



## Syllabus for ENGR130-01: Thermodynamics

Spring 2018

Instructor: James Palko

<b>Designation:</b>	ENGR130
<b>Catalog Description:</b>	Fundamentals of equilibrium, temperature, energy, and entropy. Equations of state and thermodynamic properties, with engineering applications.
<b>Text Books and Other Required Materials:</b>	Thermodynamics: An Engineering Approach, 8th Edition Yunus Cengel and Michael Boles
<b>Course Objectives/ Student Learning Outcomes:</b>	<p>This course will explore the basic principles of thermodynamics and their application.</p> <p>Upon successful completion, students will be able to:</p> <ul style="list-style-type: none"><li>- Explain basic concepts of thermodynamics such as temperature, pressure, system, state, equilibrium, process, and cycle.</li><li>- Define concepts of energy, heat, work, energy conversion efficiency, and internal energy</li><li>- Describe the properties of pure substances using equations of state and property diagrams</li><li>- Explain and apply conservation of mass and the first and second laws of thermodynamics to common systems and cycles</li><li>- Understand implications of the second law of thermodynamics for the ability to extract work from a system</li><li>- Explain the operation and analyze the performance of power, refrigeration, and heat pump cycles in terms of key thermodynamic principles</li></ul>
<b>Program Learning Outcomes:</b>	
<b>Prerequisites by Topic:</b>	CHEM 002 (or CHEM 002H), MATH 023 (or MATH 023H), MATH 024, and PHYS 009 (or PHYS 009H)
<b>Course Policies:</b>	<p>1. In general, please try to maximize the opportunity to learn in lecture for yourself and your fellow students. Please avoid activities that may distract those around you. 2. Please silence all electronic devices and refrain from using them for anything except lecture related activities during class. 3. Only calculators may be used on exams. No cell phones, laptops, or other electronic devices may be used during exams. 4. Homework assignments will be due at the beginning of class on the due date. No late work will be accepted. 5. There will be no make-ups for missed exams or quizzes. No points will be awarded for any missed midterm exam or quiz, except in case of properly documented (e.g. doctor's note) medical or family emergency or other University approved absence. In cases of documented and approved absences, the student's grade will be determined based on the remainder of the work for the course. The final exam is required. No absences from the final will be excused, and no more than one midterm exam can be excused. 6. Students arriving late to a quiz or exam will not be allowed to take it.</p>
<b>Academic Dishonesty</b>	a. Each student in this course is expected to abide by the University of California,

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<b>Statement:</b>	<p>Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work.</p> <p>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.</p> <p>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.</p>
<b>Disability Statement:</b>	<p>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.</p>
<b>Topics:</b>	<p>Some of the key topics covered in the course will include:</p> <ul style="list-style-type: none"> <li>- Basic concepts of systems, equilibrium, processes, cycles, and the 0th law of thermodynamics</li> <li>- Energy</li> <li>- Properties of pure substances</li> <li>- 1st law of thermodynamics</li> <li>- Energy analysis of closed systems</li> <li>- Control volume analysis</li> <li>- 2nd law of thermodynamics</li> <li>- Entropy</li> <li>- Exergy</li> <li>- Gas power cycles</li> <li>- Vapor power cycles</li> <li>- Refrigeration cycles</li> </ul>
<b>Class/laboratory Schedule:</b>	2.5 hours of lecture per week; Tue. and Thu. 3:00-4:15pm COB2 130
<b>Midterm/Final Exam Schedule:</b>	Final exam: Mon. May 7th 6:30-9:30pm COB2 130
<b>Course Calendar:</b>	LECT TR 3:00-4:15pm COB2 130

Lect # Date Ch Topic

- 1 Tue 01/16/18 1 Course organization, LearnSmart tutorial, Basic concepts
- 2 Thu 01/18/18 1 Basic concepts
- 3 Tue 01/23/18 2 Energy

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4 Thu 01/25/18 2 Energy  
5 Tue 01/30/18 3 Properties of pure substances  
6 Thu 02/01/18 3 Properties of pure substances  
7 Tue 02/06/18 4 Energy analysis of closed systems  
8 Thu 02/08/18 4 Energy analysis of closed systems  
9 Tue 02/13/18 4 Energy analysis of closed systems, Review  
10 Thu 02/15/18 MIDTERM EXAM 1  
11 Tue 02/20/18 5 Control volume analysis  
12 Thu 02/22/18 5 Control volume analysis  
13 Tue 02/27/18 5 Control volume analysis  
14 Thu 03/01/18 6 2nd law of thermodynamics  
15 Tue 03/06/18 6 2nd law of thermodynamics  
16 Thu 03/08/18 6 2nd law of thermodynamics  
17 Tue 03/13/18 7 Entropy  
18 Thu 03/15/18 7 Entropy  
19 Tue 03/20/18 7 Entropy, Review  
20 Thu 03/22/18 MIDTERM EXAM 2  
Tue 03/27/18 Spring Break  
Thu 03/29/18 Spring Break  
21 Tue 04/03/18 8 Exergy  
22 Thu 04/05/18 8 Exergy  
23 Tue 04/10/18 8 Exergy  
24 Thu 04/12/18 9 Gas power cycles  
25 Tue 04/17/18 9 Gas power cycles  
26 Thu 04/19/18 10 Vapor power cycles  
27 Tue 04/24/18 10 Vapor power cycles  
28 Thu 04/26/18 11 Refrigeration cycles  
29 Tue 05/01/18 11 Refrigeration cycles  
30 Thu 05/03/18 Review  
Mon 05/07/18 FINAL EXAM

**Professional  
Component:**

Thermodynamics is key to engineering practice directly and is foundational to all areas related to the thermofluid sciences.

**Assessment/Grading  
Policy:**

Evaluated components of the course will be weighted as follows:

Learn Smart study assignments: 10%  
Homework: 10%  
Quizzes: 10%  
Midterm Exam 1 20%  
Midterm Exam 2 20%  
Final Exam 30%

Grades will be assigned based on the following approximate ranges:

A: 90 - 100%  
B: 80 - 90%  
C: 70 - 80%  
D: 60 - 70%  
F: 0 - 60%

+/- may be added when final grades are assigned. The cutoffs above will guarantee at least the grade shown. e.g. 80% will be at least a B.

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**Coordinator:** James Palko

**Contact Information:** Professor:  
James Palko  
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**Office Hours:** Palko: SE2 281 Tu 4:30-5:30p; Thu. 10-11a;  
Office hours with Dr. Palko can also be arranged by appointment. Try to arrange appointments well in advance, as it may be difficult to accommodate them on short notice.

Gomez: AOA 142 M 4:30-6:30p