

## ENGR 130 – THERMODYNAMICS (ONLINE)

### FACULTY INFORMATION:

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### TEACHING ASSISTANT INFORMATION:

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Office Hours: Thursday/Friday 10:00 – 11:30 am (Zoom and AOA 142)

### COURSE INFORMATION:

Term: Spring 2017  
Designation : ENGR 130  
Course Title: Thermodynamics (Taught 100% Online)  
Credits: 3 Credit Hours  
Prerequisite(s): CHEM 002, MATH 023, MATH 024 and (PHYS 009 or PHYS 019)  
Textbook: Online Connect License (Available at the bookstore or online)  
Thermodynamics: An Engineering Approach, 8th edition  
by Yunus A. Çengel and Michael A. Boles, McGraw Hill, 2015

Midterm exam#1: 2/24/2017 (Friday) 2:00 – 3:15 pm  
For UCM Students: @ SSB170 (UC Merced)  
For non-UCM Students: Location and time to be arranged w/off-campus test center or online proctoring service. See course site in Canvas for more information.

Midterm exam#2: 4/7/2017 (Friday) 2:00 – 3:15 pm  
For UCM Students: @ SSB170 (UC Merced)  
For non-UCM Students: Location and time to be arranged w/off-campus test center or online proctoring service. See course site in Canvas for more information.

Final exam: 5/6/2015 (Saturday) 11:30 am – 2:30 pm  
For UCM Students: @ SSB170 (UC Merced)  
For non-UCM Students: Location and time to be arranged w/off-campus test center or online proctoring service. See course site in Canvas for more information.

### COURSE LEARNING OUTCOMES:

This course will focus on the basic principles of Thermodynamics. Upon completion, students should be able to:

1. Explain the basic concepts of thermodynamics such as system, state, state postulate, equilibrium, process, and cycle.
2. Define the concept of heat, work, first and second law of thermodynamics, energy conversion efficiencies, and compressibility.
3. Illustrate the P-v, T-v, P-T property diagrams and P-v-T surfaces of pure substances.
4. Apply the ideal-gas equation of state in the solution of typical problems.
5. Develop the general energy balance applied to both close and open systems.
6. Analyze processes involving ideal gases and real substances as working fluids in both closed

systems and open systems or control volumes to determine process diagrams, apply the first law of thermodynamics to perform energy balances, and determine heat and work transfers.

7. Analyze systems and control volumes through the application of the second law and concepts of energy and exergy.

### **PROGRAM LEARNING OUTCOMES:**

The course relates to these following mechanical engineering program learning outcomes:

1. Apply knowledge of mathematics, science, and engineering to solve thermodynamics problems. (a)
2. Identify, formulate, and solve engineering problems related to thermodynamics. (e)
3. Develop a knowledge of contemporary issues. (j)

### **GRADING POLICY & DISTRIBUTION:**

90 – 100	A-/A	12 Weekly pre-reading and check understanding	6 %
80 – 89.9	B-/B/B+	12 Weeks of in-video quiz	6 %
70 – 79.9	C-/C/C+	3 Online quiz (2 for each)	6 %
60 – 69.9	D	12 Weekly homework assignment	12 %
0 – 59.9	F	Midterm exams (20 for each)	40 %
		Final exam	30 %
		Participation, Survey, Evaluation, etc.	Bonus
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TOTAL			100 %

### **LEARNING ACTIVITIES:**

This course uses a learning management system called Canvas to organize content and act as a portal to McGraw Hill Connect platform, which has an interactive e-textbook, pre-reading assignment, weekly homework. There are twelve weekly modules in the course. To be successful in this course, students must actively engage in all four activities:

1. Reading the textbook
2. Watch the video lectures
3. Do all online assignments and submit them on time
4. Interactive with others
5. Prepare for exams

#### **1. Readings (Reading and check understanding): (Monday)**

Each week indicates the required reading and links to interactive e-textbook based on our textbook. There will be weekly assignment for checking your understanding, which allows unlimited attempts. This activity is suggested to be completed every Monday and has a submission deadline on every Monday at 8 pm. This activity consists of 6% of the semester grade.

#### **2. Recorded video lecture with in-lecture quiz: (Tuesday/Wednesday)**

Each week also links to short video lectures that explain the course concepts in detail. There are quizzes built-in during each lectures. In addition, there are weekly problem solving demonstration videos, which aim to directly help students with homework assignments. This activity is suggested to be completed every Wednesday. The assignments consist of 6% of the semester grade and has a submission deadline every Wednesday at 8 pm.

#### **3. Homework: (Thursday/Friday)**

Each week indicates the required homework assignment either on McGraw Hill Connect platform or on Canvas. This system provides hint and immediate feedback on answers submitted and allows for

unlimited attempts. This activity is suggested to be completed every Friday. The assignments consist of 12% of the semester grade and has a submission deadline every Friday at 8 pm.

#### **4. Interaction:**

At the beginning of the course, instructor will arrange a 10-15 minutes mandatory small group in-person or online meeting to discuss expectations and answer questions. The course includes an on-line discussion forum centered on questions relating to the video lectures, homework, reading, and course logistics. In addition, the instructor and TA hold regular on-line and in-person office hours. Finally, the course includes student-run, location-based study groups with corresponding online group interaction spaces in the LMS. Details on how to participate are outlined on the lesson pages and other dedicated pages in the LMS.

Please note that no late submission. Practice and homework assignments will be submitted automatically on the due date.

#### **5. Exams:**

For UC Merced Students: All UC Merced students will take the exam on campus in the specified room at the specified time. The date and time of the midterm and final exams are posted in course information above.

For Cross-campus and non-matriculated students: You must arrange for a proctored exam session for both the midterm and the final, at an approved testing center. You will be contacted by UC Online with instructions for how to arrange for your exams. If you do not receive communication from UC Online in the first 2 weeks of the course, it is your responsibility to contact them at [crossenroll@universityofcalifornia.edu](mailto:crossenroll@universityofcalifornia.edu). More detailed information is available on the "Exam Information" page in the "Course Essentials" module in Canvas.

#### **Time Commitment:**

Consistent with UC's credit hour policy, students should expect to work an average of 9 hours per week to achieve the learning outcomes and earn a passing grade in this course. For an average week, students will spend 1.5 hours for pre-reading and recorded video lectures; 1 hour in weekly announcement and problem demonstration; and 6.5 hours for practice, homework assignment, office hour, discussion board, and exam preparation.

#### **Grade Disputes:**

If a student feels that an exam or homework set was graded unfairly, or if there is an error in the grading, it should be brought to instructor's attention within one week after the grade is announced. Scores will not be reconsidered beyond one week after they are announced.

### **COURSE WEEKLY MODULES:**

#### Get Started:

- **Prepare for Online Learning** (Essential course information on getting connected to course tools and getting help with logistical, content and technical issues)
- **Syllabus** (Detail description of course components, grading, and policies)
- **Canvas LMS tool** (General structure, layout, quiz, and assignment pages)
- **Online McGraw Hill Connect** (e-textbook, reading assignment, and online homeworks)
- **Office Hours** (Schedule and information on participating in online and in-person office hours)

- **Mandatory first small group meeting** (During the first two weeks, instructor will arrange for 10-15 mandatory small group in-person or online meeting to discuss expectations and answer questions)

To access the course materials, students must complete the course contract by Wednesday of the first week.

#### Weekly structure and module:

- **Monday:** MH Connect Reading Assignment due before 8 pm.
- **Wednesday:** Video Lecture Quiz due before 8 pm.
- **Friday:** Homework assignment due before 8 pm.

Week	Module	Dates	Topics to be Covered	HW	Content
1	1	1/17-1/22	Overall course Introduction Small group meeting Chap. 1.1 – Chap. 1.3	HW1	
2	2	1/23-1/29	Chap.1.4 – Chap.1.11	HW2	
3	3	1/30-2/5	Chap.2.1 – Chap. 2.6	HW3	
4	4	2/6-2/12	Chap.2.7 – Chap. 3.3	HW4	
5	5	2/13-2/19	Chap.3.4 – Chap. 3.8	HW5	
6		2/20-2/26 2/24/2017	Midterm#1 review <b>Midterm Exam#1 (2:00-3:15 pm, Friday)</b>		Chap. 1-3
7	6	2/27-3/5	Chap.4.1 – Chap. 4.5	HW6	
8	7	3/6-3/12	Chap.5.1 – Chap. 5.5	HW7	
9	8	3/13-3/19	Chap.6.1 – Chap. 6.5	HW8	
10	9	3/20-3/26	Chap.6.6 – Chap. 6.11	HW9	
11		3/27-4/2	<b>Spring Break</b>		
12		4/3-4/9 4/7/2017	Midterm#2 review <b>Midterm Exam#2 (2:00-3:15 pm, Friday)</b>		Chap. 4-6
13	10	4/10-4/16	Chap.7.1 – Chap. 7.7	HW10	
14	11	4/17-4/23	Chap.7.8 – Chap. 7.13	HW11	
15	12	4/24-4/30	Chap.8.1 – Chap. 8.7	HW12	
16		5/1-5/6 5/6/2017	Course review for Final Exam <b>FINAL Exam (11:30 – 2:30, Saturday)</b>		Chap. 5-8

#### ONLINE COURSE MOTIVATION:

This online Thermodynamic course is an introduction to the concept of energy. It provides the basic tools necessary for the analysis of any engineering system in which energy transfer or energy transformations occur; thus, thermodynamics is an important part of the training of almost all engineering disciplines. The online option allows student to learn all fundamental contents anywhere at any time. Further, the course adapts smart textbook for effective online learning. Students will learn the fundamental content more effectively and efficiently without the physical boundary of the classroom.

#### COURSE ASSESSMENT AND EVALUATION:

During the course of the semester, you will be provided many opportunities to evaluate the course content, instructional tools, and the effective of your instructor. Your participation in the evaluation is an integral part of the development of the course. Your feedback is vital to improving education at UC Merced. Therefore, those who successfully completed the course evaluation will be given **2%** bonus points.

#### ACADEMIC DISHONESTY STATEMENT:

- a. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work.
- b. You are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an e mail, an e mail attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.
- c. During examinations, you must do your own work. Talking or discussion is not permitted during the examinations, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the examinations will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

### **ATTENDANCE POLICY:**

Attendance is essential to keep up-to-date with coursework. Be familiar with University Regulations, part 2, Section VI, regarding class participation. Please read this important document. Major medical incidences and emergencies that affect any student's participation in the course need to be reported to the instructor as soon as possible. Extended medical absences will require documentation. If you have to miss a live online lecture, please arrange to get class notes from a classmate.

### **DISABILITY STATEMENT:**

Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

### **CATALOG DESCRIPTION:**

Fundamentals of equilibrium, temperature, energy, and entropy. Equations of state and thermodynamic properties, with engineering applications.

### **DISCLAIMER:**

In the event of a major campus emergency, the above requirements, deadlines and grading policies are subject to changes that may be required by a revised semester calendar. Any such changes in this course will be posted once the course resumes on CANVAS or can be obtained by contacting the professor via email or phone.