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ME 40: Thermodynamics
Fall 2025
Format: In person
3 Units

Course Description: This course introduces the scientific principles that deal with energy conversion among different forms, such as heat, work, internal, electrical, and chemical energy. The physical science of heat and temperature, and their relations to energy and work, are analyzed on the basis of the fundamental thermodynamic laws. These principles are applied to various practical systems, including heat engines, refrigeration cycles, and air conditioning systems.

Objectives:

I. *Knowledge:* Write the first and second laws of thermodynamics.
II. *Comprehension*: Describe the first and second laws in the student's own language.
III. *Application*: Solve simple single-answer problems using the first law.
IV. *Analysis*: Solve problems requiring both the first and second laws.
V. *Synthesis*: Develop schemes to improve the efficiency or performance of thermodynamic systems, e.g., compressors, turbines, heat pumps, power cycles, etc.
VI. *Evaluation*: Determine and describe second law fallacies in proposed power cycles.
VII. *Evaluation*: Judge when classical thermodynamics is not the appropriate analysis tool.
VIII. *Evaluation*: Find and correct errors in the student's own solutions and in those of others.
IX. *Analysis and Evaluation*: Search appropriate databases and the literature to find required thermodynamic data, and if the data are not available the student can select appropriate procedures and predict the values of the data.
X. *Knowledge*: Briefly outline the history of the field of thermodynamics.

Instructor: Prof. Thomas Schutzius; email: tschutzius@berkeley.edu
Office Hours and Location: Tuesday 12:00-1:00 pm, 6153 Etcheverry Hall (Vogt Room).
If there is demand additional office hours will be added. Please contact the instructor.

Teaching Support Staff

Head GSI
Cassidy McCormick;
cjmccormick@berkeley.edu

GSI
Jessica Wu; email:

Office Hours: Tuesdays, 2:30pm–3:30pm, Hesse Hall, "fishbowl".

Office Hours: …

Reader
Dheer Baldua, dheerb@berkeley.edu

Emails to course staff: Begin subject line with "[ME40]: …"
Messages on Canvas are not regularly monitored. Email is best for communication.

Required Text: Çengel and Boles, *Thermodynamics: An Engineering Approach*, **10th Edition**
Other recent editions may be acceptable (e.g., 7th, 8th, or 9th), but it is your responsibility to determine the correct homework problems and readings if they do not match up.

Each week you are expected to read a book chapter. The course will operate best if you do the assigned readings before the lecture is given. For example, on 9/3 and 9/5 I will be lecturing on *Energy, Energy Transfer, and General Energy Analysis*. Therefore, please read "Chapter 2: Energy Transfer, General Energy Analysis from *Thermodynamics: An Engineering Approach* by *Cengel* and *Boles*" before 9/3.

Lecture: Monday, Wednesday, Friday at 2:00 pm-3:00 pm in Hearst Mining 390
There may also be a video playlist for each lecture. Please watch the video playlist before attending live lecture or section. Recordings from previous years are also sometimes provided. I will be traveling during the week of November 17th. Alternative arrangements will be made for lecture.

Discussions: 101: Tuesday, 11:00 am – 12:00 pm in TBD
102: Thursday 1:00 pm – 2:00 pm in Etcheverry 1165
103: Friday 12:00 pm – 1:00 pm in Etcheverry 1165

Website: All teaching material is available for download from this link:
https://bcourses.berkeley.edu/courses/1544920

Grading:

Quizzes	Worth 80 points total (3 quizzes, each worth 40 pts; drop your lowest score)
Final Exam	Worth 75 points
One Project	Worth 20 points
Homework	Worth 20 points (there are 15 homework assignments)
Course Evaluation	Worth 5 points (need to submit a screenshot showing completion, submit here)

Total of 200 points.

Attendance — Attendance at lectures and discussions is expected not required.

Homework: — We usually will use PrairieLearn for homework submission and grading, and for these homework, retakes are allowed with no penalty for number of attempts. Must submit a document that shows your work for full credit. Depending on the content, we may ask for handwritten homework to be submitted, and in this case, we will only grade a subset of the problems and retakes are not allowed.

Quizzes: — 1 hour. Closed book and notes. We will use the Computer-based Testing Facility (CBTF) to do this assessment. Please read their rules here.

See 2025_Fall_ME40_Schedule.pdf for the dates.

You may be required to take the Computer-based Testing Facility (CBTF) Orientation Quiz before the exam. We give variants for each problem type, which can sometimes have differences in problem difficulty, resulting in lower or higher scores. In such cases we adjust the raw scores to account for this.

Final: — 3 hours. Closed book and notes. Programmable calculator (non-transmittable) and 3 letter-sized sheets summary (8.5" x 11", double-sided) for this exam is permitted.

You will be given 6 problems. Select five of them and solve. If you received a 90% score or better on the quiz for these specific problems (e.g., Problems B and C) then you will receive full marks for the corresponding final exam problem.

Note: We may opt to conduct part of the Final exam through PrairieLearn and details on the time allowed and learning materials would be communicated well in advance of the assessment. You may be required to take the CBTF Orientation Quiz before the exam.

Project: — The project is a larger assignment intended to combine ideas from the course in interesting ways. You are expected to work alone. Projects are graded on correctness. Creativity is encouraged. See 2025_Fall_ME40_Schedule.pdf for the dates.

Regrades: — Any serious concerns about grading should be addressed to the Instructor, not the GSIs or Reader, within seven days of receiving the graded homework, quiz, or exam. Please include a brief written explanation of your concern. Re-graded scores may

	increase, decrease, or remain the same. The instructor reserves the right to regrade the other problems on the homework, quiz, or exam too.
Absences, Late Work, and Make-ups:	Lectures: Ask a classmate for the notes. Homework: Homework may be turned in one week late for half credit. Exams: Missing a quiz or exam will result in a zero grade for that assessment unless alternative arrangements are made with the instructor prior to the exam. (Exceptions may be made for severe medical or family emergencies.) When granted, makeup exams may be oral or written.
Other Expectations:	Questions are encouraged. Silence your cellphones. Treat your colleagues, Reader, GSIs, and Instructor with respect. No food or drinks, except for water.
Cheating:	Please review the Berkeley Campus Code of Student Conduct.
Student with Disabilities	If you require course accommodations due to a physical, emotional, or learning disability, contact UC Berkeley's Disabled Students' Program (DSP). Notify the instructor and GSI through course email of the accommodations you would like to use. You must have a Letter of Accommodation on file with UC Berkeley to have accommodations made in the course. DSP accommodations for exams: If more than "Reduced Distraction" and "Extra time" are required, please apply with the DSP Proctoring Office to take the exam at their facility. Do this as early as possible. We have an Alternative Testing Agreement in place. DSP accommodations for homework: If "Extensions to Assignment Deadlines" is required, please email the instructor to inquire about the assignment deadline.
Other	Due to travel, several lectures may be pre-recorded and uploaded or someone else may deliver the lecture. You will be notified well in advance of those dates.