

San José State University
Department of Mechanical Engineering
ME120 - Experimental Methods – FALL 2017

Course and Contact Information

Instructor: Ananda Mysore

Office Location: E133

Telephone: 408.306.4537

Email: Ananda.mysore@sjsu.edu

Office Hours: Monday 4:30PM to 5:30PM or by Appointment

Class Days/Time:	<i>Section</i>	<i>Code</i>	<i>Day</i>	<i>Time</i>	<i>Room</i>	<i>Instructor</i>	<small>* Lab sections are subject to change, based on enrollment</small>
Lecture	01	44109	W	09:00-09:50	ENG 189	Mysore	
Lab	02	40569	M	10:30-13:15	ENG 133	Mysore	
Lab	03	40570	M	13:30-16:15	ENG 133	Mysore	
Lab	04	40571	M	18:00-20:45	ENG 133	Mysore	
Lab	05	40979	T	10:00-12:45	ENG 133	Mysore	
Lab	06	41352	T	13:30-16:15	ENG 133	Zaidi	
Lab	10	50308	F	10:00-12:45	ENG 133	Zaidi	

Classroom: E189(Lecture) & E133(Lab)

Prerequisites: CE 112, ENGR 100W, ME 130 all with C- or better grades

Faculty Web Page and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at : <http://www.sjsu.edu/people/ananda.mysore/> and on [Canvas Learning Management System course login website](#) at <http://sjsu.instructure.com>. You are responsible for regularly checking with the messaging system through [MySJSU](http://my.sjsu.edu) at <http://my.sjsu.edu> (or other communication system as indicated by the instructor) to learn of any updates.

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 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 transduction 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

15% for Theory Homework

15% for Mid-Term Exam

20% for Final Exam, scheduled on

Monday, Dec 18th 0715-0930

10% for Lab Quizzes

20% for Lab Reports

20% for Term Project

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.

97.0 - 100 A+ ; 93.0 - 96.9 A ; 90.0 - 92.9 A-
87.0 - 89.9 B+ ; 83.0 - 86.9 B ; 80.0 - 82.9 B-
77.0 - 79.9 C+ ; 73.0 - 76.9 C ; 70.0 - 72.9 C-
67.0 - 69.9 D+ ; 63.0 - 66.9 D ; 60.0 - 62.9 D-

- [University Syllabus Policy S16-9](http://www.sjsu.edu/senate/docs/S16-9.pdf) at <http://www.sjsu.edu/senate/docs/S16-9.pdf>.
- Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

“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 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.”

Final Examination or Evaluation

Insert More details can be found in

[University Policy S06-4](http://www.sjsu.edu/senate/docs/S06-4.pdf) (<http://www.sjsu.edu/senate/docs/S06-4.pdf>) which states that

“There shall be an appropriate final examination or evaluation at the scheduled time in every course, unless the course is on the official List of Courses in which a final is optional.”

20% for Final Exam, scheduled on

Monday, Dec 18th 0715-0930

Classroom Protocol

NO TEXTING OR CELL PHONE USAGE DURING THE CLASS

University Policies (Required)

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/>

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".

ME120 Experimental Methods, FALL 2017 Course Schedule*

Lecture Schedule		
Week	Date	Topics
Week 1	08/23/2017	Course Introduction & Enrollment Administration. Experimentation and Validity of Measurement (Chapters 1 & 2)
Week 2	08/30	Data Acquisition and Sampling (Chapter 4)
Week 3	09/06	Measuring Displacement and Motion (Chapter 8)
Week 4	09/13	Measuring Force, Stress, and Strain (Chapter 8)
Week 5	09/20	Measuring Temperature and Light (Chapter 9)
Week 6	09/27	Measuring Pressure and Sound (Chapter 9)
Week 7	10/04	Measuring Fluid Flow (Chapter 10)
Week 8	10/11	Mid-Term Exam
Week 9	10/18	Signal Conditioning (Chapter 3)
Week 10	10/25	Dynamic Signal Analysis (Chapter 5)
Week 11	11/01	Statistical Analysis I: Probability Distributions (Chapter 6)
Week 12	11/08	Statistical Analysis II: Parameter Estimation (Section 6.4)
Week 13	11/15	Statistical Analysis III: Correlation and Regression (Section 6.6)
Week 14	11/29	Uncertainty Analysis (Chapter 7)
Final Exam	12/18/17	Final Exam – Monday– 0715-0930

Chapters are based on the course textbook *Experimental Methods for Engineers*

ME120 Lab Schedule* FALL 2017

ME120 Lab Schedule					
Week	Experiment	Monday Section	Tuesday Section	Friday Section	Report/Quiz Due
1	LabVIEW 1	28-Aug	29-Aug	1-Sep	
2	LabVIEW 2	11-Sep	5-Sep	8-Sep	Quiz 1
3	LabVIEW 3	18-Sep	12-Sep	15-Sep	Quiz 2
4	Waveform Logger	25-Sep	19-Sep	22-Sep	Quiz 3
5	Metrology & SPC	2-Oct	26-Sep	29-Sep	Lab Report - Waveform Logger
6	GR&R	9-Oct	3-Oct	6-Oct	Lab Report - Metrology & SPC
7	Beam Displacement	16-Oct	10-Oct	13-Oct	Lab Report- GR&R
8	Beam Vibration	23-Oct	17-Oct	20-Oct	Lab Report - Beam Displacement
9	Pitot Tube	30-Oct	24-Oct	27-Oct	Lab Report - Beam Vibration
10	Term Project	6-Nov	31-Oct	3-Nov	Lab Report - Pitot Tube
11	Term Project	13-Nov	7-Nov	17-Nov	
12	Term Project	20-Nov	14-Nov	1-Dec	
13	Project Presentation	27-Nov	21-Nov	8-Dec	Project Report

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