem-solving using computers. Prerequisite: MTH 263. Lecture 3 hours per week.

General Course Purpose: This course may be used as an elective for Engineering AS students and is required for many Engineering majors at four-year institutions.

Course Prerequisites and Co-requisites:

Prerequisite: MTH 263

Student Learning Outcomes:

Upon completing the course, the student will be able to

- a. Solve problems using the first law of thermodynamics to include adiabatic processes, boundary work, extensive and intensive properties, equilibrium specification of state, enthalpy, and specific heat;
- b. Apply assumptions defined by the properties of an ideal gas;
- c. Solve problems using the properties of pure substances;
- d. Solve problems using an energy analysis of open systems;
- e. Solve problems using the second law of thermodynamics and entropy to include heat engines, reservoirs, Clausius inequality, closed system reversible and irreversible processes and refrigerators, entropy production and heat transfer, Carnot engine efficiency, and Coefficients of Performance;
- f. Identify and apply consequences of the second law, including control volume, Gibbs function, isentropic processes, and entropy changes for ideal gas and real substance; and
- g. Solve problems using the characteristics of gas and vapor power cycles to include the Brayton and Rankine cycles.

Major Topics to Be Included:

- a. Energy and Entropy
- b. The First Law of Thermodynamics
- c. The Second Law of Thermodynamics
- d. Open- and Closed-system Analysis
- e. Vapor and Gas Properties
- f. Refrigeration and Power Cycles

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