

## ME 40 - Thermodynamics

Fall 2020

**Lecture Meeting Time:** MWF 9-10 AM online (lectures and discussions will be recorded and posted)

**Instructor: Prof. Van P. Carey**  
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email: vpcarey@berkeley.edu  
Office hours: M, Th 9:30-10:30 AM (by appointment)

**GSI's: Emma McClure** <emma\_mcclure@berkeley.edu>  
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**Text:** *Thermodynamics, An Engineering Approach*, Y.A. Cengel and M.A. Boles, McGraw-Hill, 9th Edition, 2018.

**Web Site:** ME 40 bcourses site

### Course Outline:

<u>Week</u>	<u>Subjects</u>	<u>Text Chapters</u>
1	Introduction; conservation of energy; definitions of heat and work; system states; properties; phase equilibrium; First Law analysis for closed systems; internal energy	1-4
2	First Law for open systems, the Second Law	5,6
3	Analysis of heat engines and the Carnot cycle; entropy; entropy change and Second Law analysis	6,7
4	Combined First and Second Law analysis for closed and open systems; engineering applications	7
5	Alternate statements of the second law; exergy analysis	8
6	gas power cycles; <b>Midterm I: Friday, October 2</b>	9
7	Internal combustion engines, Brayton cycle analysis for gas turbines	9
8	The Rankine power cycle	10
9	Refrigeration cycles	11
10	Thermodynamic property relations; gas mixtures	12
11	air and water vapor mixtures; <b>Midterm II: Friday, November 13</b>	14
12	Psychrometrics; human comfort; building HVAC processes	14
13	Thermodynamics of combustion	15
14	reacting systems applications; special topics; review	15

**Course Grade:** 30% Final Exam;  
20% for each of 2 Midterms: 10/2, 11/13;  
20% Quizzes: 9/4, 9/18, 10/9, 10/23, 11/6, 11/20, Mon. 11/23 (top 5 scores count); 10% Homework Problem Sets (solutions will be posted).

## **Piazza blurb:**

This term we will be using Piazza for class discussion and to aid in online teaching. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. This will help organize questions you may all have in one place. We will not be available to answer questions at all times. We will take time to answer questions before 6pm on weekdays and replies may take 24-48 hours. If we have additional time we will answer questions outside these times at our own discretion. Don't wait till the last minute to ask your questions!

To enroll in the class:

- 1. Use link to find the ME40 class page [piazza.com/berkeley/fall2020/me40](https://piazza.com/berkeley/fall2020/me40)
- 2. Register as a student and press "Join Class"
- 3. Enter and confirm your berkeley email address

## **Course Policies**

**Inclusion:** We are committed to creating a learning environment welcoming of all students that supports a diversity of thoughts, perspectives and experiences, and respects your identities and backgrounds (including race/ethnicity, nationality, gender identity, socioeconomic class, sexual orientation, language, religion, ability, etc.) To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official records, please let us know.
- If you feel like your performance in the class is being impacted by your experiences outside of class (e.g., family matters, current events), please don't hesitate to come and talk with us. We want to be resources for you.
- We (like many people) are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to us about it. You may also contact the ME department's Vice Chair for Equity & Inclusion, Professor Grace O'Connell ([g.oconnell@berkeley.edu](mailto:g.oconnell@berkeley.edu)) or Staff Student Services for Equity and Inclusion, Ricky Vides ([rickyv72@berkeley.edu](mailto:rickyv72@berkeley.edu)). For ME specific resources for Equity & Inclusion please visit our website: <https://me.berkeley.edu/about/equity-and-inclusion/>
- As a participant in this class, recognize that you can be proactive about making other students feel included and respected.

**Berkeley honor code:** Everyone in this class is expected to adhere to this code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others."

**Academic honesty:** You are encouraged to form study groups and work together to understand course material, but all written work as well as responses to in-class questions should be your own. You may not copy other students' work. Academic integrity and ethical conduct are of utmost importance in the College of Engineering and at U.C. Berkeley.

**Accommodation policy:** We honor and respect the different learning needs of our students, and are committed to ensuring you have the resources you need to succeed in our class. If you need religious or disability-related accommodations, if you have emergency medical information you wish to share with us, or if you need special arrangements in case the building must be evacuated, please share this information with us as soon as possible. You may speak with either instructor privately after class or during office hours. Also see DSP under "Resources".

## **Resources**

### **Center for Access to Engineering Excellence (CAEE)**

The Center for Access to Engineering Excellence (227 Bechtel Engineering Center; <https://engineering.berkeley.edu/student-services/academic-support>) is an inclusive center that offers study spaces, nutritious snacks, and tutoring in >50 courses for Berkeley engineers and other majors across campus. The Center also offers a wide range of professional development, leadership, and wellness programs, and loans iclickers, laptops, and professional attire for interviews.

### **Disabled Students' Program (DSP)**

The Disabled Student's Program (260 César Chávez Student Center #4250; 510-642-0518; <http://dsp.berkeley.edu>) serves students with disabilities of all kinds. Services are individually designed and based on the specific needs of each student as identified by DSP's Specialists.

### **Counseling and Psychological Services**

The main University Health Services Counseling and Psychological Services staff is located at the Tang Center (<http://uhs.berkeley.edu>; 2222 Bancroft Way; 642-9494) and provides confidential assistance to students managing problems that can emerge from illness such as financial, academic, legal, family concerns, and more.

To improve access for engineering students, a licensed psychologist from the Tang Center also holds walk-in appointments for confidential counseling in 241 Bechtel Engineering Center (check here for schedule: <https://engineering.berkeley.edu/student-services/advising-counseling>).

### **The Care Line (PATH to Care Center)**

The Care Line (510-643-2005; <https://care.berkeley.edu/care-line/>) is a 24/7, confidential, free, campus-based resource for urgent support around sexual assault, sexual harassment, interpersonal violence, stalking, and invasion of sexual privacy. The Care Line will connect you with a confidential advocate for trauma-informed crisis support including time-sensitive information, securing urgent safety resources, and accompaniment to medical care or reporting.

### **Ombudsperson for Students**

The Ombudsperson for Students (102 Sproul Hall; 642-5754; <http://students.berkeley.edu/Ombuds>) provides a confidential service for students involved in a University-related problem (academic or administrative), acting as a neutral complaint resolver and not as an advocate for any of the parties involved in a dispute. The Ombudsman can provide information on policies and procedures affecting students, facilitate students' contact with services able to assist in resolving the problem, and assist students in complaints concerning improper application of University policies or procedures. All matters referred to this office are held in strict confidence. The only exceptions, at the sole discretion of the Ombudsman, are cases where there appears to be imminent threat of serious harm.

### **UC Berkeley Food Pantry**

The UC Berkeley Food Pantry (#68 Martin Luther King Student Union; <https://pantry.berkeley.edu>) aims to reduce food insecurity among students and staff at UC Berkeley, especially the lack of nutritious food. Students and staff can visit the pantry as many times as they need and take as much as they need while being mindful that it is a shared resource. The pantry operates on a self-assessed need basis; there are no eligibility requirements. The pantry is not for students and staff who need supplemental snacking food, but rather, core food support.