

San José State University Mechanical Engineering ME115-1,2,3,6 Thermal Engineering Lab, Spring 2022

This course adopts for synchronous study online (up to 2/11) and in-person lab (from 2/14) with online calculations.

Canvas and Lab Course Messaging

Copies of the Lab materials such as the Course Administration and Laboratory Experiments (presentations, Lab Writeups, etc.) is on the site:

https://www.sjsu.edu/people/nicole.okamoto/courses/me_115/index.html and also will be posted on the Canvas site for the class. I will be using this system for any communication with the class. This system will also allow you to have discussions or chat with others in the class.

To log in, go to the Canvas URL <http://sjsu.instructure.com>. Log in with your 9-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. In case of problems with Canvas you can use my SJSU mail. Do not forget to write a proper subject, your name and section.

Class:	Sect.: Day: Time	Instructor:
	S01 Mon 9:00-11:45	I. Tyukhov
	S02 Mon 1:30-4:15	I. Tyukhov
	S03 Mon 4:30-7:15	I. Tyukhov
	S06 Th 9:00-11:45	I. Tyukhov

For measurements during in-person class is divided by half (according to numbers of groups)

Instructors:	Instructor:	Email:
	Dr. Igor Tyukhov	igor.tyukhov@sjsu.edu

Instructor's Office: Dr. Igor Tyukhov Zoom Meetings (TBA) and in-person E348 or E113.

Classroom: Lab is based in Engineering Building, Room E113

Prerequisites: ME 114 Heat Transfer (may be taken concurrently). 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

Course Schedule

Class sessions	Topic:	Location:
Week 1	Introduction/Zoom from lab	ENG 113/ Zoom
Week 2	Air Conditioning Experiment	ENG 113/ Zoom

Week 3	Air Conditioning Experiment Report	ENG 113/ Zoom
Week 4	Spark Ignition Experiment	ENG 113/
Week 5	Spark Ignition Experiment Report	ENG 113/ Zoom
Week 6	Finite Difference Project/lecture – deriving formulas	Zoom
Week 7	Steam Turbine Experiment	ENG113
Week 8	Steam Turbine Experiment Report	ENG113/ Zoom
Week 9	Hot Dog Anemometer Experiment	ENG113
Week 10	Hot Dog Anemometer Experiment Report	ENG113/ Zoom
Week 11	Centrifugal Pump Experiment	ENG113
Week 12	Centrifugal Pump Experiment Report	ENG113/ Zoom
Week 13	Photovoltaic (PV) conversion for sustainable generation. Introduction. Foundations of the PV theory.	ENG113/ Zoom
Week 14	Photovoltaic conversion by solar cells and solar modules. Report.	ENG113
Week 15	Simulating photovoltaic system with balance-of-system demonstration.	ENG113/ Zoom
Week 16	Makeup	ENG113/ Zoom

February 7: end of official drop period

February 11: end of official add period

If you do not participate in the report-writing session, your grade on the lab report that you submit will be reduced by 10% unless you have made prior arrangements with your instructor or you have an unavoidable documented emergency.

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
- Explain photovoltaic conversion of solar energy into electricity
- Describe how solar cells and modules are characterized
- Measure of solar cells and modules characteristic and PV system.

Reports

Summary Reports are required for each of the lab experiments. The report requirements **for the finite difference individual** 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.**

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, additional instructions will be in Canvas.

Lab reports are due by 5:00 pm in the instructor's mailbox (in Canvas) two school days after your last lab for a given topic, unless otherwise instructed during class. Use your textbook and calculator for preparing to class and final report. You will work in groups during each lab except for the finite difference lab. Each group should have two to four students. No teams of more than four students are permitted.

Classroom Protocol / Attendance

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: six (6) Team Summary Reports, 15% each, one (1) Individual Finite Difference summary, 10%.

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

Letter Grades

A+ > 96	A 93.0-95.9	A- 90.0-92.9
B+ 87.0-89.9	B 83.0-86.9	B- 80.0-82.9
C+ 77.0-79.9	C 73.0-76.9	C- 70.0-72.9
	D 60.0-69.6	

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/>"

Online Class Regulations

1. ME115 is online or in-person lab and synchronous class with lectures, discussions and interactive activities for spring 2022.
2. Be respectful and friendly to others, coordinated team work is important. By working together, teams can find the solutions that work best.
3. Do not discuss other things in Zoom Chat.
4. All participants will be muted during Zoom lectures when needed.
5. You can request to be unmuted if you have a quiet space during the lecture and want to ask questions directly.
6. Use Zoom Chat to ask questions during lectures and lab discussions.
7. Cameras are required for discussions, roll call attendance.
8. Remember Canvas automatically checks submissions for plagiarism from multiple online sources.
9. All reports (your homework) should be uploaded to Canvas - one report from one group. If you send your report via an email or message it will not be graded (or graded sufficiently lower).
10. You will not get credit for a lab if you do not participate in both the experiment and calculations or, previously have made arrangements with your instructor to make up your work.