MECH 237:
Introduction to Thermal Sciences

WALTER SCOTT, JR. COLLEGE OF ENGINEERING
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Instructor:
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Description:
The course covers the first and second laws of thermodynamics, properties of substances, energy conversion, heat transfer, and basic energy conversion applications such as power generation.

Prerequisite:
MATH 160 and PH 141.

Textbook:
WileyPlus online version is required: Moran–Shapiro–Boettner–Bailey, Fundamentals of Engineering Thermodynamics, 9th edition, Wiley & Sons, ISBN 978-1-119-50311-8.

Disability Accommodation:
Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 requires Colorado State University to provide academic adjustments or accommodations for students with documented disabilities. Students seeking academic adjustment or accommodations must self-identify with the Office of Resources for Disabled Students (ORDS). After meeting with ORDS staff, and based on their recommendations, students are encouraged to meet with their instructors to discuss their needs, and if applicable, any lab safety concerns related to their disabilities.

Resources:
The CSU Writing Center is an excellent resource to support the development of your writing skills throughout your college career. While students are not required to access services, you are strongly encouraged to seek consultation on your writing projects required for this course. In addition to contact information, there are useful resources available on their website. The Morgan Library reference librarians can direct you to books and articles for the research paper and the oral presentation.

Professional Honesty:
This course adheres to the Academic Integrity Policy of the Colorado State University General Catalog and the Student Conduct Code. Honors students enrolled in this course are held to high standards of integrity. Academic integrity is expected within all assignments for this course. Students will be required to make an honor pledge to complete this course. The honors pledge will be completed as a class. It is expected that students will use their own knowledge and skill for assignments unless directed to do otherwise. Incidents of cheating, plagiarism or knowingly providing false or incorrect information are considered serious and will be treated seriously. Consequences of these incidents are at the discretion of the faculty member involved and may consist of confiscation of assignments, an F-grade, or reporting to the CSU Student Conduct office. It is expected that students will demonstrate concern for others, respect the confidentiality of information about, the property of and the decisions made by others.

Assessment:

Course learning outcomes are assessed using the following rubric:

Homework	30%
Exam I (Chapters 1 – 4)	35%
Exam II (Chapters 4 – 6)	35%

Learning Outcomes:

- Understand basic control volume concepts: properties, system, boundary, surrounding, etc.
- Clearly determine the following key properties: v, u, h, s for water, air, and other ideal gases.
- Understand and employ various property/phase diagrams, such as: T–v, P–v, T–h, T–s, etc.
- Develop solving techniques and software tools to effectively solve engineering problems.
- Demonstrate understanding of the 1st and 2nd laws of thermodynamics via problem solving.
- Conduct closed and open system analysis based on the 1st and 2nd laws of thermodynamics.
- Apply mass, energy, and entropy balances to closed and open systems.
- Perform thermodynamic analysis of vapor and gas power cycles.
- Develop the fundamental principles and laws of heat transfer and explore their implications.
- Solving basic problems related to the production, conversion, and distribution of energy.
- Analyze and design basic control systems for thermal processes.

Topics:

Week	Chapter	Topic
1	1	Introductory Concepts and Definitions
2	2	The First Law of Thermodynamics
3	3	Evaluating Properties
4		
5	4	Control Volume Analysis
6		
7	5	The Second Law of Thermodynamics
8		
9	6	Entropy Analysis
10		
11		Heat Transfer
12		
13		Power Generation
14		
15		Control Systems