

Thermodynamics I (ME 398), Spring 2015

Department of Mechanical Engineering, Wichita State University

Instructor:	Dr. Gisuk Hwang
Office location/hours:	EB 101C, M/W 4:00pm – 5:30pm or by appointment
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Class schedule	Room HH 209, M/W 5:35 – 6:50 pm
Prerequisites:	MATH 243 (Calc II), PHYS 313 (Phys I), or by instructor permission
Grader:	Mr. Tadeh Avanesian (txavanesian@wichita.edu)

Textbook: *Fundamentals of Engineering Thermodynamics*, 7th Ed., Wiley, by Moran, Shapiro, Boettner, and Bailey

References: *Fundamentals of Thermodynamics*, Wiley, 8th Ed., 2012, and *Thermodynamics* 6th Ed., Wark, McGraw-Hill, 2001

Course Description: the laws of thermodynamics including properties of substances and phase equilibrium, the first and second laws of thermodynamics, entropy, power cycles, refrigeration cycles, and chemical and phase equilibrium.

Objectives:

To gain an understanding of heat, work, and the first and second laws of thermodynamics

To apply the above concepts to simple processes, including phase changes, control mass and control volume processes

Grading:

Weekly Quiz	20%
Midterm exam I	25%
Midterm exam II	25%
Final exam	30%

Grading scale:

A: 100-95, A-: 94-90, B+: 89-85, B: 84-80, B-: 79-75, C+: 74-70, C: 69-65, C-: 64-60, D+: 59-55, D: 54-50, D-: 49-45
F: < 45.

Exam format:

Two midterm exams will have three problems for each, and final exam will have four problems. Hardcopy cheating sheets will be given. Calculator is allowed. Use of other electronic devices such as cell phone, laptop, and tablet PCs is strictly prohibited.

Quiz format:

12-13 in-class quizzes will be given at the beginning of the every Wed. classes. 1 or 2 simple problems will be given for 10-15 min from the homework problems.

Reading assignments & homework:

Students are strongly encouraged to go through the reading assignments before the class. Homework problems are assigned in Blackboard. **Homework will not be collected.** Students are strongly encouraged to come to office hours for homework related issues, and to form study groups with your peers.

Extra credit and make-up assignments:

No extra credit work will be assigned/accepted. Make-up exams will be administered only upon the submission of the relevant documents, explaining the reasons for the missing ones.

Cheating/plagiarism policy:

Cheating/plagiarism is considered as a crime in this class, and will be reported to the police. The first time caught will result in the zero point with a verbal warning, and the second time caught will result in “F” grade with a police report.

Exam/Quiz Solution Format:

- a) Simple restatement of problem, noting information given: include sketches
- b) State assumptions and indicate non-obvious logic
- c) Write governing equations when used, note reasons why terms are neglected
- d) Carry units in all calculations (this helps eliminate logic and math errors)
- e) Clearly indicate final answer (box or underline)
- f) Discuss answer (Note any particular behavior or significant points demonstrated by the problem)

Class Schedule

Week	Date	Subject	Reading
1	1/21	Introductions: overview and backgrounds	1.1-1.3
2	1/26	Unit and measuring properties	1.4-1.9
	1/28	Energy and work	2.1-2.3
3	2/2	Energy transfer by heat and first law of thermodynamics	2.4-2.5
	2/4	Energy analysis of cycles and energy storage	2.6-2.7
4	2/9	State properties: pressure, specific volume, and temperature	3.1-3.3
	2/11	Evaluating properties	3.4-3.5
5	2/16	Thermodynamics properties: enthalpy, and internal energy	3.6-3.8
	2/18	Review: 1.1-3.8	1.1-3.8
6	2/23	In-class midterm exam I: Chap 1.1-3.8	1.1-3.8
	2/25	Thermodynamics properties: specific heats	3.9
7	3/2	Liquid and solid, generalized compressibility and ideal gas model	3.10-3.11
	3/4	Ideal gas model and polytropic process relation	3.12-3.15
8	3/9	Conservation of mass for a control volume	4.1
	3/11	Mass rate balance and conservation of energy	4.2-4.5
9	3/16	Spring break (no class)	-
	3/18	Spring break (no class)	-
10	3/23	Nozzles, diffusers, and turbines	4.6-4.7
	3/25	Compressors and pumps and heat exchangers	4.8-4.9
11	3/30	Throttling devices and system integration	4.10-4.11
	4/1	Transient analysis	4.12
12	4/6	Reviews: 3.9-4.12	3.9-4.12
	4/8	In-class midterm exam II: Chap. 3.9-4.12	3.9-4.12
13	4/13	Entropy in Closed Systems	5.1-5.4
	4/15	Applying the second law to thermodynamic cycles	5.5-5.7
14	4/20	Maximum performance measures	5.8-5.9
	4/22	Carnot cycle, Clausius inequality, and Entropy	5.10-6.4
15	4/27	Entropy change of an ideal gas and closed system	6.5-6.8
	4/29	Entropy rate balance for control volume and isentropic process	6.9-6.11
16	5/4	Isentropic efficiencies and heat transfer	6.12-6.13
	5/6	Final review	1.1-6.13
	5/13	Final Exam: Chap 1.1-6.13 (5/13, 5:40 – 7:30 pm)	1.1-6.13