

San José State University
Engineering/Mechanical
ME113, Thermodynamics, Section 03, Fall, 2017

Course and Contact Information

Instructor:	Syed Zaidi
Office Location:	Main Department Office
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Office Hours:	Wed 1:00 – 2:00 pm, 133 Engineering Building
Class Days/Time:	Mo/Wed 7:30 pm to 9:10 pm
Classroom:	Engineering Building 339
Prerequisites:	Phys 52 and Math 32, with a C- or better in each "You must present (to the Department Secretary) an unofficial transcript with the prerequisites highlighted by the second class period, or you will be dropped from the class."

Course Format

Technology Intensive

This course heavily relies on class lectures. The covered material in the class is reinforced by the use of software packages including MATLAB, Excel, and NASA web pages related to the subject.

Service learning (SL) Courses or Credit bearing Internships

Not Applicable

Faculty Web Page and MYSJSU Messaging

Syllabus and other additional documents are sent directly via email to each student.

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.

Copies of the course materials such as the syllabus, assignments, exam review material, Powerpoint presentations, etc. *may be* found on the Canvas site for the class. This system will also show you your grades, and it allows you to have discussions or chat with the class. This feature may be especially helpful if you need assistance on a homework problem. Homework assignments and electronic classroom materials are posted on this site.

To log in, go to the Canvas URL <http://sjsu.instructure.com>. Log in with your 9-digit digit SJSU ID and password you use for your SJSUOne account. For questions on the use of Canvas, please check out http://www.sjsu.edu/at/ec/canvas/student_resources/index.html

You are responsible for regularly checking with the messaging system through Canvas. You can set up your Canvas account to forward all email sent to your Canvas account to any other email address you wish”.

Course Learning Outcomes (CLO)

Upon completion of this course, student should be able to

- 1) Discuss the causes of ozone depletion and global warming and the uncertainty involved in making long-term environmentations.
- 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 physical aspects of the first and second law of thermodynamics, and apply them in solving 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

Thermodynamics: An Engineering Approach, by Cengel and Boles, McGraw-Hill, 2011. 8th edition.

Other Readings

Will be provided in the class and will be sent by email at various occasions during the course.

Course Requirements and Assignments

Expected Time Commitment

According to university rules: "Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of forty-five hours over the length of the course (normally 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus."

Many students who do poorly in ME 113 appear to do so because they do not devote enough time to learning and practicing the subject material. You should plan to spend 2-3 hours outside of class for every hour in class, for a total of 8-12 hours outside of class minimum. This time should be spent reviewing notes, reading the book, doing homework problems, and studying for exams. Some student may need to spend more time than this.

Quizzes

Four quizzes will be given in class. Some of them *may be* open book, so remember to bring your textbooks to class! 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. These quizzes cover material absolutely necessary to pass the class.

Homework

Homework will be assigned every week, and it will be due the Wednesday of the following week unless otherwise announced. Homework is turned in the class on the prescribed date.

The amount of homework assigned is the minimum necessary to understand the material. Many of you will need to complete more problems! No late homework is accepted without a university-authorized excuse. A

Essay, on CAFÉ Standards

It must be passed with a C or better to pass the class. Any student caught plagiarizing on their essay or copying another student's EES model (IF YOU USE ONE), or allowing another student to copy their model, will receive a "0" for this entire assignment.

Final Examination or Evaluation

Two exams will be given in addition to the final exam. They must be taken on the scheduled dates except for documented emergencies (for example, you're ill and have a note from a doctor or the SJSU health center, were in a car accident on the way to class, or had a death in the family). If you have an un-avoidable scheduling conflict (such as travel for work or for a sports competition), arrangements must be made in advance. All work must be shown clearly on exams. The two mid-terms will be closed book except for the property tables and one page of notes (8.5"x11", one side only) for the first exam and two pages for the second. The final exam will be open book with no notes allowed. Bring your textbook to all exams. *You are not allowed to share a textbook.*

Final exam plays a vital role in overall grades. It is important to appear in the final exam that constitutes 60% of the combines two mid-terms and finals.

Grading Information

A 90.0-100 A- 87.0-89.9 B+ 84.0-86.9 B 80.0-83.9 B- 77.0-79.9 C+ 74.0-76.9 C 70.0-73.9 C- 67.0-69.9 D 57.0-66.9

Homework (12 @ 1 % each) 12%

CAFÉ essay 2%

Quizzes (4@ 4% each) 16%

Rest of 70% will be distributed among two Mid terms and Final Exam in a ration of (40:60)

Classroom Protocol

Please do not use cell phones in class. Exams and most quizzes will be given at the beginning of class, so plan to be on time. Dropping and Adding Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic calendar web page located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The Late Drop Policy is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at <http://www.sjsu.edu/advising/>.

University Policies

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University's Academic Integrity policy, located at <http://www.sjsu.edu/senate/S07-2.htm>, requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sa.sjsu.edu/judicial_affairs/index.html. Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy S07-2 requires approval of instructors. A major problem in ME 113 is that many students copy homework from one another or else rely very heavily on assistance from friends in completion of homework. This may improve your homework grade, but it will result in poor or even failing exam grades. The best way to handle homework is to struggle through it in your own first. Use your book and notes to help you. Then if you're stuck, ask your instructor or friends from class for hints. You are welcome to compare homework answers or solution methods with your friends after you have completed your problems.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the Disability Resource Center (DRC) at <http://www.drc.sjsu.edu/> to establish a record of their disability.

ME113 / Thermodynamics, Spring 2017, Course Schedule

Course Schedule

Week	Topics, Readings, Assignments, Deadlines
1	Basic Concepts, Pressure
2	Forms of Energy, 1st law of Thermodynamics
3	The Greenhouse Effect, Phase Changes, Property Diagrams Property Tables
4	Equations of State, Boundary Work Quiz 1/ Closed Systems, Specific Heat
5	Conservation of Mass, Flow Work, 1st Law for Steady Flow Steady Flow Processes and Devices
6	Steady Flow Problem-Solving Unsteady-Flow Processes
7	Quiz 2/ Second law of Thermodynamics and/or Intro to EES Second Law of Thermodynamics, Entropy
8	Isentropic Processes, Property Diagrams, T-dS Relation Exam 1 Ch 1-5
9	More Entropy Changes, Reversible Work, Isentropic Efficiencies Isentropic Efficiencies cont., Entropy Balance
10	Quiz 3/ Ch 7 Problem-Solving Session Gas Power Cycle Intro, Otto Cycle
11	Diesel Cycle, Brayton Cycle Cycle problem-solving, visit to jet engine
12	Carnot Vapor and Rankine Cycles, Improving Efficiencies Exam 2 Ch 6, 7, 9
13	Reheat and Regenerative Cycles, Cogeneration
14	Vapor-Compression Cycle, Refrigerants, Ozone Depletion, Mole and Mass Fraction Properties of Gas Mixtures and problem solving
15	Quiz 4/ Humidity, Psychrometric Chart
16	Air Conditioning Processes Air Conditioning Processes Problem Solving
17	Final Exam
Final Exam	Venue and Time – will be announced in the class. This information will also be sent via email to each student.

Note: Assignment dates will be decided in the class. One week will be given for each assignment including essays.