Fall 2025: ME 311 S101 Thermodynamics I

Department of Mechanical and Industrial Engineering
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Office Hours: Tuesdays (5:00 PM – 6:00 PM) or by appointment. If you would like to schedule a meeting outside office hours, please send me an email at least 48 hours in advance with the subject "ME311 Meeting Request."

Course Information

Lectures: Wednesdays (6:00 PM – 8:50 PM)
Location: ME 244
Credits: 3.00
Prerequisites: Math 211 - Calculus III; Phys 111 - Physics I

Book: Yunus A. Cengel & Michael A. Boles; *Thermodynamics - An Engineering Approach*, 8th Edition, McGraw-Hill Education

Course Description and Tentative Timeline

Thermodynamic fundamentals, energy concepts, laws of thermodynamics, properties, closed and open systems, availability analysis, and cycles.

Table 1: Topics

Book Chapter	Topics
1	Introduction and Basic Concepts: Thermodynamics and Energy, Dimensions and Units, Systems and Control Volumes, Properties, Density, State and Equilibrium, Processes and Cycles, Zeroth Law, Pressure and Measurement Devices, Problem-Solving
2	Energy, Energy Transfer, and Analysis: Heat, Work, Mechanical Work, First Law, Efficiencies, Energy and Environment

3	Properties of Pure Substances: Phases, Phase-Change Processes, Diagrams, Tables, Ideal-Gas Equation, Compressibility Factor, Equations of State
4	Energy Analysis of Closed Systems: Moving Boundary Work, Energy Balance, Specific Heats, Internal Energy, Enthalpy (Ideal Gases, Solids, Liquids)
5	Mass and Energy Analysis of Control Volumes: Conservation of Mass, Flow Work, Steady-Flow Devices, Unsteady-Flow Processes
6	Second Law: Reservoirs, Heat Engines, Refrigerators, Perpetual Motion, Reversible/Irreversible Processes, Carnot Cycle, Principles, Temperature Scale
7	Entropy: Increase of Entropy Principle, Entropy Change, Isentropic Processes, Diagrams, Tds Relations, Entropy Balance, Isentropic Efficiencies

Table 2: Tentative timeline

Week	**Date**	**Book Chapter**	**Homework**	**Exams**
1	09/03	1		
2	09/10	2		
3	No Lecture	—	1 (Assigned)	
4	09/24	2		
5	10/01	3	1 (Due)	
6	10/08	3		Quiz 1
7	10/15	4	2 (Assigned)	
8	10/22	4		
9	10/29	5	2 (Due)	
10	11/05	—		Midterm Exam
11	11/12	5	3 (Assigned)	
12	11/19	6		
13	11/26	6	3 (Due)	
14	12/03	7		Quiz 2
15	12/10	7	4 (Assigned)	
16	No Lecture	—		
17	TBD	—	4 (Due)	Final Exam

Learning Outcomes

1. Identify the properties of real substances and gases from data/equations of state.
2. Analyze processes in open/closed systems using the first law.
3. Apply the second law of thermodynamics to analyze systems.

4. Analyze simple thermodynamic cycles.

Grading Policy and Late Policy

The final grade is determined based on homework, quizzes, midterm exam and final exam. One of the homework assignments is optional, and you may choose which one to skip (if any). If you turn in all four homework assignments, you can think of one of them as extra credit towards your final grade. Additionally, you can gain 5% extra credit on each homework if you type it up in Word, and 10% extra credit if you use LaTex. (I will provide a LaTex template that you can use.) The contribution of the homework, quizzes, and exams to the final grade is given below.

1. Homework: $4 \times 10\% = 40\%$ (42% with Word and 44% with LaTex)
2. Quizzes: $2 \times 10\% = 20\%$
3. Midterm exam: 20%
4. Final exam: 30%

Because of all these opportunities for extra credit, assignments that are handed in late will not be accepted and will receive a grade of 0. The final grade may not be curved.

Table 3: Final grading scale

Grade	**Significance**	**Overall Score**
A	Superior	90–100
B+	Excellent	80–89
B	Very Good	70–79
C+	Good	60–69
C	Acceptable	50–59
D	Minimum	40–49
F	Fail/Inadequate	<40

Academic Integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the NJIT academic code of integrity policy. Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in

disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

AI Usage

The use of Artificial Intelligence (AI) is "Allowed with conditions and citation/acknowledgment" in accordance with NJIT's Perspective on AI Usage in Teaching/Learning. In particular, AI tools such as ChatGPT and Google Gemini may be used in this course for **homework assignments** under the following conditions:

1. You must cite and acknowledge any use of AI tools in your work (e.g., "Portions of this solution were generated with the assistance of ChatGPT and then verified/edited by me").

2. You remain responsible for the accuracy, correctness, and originality of the submitted work. Simply copying AI output without understanding it is not acceptable.

Use of AI is stricly prohibited during **exams**, **quizzes**, or other **closed assignments**. Any use of AI in these settings will be treated as an academic integrity violation.

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