MENG 3401 – Thermodynamics
Course Syllabus

Semester / Year	Fall 2025
Catalog Description	Thermodynamic properties of pure substances. Definitions of work, heat, and energy. First and second laws of thermodynamics and its application to fixed mass systems and control volumes. Analysis of thermodynamic cycles and their components.
Prerequisites	C or better grade in ENGR 2302 Dynamics, PHYS 2325 (Physics I), and PHYS 2125 (Physics I Lab).
Section Number	MENG 3401.001
Instructor Name	Dr. Nelson Fumo
Contact Information	Office: RBN 3009, Email: nfumo@uttyler.edu
Class Type / Instruction Mode / Location	Lecture/Face-to-Face/RBN 3039
Class Time	Mo and We 8:00 AM to 9:50 AM
Office Hours	Tu, We, and Th 11:00 PM to 12:00 PM and by appointment, except on Fridays, which are reserved for the instructor's research.
No. of Credits	4
Required Textbook	Fundamentals of Engineering Thermodynamics, 9th Edition. Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Bailey. Wiley ISBN: 978-1-119-39138-8.
Optional References	(1) Thermodynamics. Luscombe, James, 2018. (Online, free through the library's website) and (2) Schaums Outline of Thermodynamics for Engineers, 3rd Edition (Schaum's Outlines), 2013.
Additional Rules and Requirements	**Grading of Problems in Exams:** • Students are expected to provide complete and correct solutions to all assigned problems. Full credit will only be given for correct final answers that are supported by the proper procedure and reasoning. Partial credit may be awarded when the solution demonstrates a clear understanding of the problem and applies the correct procedure, but contains a small mistake (such as an arithmetic or algebraic slip). Errors due to carelessness, omissions, or major misunderstandings of the concepts will significantly reduce or eliminate partial credit. **Artificial Intelligence:** • AI tools are allowed to support students' learning and productivity, provided that their use aligns with academic integrity standards. When required, students must disclose their use of AI.
Evaluation Method	Exam 1 20% Exam 2 20% Exam 3 20% Quizzes and HW 20% Final exams 20%
Grading Policy / Scale	Letter grades, scale: A: 90 – 100; B: 80 – 89; C: 70 – 79; D: 60 – 69; F: < 60

Important Events / Dates	Census date: September 8 Second drop for non-payment: September 17 Last date to withdraw from one or more 15-week courses: November 3 Academic Calendar 2025 - 2026
Attendance / Makeup policy / other rules	1. **Attendance**: Attendance is not mandatory but is strongly recommended. Questions regarding missed classes will not be answered. There will be no makeups for quizzes; however, the lowest quiz grade will be dropped. 2. **Makeup exam**: An opportunity to make up a missed exam may be offered to students with an excused absence. Excused absences include participation in university-sponsored events and religious observances, in accordance with university policy. Other makeups will be granted only in extreme circumstances and at the discretion of the instructor. Absences due to illness must be supported by documentation of treatment from medical personnel at a recognized medical facility. Makeup exams may be scheduled for the end of the semester. 3. **Grade Appeal**: Grades may be appealed by meeting with the instructor during office hours, but no later than one week after the grade has been posted. 4. **Questions**: Questions will only be addressed if the student can demonstrate that they have made a genuine effort to find the solution or answer independently. 5. **Communication Policy**: Students must contact me directly by email at nfumo@uttyler.edu. Please do not use Canvas messaging, as I do not monitor it for course communication and it does not allow proper threads of replies. 6. **Syllabus Changes**: The instructor reserves the right to make changes to the syllabus. Any changes will take effect one week after they are announced.
Course Learning Objectives / ABET & PEOs Relation	By the end of this course, students will be able to: 1. Determine properties of substances (Applying appropriate physical models of state for a substance). 2. Calculate the work done by and heat taken in by a system undergoing a change of state (reversibly and irreversibly). 3. Perform first and second law analysis of steady-state flow systems (heat exchangers, turbines, pumps, condensers, boilers, and throttle valves). 4. Perform analysis of thermodynamic cycles (e.g. Carnot, Rankine and Brayton cycles).
Tentative Topics / Course Plans	• Systems definition, description, behavior, and its properties. • Computation of mechanical work and relation to pressure/volume space. • Kinetic and potential energy and internal energy as a property of state. • First law and computation of heat transfer and its "equivalent" work. • First law analysis of steady state flow systems. • Irreversibility and definition and quantification of entropy. • Forms of the second law. • Definition of cycle efficiency and comparison with theoretical limit (Carnot). • Second law analysis of steady state flow systems. • Isentropic efficiency of turbines and pumps/compressors. • Efficiency of Rankine and Brayton cycles. • Vapor phase cycle/Refrigeration cycle and Heat Pump Systems.
University Policies	https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information.pdf

Tentative class schedule:

MENG 3401 Thermodynamics

Lec	Day	Date	Topic	Reading	Assessment
1	Mo	25-Aug	Introduction, Systems, Units, Properties	Chapter 1	
2	We	27-Aug	Work, Power, Kinetic and Potential Energy	2.1 & 2.2	
	Mo	1-Sep	Labor Day holiday: all offices closed; no classes held		
3	We	3-Sep	Understanding Energy	2.3 to 2.6	Q(2.1 & 2.2)
4	Mo	8-Sep	Evaluating Properties and use of property tables	3.1 to 3.6	
5	We	10-Sep	Evaluating Properties and use of property tables	3.8 to 3.10	
6	Mo	15-Sep	Review for Exam 1		Q(3.1 to 3.10)
7	We	17-Sep	Exam 1		
8	Mo	22-Sep	Ideal Gas Model	3.11 to 3.13	HW(3.15)
9	We	24-Sep	Conservation of Mass	4.1 to 4.3	
10	Mo	29-Sep	Conservation of Mass	4.1 to 4.3	Q(4.1 to 4.3)
11	We	1-Oct	Conservation of Energy	4.4 to 4.12	
12	Mo	6-Oct	Conservation of Energy	4.4 to 4.12	
13	We	8-Oct	Review for Exam 2		Q(4.4 to 4.12)
14	Mo	13-Oct	Exam 2		
15	We	15-Oct	Second Law of Thermodynamics	5.1 to 5.4	
16	Mo	20-Oct	Second Law of Thermodynamics	5.5 to 5.11	
17	We	22-Oct	Using Entropy	6.1 to 6.7	Q(5.1 to 5.11)
18	Mo	27-Oct	Using Entropy	6.8 to 6.12	
19	We	29-Oct	Ranking Cycle	8.1 & 8.2	
20	Mo	3-Nov	Ranking Cycle	8.3 & 8.4	Q(8.2)
21	We	5-Nov	Gas Power Systems	9.1 to 9.6	HW(9.1 to 9.6)
22	Mo	10-Nov	Vapor Refrigeration Systems	10.1 & 10.2	
23	We	12-Nov	Heat Pumps Systems	10.6	
24	Mo	17-Nov	Review for Exam 3		Q(10.1 & 10.2)
25	We	19-Nov	Exam 3		
	Mo	24-Nov	Thanksgiving - No class		
	We	26-Nov			
26	Mo	1-Dec	Applying Thermodynamics		
27	We	3-Dec	Applying Thermodynamics		
University Calendar			Final Exam - Comprehensive		