

EGN 3343 – Engineering Thermodynamics
Common Course Syllabus

Catalog data: 3 Credits. Topics include properties of a simple pure compressible substance, equations of state, the first law of thermodynamics, internal energy, specific heats, enthalpy, and the application of the first law to a system or a control volume. The study of the second law of thermodynamics is also discussed leading to the discovery of entropy as a property and its ramifications.

Goals: This course introduces the student to the basic knowledge of energy production, conversion and utilization from natural resources. Development and application of the basic principles of thermodynamics to systems and control volumes are illustrated and emphasized.

Prerequisite:

1. Physics for Engineers I - PHY 2048 or equivalent
2. Calculus II - MAC 2312.

Topics: (the number of sessions merely provides guidelines and is subjected to change by individual instructor)

1. Definitions, terminology, properties of systems, pressure, temperature scale, heat and work as path-dependent functions, zeroth law of thermodynamics, the concept of a thermodynamic equilibrium, different kinds of work (3 sessions).
2. The first law of thermodynamics, and its application to systems (4 sessions).
3. Properties of a pure compressible substance, Phases and their transitions, p-V-T relation for a gaseous medium, specific heats (4 sessions).
4. Applications of the first law to closed systems (1 session).
5. Application of the first law to a control volume: energy relationship for flow processes (4 sessions).
6. Cycles of heat engines, different kinds of processes, the thermal efficiency of heat engines (3 sessions).
7. The second law of thermodynamics, Corollaries of the second law of thermodynamics, reversible processes and irreversible processes (6 sessions).
8. Entropy and entropy production (2 sessions).
9. Entropy rate balance for closed systems and control volumes (3 sessions).
10. Examples of a power generation and refrigeration systems (4 sessions).

Course Outcomes: (numbers in parentheses indicate correlation of the outcome with the appropriate ABET program outcomes 1-7)

1. The students will have learned that energy is conserved based on the first law of thermodynamics. (1)
2. The students will have learned whether or not a process is possible based on the second law of thermodynamics. (1)
3. The students will be able to apply the 1st and 2nd laws of thermodynamics in performance analysis of various power plants, engines and refrigeration systems. (1)

Design Content:

This course has no requirement for design content.

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