San José State University Mechanical Engineering Department
ME 113: Thermodynamics – Section 2, Fall 2018

Course and Contact Information

Instructor:	Prof. Abdie Tabrizi
Office Location:	ENG 348
Telephone:	408-924-3854 (please use email given below)
Email:	Abdie.Tabrizi@evc.edu
Office Hours:	Tuesday/Thursday 7:30-8:00 AM or 9:45-10:15 AM; and by appointment.
Class Days/Time:	Tuesdays & Thursdays, 8:00-9:40 AM
Classroom:	ENG 329
Prerequisites:	Phys 52, and Math 32, with a C- or better in each
Course Website:	Log into Canvas then click on the Connect link
Course Format	Weekly, TTR, in-class meetings

Canvas and Connect

All lectures will be delivered in class via written notes, discussion, and PowerPoint. The presentations in electronic format will be posted to Canvas regularly, along with the syllabus, announcements, and other useful information. Communications will be done via my office hours, email, and appointments, if possible. You are responsible for checking the class page regularly to keep up to date on the coursework. I strongly suggest having all announcements forwarded to an email address you check daily. To use Canvas, go to http://my.sjsu.edu, click "Canvas," and log in with your 9-digit SJSU ID and password. If you have any questions about using Canvas, please see me or visit http://www.sjsu.edu/at/ec/canvas/student_resources/index.html.

All homework will be posted, submitted, and graded via a separate online system called McGraw-Hill Connect. You are required to purchase either the bundled book with access code from the bookstore or otherwise purchase an access code (which gives you access to an e-book). In order to complete homework, you will need regular access to a computer (tablet, laptop, or desktop) with access to the internet. If you require special accommodation(s), please contact me ASAP at the start of the semester. The McGraw-Hill Connect system has been integrated into the Canvas so you do not need to access two different websites. Of course, you still need to purchase an access code to access the Publisher material through the Connect link within Canvas.

Course Description

This class covers properties of simple compressible substances, ideal gas and other equations of state, and the first and second laws of thermodynamics. Power cycles, refrigeration cycles, gas mixtures, and gas-vapor mixtures are also included.

Course Learning Outcomes (CLO)

Upon completion of this course, the student should be able to
1. Discuss the causes of ozone depletion and global warming and the uncertainty involved in making long-term environmental predictions.
2. Discuss basic thermodynamic terms, such as enthalpy, entropy, specific and relative humidity, dew point, and adiabatic saturation and wet-bulb temperatures, in simple enough terms that someone outside the field of thermodynamics could understand what they are.
3. Understand how energy transfer processes (heat and work) affect the thermodynamic state of pure substances. This involves the ability to
    a. Use tabulated data, equations of state, and the computer program EES to determine the phase and properties (temperature, pressure, specific volume, internal energy, enthalpy, and entropy) of a pure substance.
    b. Analyze the thermodynamic performance (i.e., calculate work or heat input or output, mass flow rates, and first and second law efficiencies) of common steady-flow engineering devices such as pumps, compressors, turbines, nozzles and diffusers, expansion valves, heat exchangers, and mixing chambers using the first and second laws of thermodynamics and the conservation of mass.
    c. Apply the first law of thermodynamics to simple unsteady-flow problems.
    d. Explain the physical aspects of the first and second law of thermodynamics, and apply them to solve real engineering problems
4. Understand the operation of basic energy conversion devices and be able to analyze their performance, including calculation of work, heat input or output, mass flow rates, and first law efficiencies. This involves the ability to
    a. Analyze the performance of a simple Otto cycle and Diesel cycles
    b. Analyze the performance of a simple Brayton cycle and one with regeneration.
    c. Analyze the performance of a simple Rankine cycle and one with reheating and regeneration.
    d. Analyze the performance of a simple vapor compression cycle.
    e. Use EES to model and optimize thermodynamic cycles.
5. Understand engineering systems involving non-reacting mixtures and be able to analyze their thermodynamic performance. This involves the ability to
    a. Calculate properties of ideal and real gas mixtures.
    b. Explain why condensation forms using technical terms.
    c. Analyze different air-conditioning and cooling processes involving air-water vapor mixtures.

Required Texts/Readings

Textbook

The textbook for this course is the 9th edition of *Thermodynamics: An Engineering Approach*, by Çengel and Boles. The 7th-8th editions are also acceptable, as are e-books. The custom version from the bookstore will save you money, as it comes bundled with an access code for the online system. However, the minimum requirement is an access code to the publisher website which also includes an ebook.

Other Materials

You will use Canvas and McGraw-Hill Connect regularly; see details above.

Course Requirements and Assignments

Prerequisites

To enroll in this course, you must have completed Phys 52 and Math 32, with a C- or better in each. You must turn in an unofficial transcript with the prerequisites highlighted by **the second lecture of the semester**, or you will be dropped   from the class.

Expected Time Commitment

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Effort and course performance are strongly correlated. I don't give A's for effort, but putting the time and energy into this class will give you a much better chance of performing well. You should plan to spend 2-3 hours outside of class for every hour of class; for a 4-credit class such as this one, you should expect to spend 8-12 hours outside of class every week. Some students may spend more or less time than this, but this is a good guideline. How you spend this time is dependent on how you best learn, but I would suggest reviewing your notes, reading pertinent sections of the book, doing or redoing homework problems, and completing LearnSmart activities (discussed subsequently).

Class Attendance

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to ensure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading." However, class participation earns recognition. Extra credit opportunities, if any, are only available to those without absences.

Make up for any missed activity in class, such as a quiz, will only be given for a substantiated excuse.

Homework

There will be chapter assignments throughout the semester. Homework will be assigned for every chapter, and it will be due Thursday of the following week at 11:00 PM unless otherwise announced. All homework is done via the McGraw-Hill Connect website. Some assignments will require you to scan and upload a solution done by hand. These uploads must be *.doc, *.docx, or *.pdf files. It is **your responsibility** to make sure that the scanned document is legible; many cellphones can take a legible photo, but please double check before submitting. If you are unable to scan and upload these files, please ask me for help.

For problems done by hand, please include the following:
- List your name, date, and homework assignment number at the top of your assignment.
- Summarize the problem statement before beginning each problem. Give enough information that you could return to this problem a month or a year from now and understand what it is asking without looking up the problem in the book.
- Drawing a figure may be helpful as well, particularly on more complex problems.
- List all assumptions.
- Write down all equations in the symbolic form first, before plugging in numbers.
- Write units next to all equations! This will keep you from making mistakes. If you learn nothing else from this class, please learn to keep track of your units.

Most homework problems are "algorithmic" problems, wherein Connect assigns everyone different numbers. However, at least one problem per week will be non-algorithmic. Each Thursday, we will spend time working on one non-algorithmic problem in groups at the beginning of class. You will still be required to submit the answers via Connect, and if you miss the in-class group work, you'll be required to complete the problem on your own.

No late homework will be accepted without a university-authorized excuse; however, **one lowest   homework score will be dropped**.

LearnSmart Exercises

There will be LearnSmart assignments per chapter throughout the semester. These are guided readings with theory-based questions, and they reinforce the course material. They are structured so that if you get a question wrong, it will   ask you more questions on the same topic until you achieve 100% completion. These due dates coincide with our completion of the corresponding material in class.

Gateway Essay

One short essay related to a contemporary environmental issue will also be assigned. This essay is a "Gateway Assignment", **and it must be passed with a 70% or better in order to pass the class**. If you don't pass the first time, you will be allowed to revise and resubmit within four days after notification. However, the best grade you can get after resubmission is 70%.

Copying any portion of your essay from another student or from a book or website without appropriate citations **constitutes plagiarism and will result in a grade of 0 for the assignment**. As this is a Gateway Assignment, this will result in you failing the course. This assignment will be submitted via Canvas and checked using the plagiarism-detection software.

Quizzes

Four quizzes will be given in class. Some of them may be open book, so remember to bring your textbooks to class! If you use an e-book, please let me know ASAP so that we can figure out a workaround. The best way to study for these quizzes is to do the assigned homework and make sure that you understand it completely, including all physical concepts and definitions.

Grading Information

General (Quizzes, Midterms, Final Exam)

In engineering, getting the right answer is obviously important, however, while mastering the material, it is important to learn the process of solving problems and paying closer attention to the details of things. To that end, in grading your work, I will look at the following:

> Getting the correct answer
> Using the correct units
> Using the correct equations in the correct way

If you attempt a problem, I will try my best to give you partial credit. The more clearly you write your solution, the easier it is for me to do this. The _required_ contents for each solution are:

- A figure depicting the system, with boundaries indicated where appropriate
- A list of assumptions
- All equations are written in the symbolic form first, before plugging in numbers
- Units included whenever applicable
- The final answer indicated clearly

McGraw-Hill Connect Assignments

The Connect system gives all homework problems an "all-or-nothing" score based on your answer being within 5% of the correct answer. However, there are cases in which a small error in an otherwise correct solution prevents you from getting the right answer, and Connect would assign you a 0, which doesn't seem fair. If you cannot get Connect to accept your answer **and** you have sought help from me before 5 PM the day the assignment is due, you may upload a legible image of your solution to the problem and contact me. I will review your solution and assign partial credit as I see fit.

Grading Policy

		A	93.0-100	A-	90.0-92.9
B+	87.0-89.9	B	84.0-86.9	B-	80.0-83.9
C+	77.0-79.9	C	74.0-76.9	C-	70.0-73.9
		D	60.0-69.9		

Homework	10%
LearnSmart Assignments	5%
Essay	3% (or 100%*)
Quizzes (4)	17%
Midterms (2)	40%
Final Exam	25%

*As discussed, you must pass the essay with a grade of 70% or higher in order to pass this course. Inability to do so will result in a failing grade in the class.

Classroom Protocol

Please place your cellphones on silent and refrain from using them during class. If you absolutely must take an emergency phone call, please leave the room quietly to do so. Exams and quizzes will be given at the beginning of class, so please be punctual. ***All cell phones must be put on the instructor's table during each exam and quiz. Only one short restroom break is allowed during the exam. No restroom break is allowed during the quizzes. You are not allowed to take your cell phone with you on restroom break.***

Students will be given a grade of "F" if he/she is caught cheating. There may also be additional penalties such as dismissal from the college.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/.

"SOS!"

Sometimes, life happens. If you are really struggling with the course material, and/or if something is going on outside of class that may significantly disrupt your studies (financial concerns, upheaval in your home life, physical or mental health issues, etc.), I will do everything I can to help you succeed. If I am personally unable to help you, I will direct you to the appropriate resource. If you aren't comfortable talking to me about a personal issue, that's fine, too! I will maintain a list on Canvas of all the resources available to you as an SJSU student. The earlier you ask for help with a problem, the easier it is to solve.

ME 113: Thermodynamics Section 1, Fall 2018, Tentative Course Schedule

Date	Topics, Readings, Assignments, Deadlines	Chapter	Assignments Due
Aug-21	Basic Concepts	1	HW_Ch1, LS1,IC1
Aug-23	Pressure, Forms of Energy, 1st Law of Thermodynamics	2.1-2.7	HW_Ch2, LS2,IC2
Aug-28	Ozone Depletion, The Greenhouse Effect, Phase Changes, Property Diagrams	2.8, 11.6, 3.1-3.4	
Aug-30	Property Tables	3.5	HW_Ch3, LS3, IC3
Sep-4	Equations of State, Boundary Work	3.6-4.1	
Sep-6	Closed Systems, Specific Heat	4.2-4.4	HW_Ch4, LS4, IC4
Sep-11	Application problems & **Quiz 1: Property Tables**		
Sep-13	Conservation of Mass, Flow Work, 1st Law for Steady Flow	5.1-5.3	HW_Ch5, LS5, IC5
Sep-18	Steady Flow Processes and Devices	5.4	**Gateway Essay Due**
Sep-20	Steady Flow Processes and Devices	5.4	
Sep-25	Unsteady Flow Processes	5.5	
Sep-27	**Quiz 2: Steady Flow Processes and Devices,** Introduction to Computer solutions	6	HW_Ch6, LS6, IC6
Oct-2	2nd Law of Thermodynamics, Entropy	7.1-7.3, 7.6	HW_Ch7, LS7, IC7
Oct-4	**Exam 1: Chapters 1-5**		
Oct-9	Isentropic Processes, Property Diagrams, T-S Relation, More Entropy Changes	7.4-7.5, 7.7-7.9	
Oct-11	Reversible Work, Isentropic Efficiencies	7.10-7.12	
Oct-16	Isentropic Efficiencies cont., Entropy Balance	7.12-7.13	
Oct-18	**Quiz 3: Entropy,** Gas Power Cycle Intro	9.1-9.4	HW_Ch9, LS9, IC9
Oct-23	Otto Cycle, Diesel Cycle, Brayton Cycle	9.5-9.6, 9.8-9.9	
Oct-25	*Gas Power Cycles Review and Problem-Solving*		
Oct-30	Carnot Vapor and Rankine Cycles,	10.1-10.4	HW_Ch10, LS10,IC10
Nov-1	Reheat and Regenerative Cycles, Cogeneration	10.5-10.6, 10.8	
Nov-6	**Exam 2: Chapters 6, 7, 9**		
Nov-8	Vapor-Compression Cycle	11.1-4, 11.7	HW_11, LS11,IC11
Nov-13	Vapor-Compression Cycle Review	12	HW_12, LS12,IC12
Non-15	**Quiz 4 Rankine Cycle,** Mole and Mass Fraction	13.1	HW_Ch13,LS13,IC13
Nov-20	Properties of Gas Mixtures	13.2-13.3	
Nov-22	Thanksgiving Recess		
Nov-27	Humidity, Psychrometric Chart	14.1-14.5	HW_Ch14,LS14,IC14
Nov-29	Air Conditioning Processes	14.6-14.7	
Dec-4	Air Conditioning Processes		
Dec-6	REVIEW		
Dec-18	**FINAL EXAM: 7:15-9:30 AM**		

IC: In-class group problem solving is done on Thursdays, usually at the beginning of class. This consists of one problem from the corresponding homework assignment.

LS: LearnSmart assignments are due on Thursday at 11:00 PM via Connect. The number denotes the chapter number of the assignment.

HW: Homework assignments are due on Thursdays at 11:00 PM via Connect. The Gateway essay is due Sep 18th at 9:00 PM via Canvas. No exceptions! If for ANY reason you missed the deadline, an extension of four days will be granted, however, the max possible grade will be 70%. This extension will be counted as a resubmission as in the case of those who failed to score 70% or

higher. No second chance.

Important Dates

Last day to drop (without notation)	**8/31**
Census day	**9/18**
Thanksgiving	**11/22**
Last day of class	**12/6**
Final exam	**12/18**