San José State University
Mechanical Engineering
ME115-1,2,3,4 Thermal Engineering Lab, Spring 2022

This course adopts in-person lab.

Class:	Sect.:	Day:	Time	Instructor:
	S01	Mon	9:00-11:45	I. Tyukhov
	S02	Mon	1:30-4:15	I. Tyukhov
	S03	Mon	16:30-19:15	I. Tyukhov
	S04	We	9:00-11:45	I. Tyukhov

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

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 CANVAS 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.

Instructors:	Instructor: Dr. Igor Tyukhov	Email: 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	Air Conditioning Experiment (AC)	ENG 113
Week 2	Air Conditioning Experiment Report	ENG 113
Week 3	Spark Ignition Experiment (ICE)	ENG 113
Week 4	Spark Ignition Experiment Report	ENG 113/
Week 5	Finite Difference Project/lecture – deriving formulas (FD)	ENG 113
Week 6	Steam Turbine Experiment (ST)	ENG 113
Week 7	Steam Turbine Experiment Report	ENG113
Week 8	Hot Dog Anemometer Experiment (HDA)	ENG113
Week 9	Hot Dog Anemometer Experiment Report	ENG113
Week 10	Centrifugal Pump Experiment (CP)	ENG113
Week 11	Centrifugal Pump Experiment Report	ENG113
Week 12	Photovoltaic (PV) conversion for sustainable energy generation. Fundamentals of the PV theory. Demonstrations.	ENG113
Week 13	DOE. Photovoltaic conversion by solar cells and solar modules (PV system).	ENG113
Week 14	DOE. Photovoltaic conversion by solar modules (PV system and by solar cells).	ENG113
Week 15	Photovoltaics report or presentation.	ENG113
Week 16	Makeup	ENG113

DOE – Design of experiments

August 31: end of official drop period

September 8: 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
- Describe design and performance characteristics of centrifugal pumps.
- Perform energy balance calculations on a water to air heat exchanger
- Describe how heat exchangers are characterized
- 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 writing derivation of each cell equations, 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 textbooks and calculator for preparing to class and final report. You will work in groups during each lab except for the finite difference lab (individual project).
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 at http://www.sjsu.edu/gup/syllabusinfo/"