United States Naval Academy
Mechanical Engineering Department

EM319 Engineering Thermodynamics

Catalog Description: EM319 Engineering Thermodynamics **Credit:** 3 (3-0-3)

A basic thermodynamics course in which the first and second laws of thermodynamics are studied primarily from the classical macroscopic viewpoint and applied to both closed and open systems. Working substances include perfect gases, real gases and vapors in addition to solids and liquids. Naval applications are emphasized.

Prerequisites: None
Corequisites: SM212 [fall, spring]

Textbooks: Cengel and Boles, Thermodynamics an Engineering Approach, 4th Ed.
McGraw-Hill *Required*
Library Reserve Materials *On Reserve in Nimitz Library*

Course Director: Prof. Martin Cerza

Objectives[1]:

1. To understand the State Principle and be able to apply it in working problems.
2. To utilize thermodynamic property tables.
3. To clearly identify control volume and control mass systems for analysis.
4. To understand Conservation of Mass, Conservation of Energy, and the Second Law and be able to apply these principles to a variety of energy transfer and conversion systems.

Course Content:

No.	Topic or Subtopic	hrs.
1	Systems, Units, States, Equilibrium	3
2	Properties, Substances, Phases, Ideal Gases, Specific Heats	4
3	Internal Energy, Enthalpy, Heat, Work	3
4	First Law, Open and Closed Systems	10
5	Second Law, Open and Closed Systems	10
6	Ideal Cycles: Otto and Diesel	5
7	Cycles: Gas Turbine and Steam	5
8	Refrigeration	3

Evaluation:

1. Quizzes	_x__ Yes	___ No
2. Homework	_x__ Yes	___ No
3. Exams	_x__ Yes	___ No
4. Laboratory Reports	___ Yes	_x__ No

5. Oral Presentations	___ Yes	_x__ No
6. Design Reports/Notebooks	___ Yes	_x__ No
7. Prototypes/Demonstrations	___ Yes	_x__ No
8. Projects	___ Yes	_x__ No
9. any other evaluation tools used	___ Yes	_x__ No

Acquired Abilities[2]:

For each Objective, list performance criteria and indicate which evaluation tools are used to assess the criteria.

1. Students will develop the ability to apply the laws of thermodynamics to engineering problems. (1,2,3)
2. Students will be able to recognize transitional energies, thermodynamic systems and environments. (1,2,3)
3. Students will learn both open and closed thermodynamic systems. (1,2,3)
4. Students will learn how to use property tables and equations of state for various substances. (1,2,3)
5. Students will learn about thermodynamic systems employed on Navy ships. (1,2,3)

Date of Latest Revision: 13 NOV 2001

[1] Letters in parenthesis refer to the Program Objectives of the Mechanical Engineering Program.
[2] Numbers in parenthesis refer to the evaluation methods used to assess student performance.