Thermodynamics EML 3100 Section 3645

Syllabus

M-W-F Period 4 (10:40 AM – 11:30 AM), WEIL 020270

Catalog Description - Application of the first and second laws of thermodynamics to closed and open systems and to cyclic heat engines. Includes the development of procedures for calculating the properties of multiphase and single phase pure substances. *Prerequisites*: CHM 2045, MAC 2313 and PHY 2048. *Credits*: 3

Instructor: Subrata Roy, Professor, Department of Mechanical and Aerospace Engineering,
Office: NEB 435, *Email*: roy@ufl.edu, *Office Phone*: 352-392-9823

Teaching Assistants: Dominic Meler (dominicmeler@ufl.edu)
Grader: Riddhideep Biswas (rbiswas@ufl.edu)

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Low
3. An ability to communicate effectively with a range of audiences	
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Low
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

Textbook:

"*Thermodynamics: An Engineering Approach*"; Yunus Cengel and Michael Boles; McGraw Hill; Ninth Edition or higher, ISBN: 9781260048360

Office Hours: Prof. Roy: NEB 435 Wednesday 1:55 PM – 2:45 PM (also available over email roy@ufl.edu)

Teaching Assistants (Office hours): TBA

Course Schedule

The following is the course structure we intend to follow.

Weeks	Material	*Homework Schedule (Approximate)*
1	Chapter 1, Chapter 2	Review Class days #1&2
2	Chapter 2, Chapter 3	HW #1
3	Chapter 3	HW #1 due
4	Chapter 3, Chapter 4	HW #2 due
5	Exam review, Chapter 4	HW #3 due
		Exam 1 Class day #11 (Sep 17)
6	Chapter 4, Chapter 5	HW #4 due
7	Chapter 5, Chapter 6	HW #5 due
8	Chapter 6	HW #6 due
9	Exam review, Chapter 8	**Exam 2 Class day #23 (Oct 15)**
10	Chapter 8	HW #7 due
11	Chapter 8, Chapter 9	HW #8 due
12	Chapter 9	
13	Chapter 9, Chapter 10, Exam review	HW #9 due
14	Thanksgiving week	**Exam 3 Class day #35 (Nov 12)**
15	Chapter 10	HW #10 due
16	Exam review	**Class days #40&41**
	Final exam (FLG 280)	**Dec 10, 2025 @ 0300-0500 PM**

Important Dates

September 17, 2025	Exam 1 (WEIL 020270)
October 15, 2025	Exam 2 (WEIL 020270)
November 12, 2025	Exam 3 (WEIL 020270)
December 10, 2025	Final Exam (3:00-5:00 pm, WEIL 020270)

Exams: Three mid-term exams and **one comprehensive final exam** will be given. Each mid-term examination is worth 20% of the course grade, and the final exam is worth 30%. Final Exam will be comprehensive. *Show all work, clearly mark answers, and be neat.* Full credit will be given for answers that are incorrect because of previously incorrect answers (i.e. cascading effects will not be possible). **No examination will be dropped.**

Homework: A series of small homework questions will be provided to complete. Assignments will be posted on Canvas at least one week before their due dates and must be turned in before class on the due date. **A maximum of ten homework assignments total. Only one problem from each homework assignment will be graded.** *Show all work, clearly mark answers, state assumptions, and be neat.* 50% of the grade will be based on the correctness of the work and 50% based on effort. All homework must be turned in on ruled, printer, or engineering paper and stapled, with your name labeled on all pages. *Answers should be clearly indicated*. Paper torn from spiral notebooks or not stapled will not be graded.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (10)	10 each	10%
Midterm Exams (3)	100 each	60%
Final Exam	100	30%
		100%

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

• Your academic advisor or Undergraduate Coordinator
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

Online Course Information: Canvas

Course Objectives: The objective of this course is for students to learn about energy conversion to describe physical systems relevant to today's world. Such systems include but are not limited to, fossil fuel-powered fired power plants, renewable power plants, combustion engines, sterling engines, refrigeration, heat pumps, and chemical reactors. Systems will be described by applying the laws of energy and mass conservation and their application to the Second Law of Thermodynamics. This class will provide a framework to understand the fundamentals of energy conversion from a somewhat broad and macroscopic perspective, going into fine mechanistic details of specific systems only sporadically. With the skillset obtained in this class, students will have the necessary tools to understand and analyze a broad range of energy conversion processes, a necessary prerequisite for the ultimate design and engineering of more cost-effective and efficient systems in the future.

Relevance: All (or almost all) energy ultimately is derived from the sun. The suns photons are converted in nature to heat, wind, biomass and rain, all of which can be further transformed into heat, work or electricity via a number of processes and thermodynamic cycles. As such, energy and energy conversion surround and sustain our daily lives, from the sunlight used to grow food, to its transportation via rail, ship or truck, to its storage in our refrigerators, to electricity provided from fossil or renewable sources. Our metabolic cycles convert the energy stored in our food to do work, analogously to the way a combustion engine converts the energy stored in gasoline to drive a car. Understanding the concept of energy and mass conservation will allow one to approach, analyze and appreciate these systems from a simplified energetic point of view to the more complex underlying mechanisms driving them.