

San José State University
Mechanical Engineering Department
ME 115 Thermal Engineering Lab, Spring 2022 (Sec 5,7)

Class Schedule:	Sect.:	Code:	Day:	Time	Instructor:
	S05	23576	Tues	1:30 pm - 4:15 pm	S. H. Zaidi
	S07	26665	Thur	1:30 pm - 4:15 pm	S. H. Zaidi

Instructor:
Syed Sohail Zaidi
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Office Hours: Office hours and location to be arranged on an as-needed basis between instructor and student.

Co/Prerequisite: ME 114 (may be taken at the same time). By the 2nd class period you should either show a class schedule that shows that you are taking ME 114 this semester or an unofficial transcript showing that you took it previously.

Class Website: http://stage.sjsu.edu/people/nicole.okamoto/courses/me_115/index.html

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on the class website. You are responsible for regularly checking email for messages.

Course Description

Thermodynamics and heat transfer experiments. Temperature, pressure, and flow rate measurements. Technical reports and presentations.

Course Delivery

This lab course will be delivered online. All experiments and hardware will be explained via online presentations (CANVAS and ZOOM). Actual experimental data will be provided to students who will analyze the data and will conduct theoretical analysis. Students will be asked to submit final lab reports for all projects.

Course Learning Objectives

By the end of this course, students should be able to:

- Explain how thermocouples, manometers, orifice plates, rotameters, wind tunnels and other basic laboratory equipment work and use them correctly
- Write professional laboratory reports
- Design and conduct a simple lab experiment
- Describe the operation and performance of a spark-ignition engine using correct terminology
- Describe how and why engine performance changes with RPM
- Calculate important engine parameters such as specific fuel consumption, brake power, and torque using experimental data

- Describe the operation and performance of a steam turbine using correct terminology
- Analyze a steam turbine and condenser using the first law of thermodynamics and appropriate properties
- Describe the operation of an air conditioner
- Analyze an air conditioner using the first law and appropriate properties for air/water mixtures
- Derive finite difference equations
- Use the finite difference method to analyze steady-state two-dimensional heat transfer
- Properly use one-dimensional transient conduction and convection equations to calculate experimental heat transfer parameters.
- Perform energy balance calculations on a water to air heat exchanger
- Describe how heat exchangers are characterized
- Calculate important heat exchanger characterization parameters

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](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>"

Reports

Summary Reports are required for each of the lab experiments except for the hot dog anemometer and finite difference labs. The report requirements for the finite difference project will be discussed during that lab session and typically include Excel sheet result printouts, hand derivation of one cell equation, and a brief paragraph of what you did and your results. The hot dog anemometer lab will require only calculations and answers to a few questions. For all labs, representative calculations must be included in an appendix in a clear, organized, manner. All equations must be shown. If you use a program such as Excel for your calculations, also include sample calculations showing the equations used and how the calculations were performed. Professional reports are required.

The summary report guidelines can be found at class website.

Lab reports are due by 5:00 pm in the instructor's mailbox two school days after your last lab for a given topic, unless otherwise instructed during class. Bring your textbook and calculator to class. You are welcome to use either your own laptop or one of the lab computers. You will work in groups during each lab except for the finite difference lab. Each group should have three or four students. No teams of more than five students are permitted.

Classroom Protocol / Attendance (online class now)

If you know that you must miss a lab, you may be able to attend a different lab session if space permits and you make advance arrangements with the instructor. You must spend both weeks for the given lab in that section. If you miss a lab unexpectedly due illness (with a note from the medical center or a hospital) or other emergency, please contact your instructor as soon as possible to discuss your options.

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). The lab itself can count for 1.5 hours per unit per week with the additional 1.5 hours for analysis and report preparation.

Grading Policy

Grading sheets for the Summary Reports are posted on the course website. Course grade breakdown is as follows: five Team Summary Reports, 15% each, one Individual Finite Difference summary, 15%, one short report (hot dog anemometer lab), 10%.

A confidential peer evaluation form may be required for each lab. You will not get credit for a lab if you do not participate in both the experiment and calculations or have made arrangements with your instructor to make up your work due to emergency. Poor participation can lower your grade up to an entire letter grade.

Grade Distribution

		A	93-100	A-	90-92.9
B+	87-89.9	B	83-86.9	B-	80-82.9
C+	77-79.9	C	73-76.9	C-	70-72.9
D+	67-69.9	D	63-69.9	D-	60-62.9

Course Schedule

Mtg.	Topic:	Location:	Type of Report Due
1	Introduction / Design of Experiments/ Temperature Measurements: Introduction Air Conditioning Experiment	In-person (Room ME113)	
2	Air Conditioning Experiment Report	In-person (Room ME113)	
3	Gasoline Engine Experiment	In-person (Room ME113)	Summary Report (AIR Cond Exp)
4	Gasoline Engine Experiment Report	In-person (Room ME113)	
5	Steam Turbine Experiment	In-person (Room ME113)	
6	Steam Turbine Experiment Report	In-person (Room ME113)	Summary Report (Steam Turbine)
7	Finite Difference Experiment	Computer Lab (option)	
8	Hot Dog Anemometer Experiment	In-person (Room ME113)	Summary Report (Finite Difference)
9	Heat Exchanger Experiment	In-person (Room ME113)	Summary Report (Hot Dog)
10	Spring Break		
11	Heat Exchanger Experiment Report	In-person (Room ME113)	Summary Report (Heat Exchanger)
12	Piping Network and Pump Experiments	In-person (Room ME113)	Summary Report (Piping Exp)
13	Piping Network and Pump Experiments Report	In-person (Room ME113)	
14	Centrifugal Pump Test	In-person (Room ME113)	Summary Report (Centrifugal Pump)
15	Solar Cell Experiment	In-person (Room ME113)	One Page Report