San José State University
Engineering/Mechanical Engineering
ME120-Experimental Methods – SPRING 2023

Instructor: Ananda Mysore
Office Location: E133
Telephone: 408.306.4537
Email: Ananda.mysore@sjsu.edu
Office Hours: Monday 4:30PM to 5:30PM by appointment online
CLASSROOM: E189 Lecture & In-person Lab E133
Prerequisites: CE 112 & ENGR 100W with C- or better grades
Corequisites: ME130. AE Majors use AE162 & AE168 to satisfy corequisite requirements.
Misc: Lecture 1 hour/lab 3 hours

Class Days/Time:
* Lab sections are subject to change, based on enrollment

Section	Code	Day	Time	Room	Instructor
1	29078	T	0900-0950	E189	A. Mysore
2	27713	M	1030-1315	ENG133	A. Mysore
3	27715	M	1330-1615	ENG133	A. Mysore
4	27716	M	1800-2045	ENG133	A. Mysore
5	27717	T	1030-1315	ENG133	A. Mysore
6	27719	T	1330-1615	ENG133	A. Mysore

Course Description

Theory and practice of experimental methods and sensors for mechanical measurements; statistical and uncertainty analysis; computer-hosted data acquisition, processing and analysis; formal report writing and presentations

Course Format

Technology Intensive, Hybrid, and Online Courses (Required if applicable)

Misc: Lecture 1 hour/lab 3 hours
Lecture: E189 In Person

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas Leaning Management System course login website at http://sjsu.instructure.com You are responsible for regularly checking with the messaging system through MySJSU at http://my.sjsu.edu (or other communication system as indicated by the instructor) to learn of any updates.
For help with using Canvas see Canvas Student Resources page.

Course Goals

Course Goals

1. Acquire familiarity with a wide variety of manufacturing processes
2. To understand modern engineering experimentation including experiment design, system calibration, data acquisition, analysis and presentation.
3. To develop and apply an understanding of statistical methods to select the best experimental approach to satisfy given requirements of accuracy.
4. To understand how to quantify error and uncertainty in physical measurements.
5. To understand how to apply statistical methods to the analysis and presentation of experimental results.
6. To understand modern data acquisition concepts and requirements.
7. To understand the various categories of mechanical measurements and the sensor technologies that they are based on.
8. To gain hands-on experience with modern instrumentation and systems-level experimentation.
9. To improve written and oral communication skills, to develop the ability to write engineering reports of high quality, and to improve the student's ability to function as a member of an engineering team.

Course Learning Outcomes (CLO)

At the end of the course, the student who has mastered the course material will be able to:
1. Draw a concept map for a generalized measurement system that identifies the most important concepts.
2. Apply basic statistical methods to design experiments, to analyze, and to present the results of experiments. Such methods may include identification of probability distributions of experimental data, estimation of population statistics from large and small samples, classification and propagation of error sources for experiment design and analysis of results, and graphical presentation of statistical descriptions.
3. Identify and describe the elements making up computer-based data acquisition systems, including alternative configurations and technologies.

4. Design a data acquisition system for a given application by analyzing and specifying requirements, selecting appropriate commercial hardware, and writing a computer program to acquire, analyze, and present the desired data.
5. Identify and describe the various types of mechanical measurements including temperature, pressure, sound, motion and position, force and torque, stress and strain, flow visualization and measurement (e.g., volume flow rate, velocity, etc.) and explain the transducer principles that underlie them.
6. Operate modern instrumentation systems that include mechanical and electro-optical technologies and computer-based data acquisition systems.
7. Communicate effectively in written form and in oral presentations information relating to the design and/or results of an engineering experiment.
8. Work productively and effectively in an engineering team.

Required Texts/Readings

Textbook

Experimental Methods for Engineers, custom edition by Pearson Custom Publishing, Boston, MA, 2004 (ISBN 0-536-90018-3).

Other technology requirements / equipment / material

LabVIEW 2016 Student Software License (Contact: National Instruments)

Course Requirements and Assignments

Assignments and Grading Policy

20% for Theory Homework
10% for Mid--Term Exam
10% for Final Exam, scheduled on **Wednesday, May 17th 0715-0930**
10% for Lab Quizzes
25% for Lab Reports
25% for Term Project

LATE POLICY: Unless otherwise specified for a particular assignment, work that is submitted late will be accepted with reduced credit according to a depreciation factor

Theory Homework Late Policy d = 0.95 < 24 hrs d = 0.70 >24 hrs < 48 hrs d= 0.50 >48 hrs < 72 hrs d = 0.00 >72 hrs

Lab Report Late Policy

d = 0.99 < 1 week late d = 0.70 > 1 week < 2 weeks d= 0.50 > 2 weeks < 3 weeks d = 0.00 > 3 weeks

The number of hours breached is determined by online submission time stamp or email-received time stamp.

EXCEPTIONS: Any grading appeals or petitions must be communicated promptly in writing (or email). Exceptions will normally be evaluated at the very end of the semester in context with an individual's overall semester track record and all other exceptions class-wide. Special consideration for truly unavoidable and extenuating circumstances will depend on timeliness and supporting documentation (e.g., doctor's note, police report).

- *University Syllabus Policy S16-9*
- *University's Syllabus Information web page*

University Policy S16-9,

"Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus."

Final Examination

10% for Final Exam, scheduled on: **Wednesday, May 17th 0715-0930**

Grading Information

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All graded work for a course ultimately will be compiled into a 100-point scale for determination of overall course grade, according to the following divisions.

Grade	*Points*	*Percentage*
A plus	*960 to 1000*	*96 to 100%*
A	*930 to 959*	*93 to 95%*
A minus	*900 to 929*	*90 to 92%*
B plus	*860 to 899*	*86 to 89 %*
B	*830 to 859*	*83 to 85%*
B minus	*800 to 829*	*80 to 82%*
C plus	*760 to 799*	*76 to 79%*
C	*730 to 759*	*73 to 75%*
C minus	*700 to 729*	*70 to 72%*
D plus	*660 to 699*	*66 to 69%*
D	*630 to 659*	*63 to 65%*
D minus	*600 to 629*	*60 to 62%*

Classroom Protocol

NO TEXTING OR CELL PHONE USAGE DURING THE CLASS

Policies or information required by the Department of Mechanical Engineering
The ME Department does not permit retroactive adding of courses. The ME Department enforces strict sanctions regarding prerequisites. One specific sanction is that any student enrolled in a course without satisfactory completion of the official prerequisites will receive a letter grade of "F".

University Policies

Per University Policy S16-9 ,relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding,

consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on Syllabus Information web page (https://www.sjsu.edu/curriculum/courses/syllabus-info.php). Make sure to visit this page to review and be aware of these university policies and resources.

ME120 Experimental Methods, FALL 2022 Lecture Schedule

Week	Date	Topics
Week1	01/31/23	Course Introduction & Enrollment Administration. Experimentation and Validity of Measurement (Chapters 1 & 2)
Week2	02/07/23	Data Acquisition and Sampling (Chapter 4)
Week3	02/14/23	Measuring Displacement and Motion (Chapter 8)
Week4	02/21/23	Measuring Force, Stress, and Strain (Chapter 8)
Week5	02/28/23	Measuring Temperature (Chapter 9)
Week6	03/07/23	Measuring Pressure and Sound (Chapter 9)
Week7	03/14/23	Fluid & Flow
Week8	03/21/23	Mid-Term Exam
Week9	04/04/23	Signal Conditioning (Chapter 3)
Week10	04/11/23	Dynamic Signal Analysis (Chapter 5)
Week11	04/18/23	Statistical Analysis I: Probability Distributions (Chapter 6)
Week12	04/25/23	Statistical Analysis II: Parameter Estimation (Section 6.4)
Week13	05/02/23	Statistical Analysis III: Correlation and Regression (Section 6.6)
Week14	05/09/23	Uncertainty Analysis (Chapter 7)
Week16	05/17/23	Final Exam 0715-0930

ME120 SPRING 2023 Lab Schedule*

San José State University

Engineering/Mechanical Engineering

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Experiment	Monday	Tuesday	Report/Quiz Due
LabVIEW 1	1/30/2023	1/31/2023	
LabVIEW 2	2/6/2023	2/7/2023	Quiz 1
LabView 3	2/13/2023	2/14/2023	Quiz 2
Waveform Data Acquisition	2/20/2023	2/21/2023	Quiz 3
Metrology & SPC	2/27/2023	2/28/2023	Report Waveform
Load Cells	3/6/2023	3/7/2023	Report Metrology
Beam Vibration	3/13/2023	3/14/2023	Report Load Cell & Project Proposal
Pitot Tube	3/20/2023	3/21/2023	Report 4
Gage R&R	4/3/2023	4/4/2023	Report 5
Term Project	4/10/2023	4/11/2023	Report 6
Term Project	4/17/2023	4/18/2023	
Term Project	4/24/2023	4/25/2023	
Project Presentation	5/1/2023	5/2/2023	Project Presentation
Project Report	5/8/2023	5/9/2023	Project Report

***The schedules are subject to change with fair notice.**