Principles of Thermodynamics I
(ME 2101)
Milwaukee School of Engineering
Spring 2019

Instructor: Dr. Christopher Damm, Professor and ME Program Director
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Office hours: Beginning week 2--Tuesdays 12:30-2:15, Thursdays 11:30-12:30. Also, students can schedule appointments with me as needed for help with the course.
Office location: **S-146 (Northeast Corner of Science Building)**
Required textbook: Thermodynamics: An Engineering Approach, 8th Edition, by Cengel & Boles, McGraw Hill. Text has an online learning center at http://www.mhhe.com/cengel-boles

Prerequisite: MA 231 and a ***sophomore on ME track v11.0 (or instructor permission).*** First year freshman ME students are not allowed to take this course without the consent of the program director (Dr. Damm).

Course Description: The first subject in engineering thermodynamics for the mechanical engineering student uses the classical approach. The subject material serves as a building block for all thermodynamic oriented subjects to follow. Specific topics include definitions, First Law, heat and work transfer, and open- and closed-system energy balances. Water, as both steam and compressed liquid, and ideal gases are the principal substances considered.

Related Program Student Learning Outcomes:

This course addresses student outcomes of the mechanical engineering program by producing graduates who have:

- an ability to apply knowledge of math, engineering, and science.
- an ability to identify, formulate, and solve mechanical engineering problems.
- a broad education necessary to understand the impact of engineering solutions in a global and societal context.
- knowledge of contemporary issues.
- the ability to work professionally in both thermal and mechanical systems areas.

Course Outcomes:
Use thermodynamic tables to find properties
Apply the ideal gas, incompressible liquid and pure substance models to thermodynamic problems.
Write an energy balance for a closed system
Use the closed system energy balance to evaluate processes, including determining work and heat transfer.
Write an energy balance for a steady flow open system
Use the open system energy balance to evaluate processes, including determining work and heat transfer.
Use the open system energy balance to evaluate transient processes
Appreciate the link between energy use and the environment

Course Topics:
Systems and control volumes
Properties of a system
State and equilibrium
Processes and cycles
Temperature and the zeroeth law of thermodynamics
Standard thermal science problem solving methodology
Forms of energy
Mechanisms of heat transfer
Mechanisms of work transfer
First law of thermodynamics
Energy conversion efficiencies
Energy and the environment
Phases of a pure substance
Phase-change processes
Property diagrams
Property tables
Ideas gas law
Closed system energy balances
Boundary work
Specific heats
Internal energy, enthalpy, and specific heats of ideal gases
Internal energy, enthalpy, and specific heats of liquids and solids
Conservation of mass
Energy of a flowing fluid
Open system energy balances
Steady flow engineering devices
Unsteady flow processes

Methods of Assessing Student Learning Outcomes: homework assignments, in-class exams (3), and a final exam

Letter Grades (This is a rough guideline. Grade determination will be discussed further in class.)

Letter Grade	% Equivalent
A	93-100
AB	87-93
B	80-87
BC	75-80
C	70-75
CD	65-70
D	60-65
F	0-60

Grade Calculation	
Exams (3) and assignments	65 %
Final exam	35 %

Homework:
Homework will be collected on occasion. I will often give a set of suggested problems that the exams will be based on.

In-Class Exams:
Exams will be closed book/closed notes/closed laptop. You will be allowed one side of an 8.5”x11” sheet of paper for formulas and notes. Calculators are allowed.

A Note Regarding Exam and Quiz Problems:
ALWAYS circle your answers and ALWAYS express them in the appropriate units! In general, be careful about units and always include them in the answer. ***I will deduct points on correct numerical answers if units are not handled appropriately (they should be shown on every number that has units in a calculation!).***

Final Exam:
The final exam will be comprehensive. You will be allowed 2 sides of an 8.5”x11” sheet of paper for formulas and notes.

Attendance, Participation and Class Decorum:
Students are expected to attend lectures regularly and to participate fully in class discussions. Attendance in class is to your advantage. I will not take attendance & you will not be penalized for missing class, but certain important material and examples given here will **not** be in the textbook. Your level of effort will be used to determine borderline grades. Attendance is a factor in gauging your level of effort. **I will not drop students from the class for not attending.** If you desire to drop the course, you must do so with the university registrar.

Regarding Collaboration and Academic Honesty:
You may discuss assignments with the professor and with other students in the class, but you **must** do and submit your own work. You **must** write up your homework **independently,** unless you are specifically directed to do an assignment in a group. You may not examine the finished written work of other students, including those of a previous class. You are expected to conform to the MSOE code for academic honesty. Violation of this policy will result in ***grades of zero*** on the corresponding exam and/or assignment. Thus, the result may be an ***F for the course***. Per MSOE policy, you cannot drop the course to avoid the grade penalty for cheating. Further, cheating students will be reported to the Department Head and the VP of Academics. If you cheat you risk ***expulsion*** from MSOE.

Examples of cheating:

-copying lab reports or assignments from another student
-copying lab solutions or assignments from a website
-copying from another student on an exam
-permitting another student to copy from you on an exam, homework assignment, or lab report
-copying lab reports or assignments from previous terms
-copying lab solutions or assignments from a solutions manual or from previously distributed solutions
-copying a lab solutions or assignments from a student who is solving the problem for others in a group setting

Bottom line--Any time you represent the work of others as your own you are cheating.

Missed Exams:
A student will receive a zero on exams and quizzes that are missed without a legitimate excuse (e.g. documented illness, family tragedy, etc.).

Tentative Schedule

Week 1	Course Overview, Ch. 1: Basic Concepts,	
Week 2	Chapter 1 and Chapter 2: Energy, etc.	
Week 3	Chapter 2: Energy, etc.	Exam 1
Week 4	Chapter 2: Energy, etc. with elements of Ch. 4	
Week 5	Chapter 3: Properties of Pure Substances	
Week 6	Chapter 4: Energy Analysis (Closed Systems)	Exam 2
Week 7	Chapter 4: Energy Analysis (Closed Systems)	
Week 8	Chapter 5: Energy Analysis (Open Systems)	
Week 9	Ch. 5 (Open Systems), Review/Discussion	Exam 3
Week 10	Chapter 5, including transient systems	
	Review(Q&A) Session, Time and place TBA	
Final Exam Date and Time to be determined		

- I will post a comment/suggestion envelope outside my office. Please let me know what you think about the course. I would particularly like to know how you feel about the pace of the course (too fast, too slow, or about right).

Student Accessibility Services (SAS)

- For students with documented disabilities, chronic medication conditions and mental health concerns; MSOE provides services to make reasonable accommodations available. If you are a student who requires or anticipates the need for accommodations, please contact Student Accessibility Services Office at 414-277-7281, by email at moureau@msoe.edu, or in person at K250 to discuss appropriate accommodations and eligibility requirements.