

San José State University
Department of Mechanical & Aerospace Engineering
ME120 - Experimental Methods – SPRING -2012

Instructor: Ananda V. Mysore

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

	<i>Section</i>	<i>Code</i>	<i>Day</i>	<i>Time</i>	<i>Room</i>	<i>Instructor</i>	
Class Days/Time:	Lecture	01	26012	Tue	08:00-08:50	ENG 339	Mysore
	Lab	05	29652	Tue	13:30-16:15	ENG 133	Mysore
	Lab	03	22540	Mon	17:30-20:15	ENG 133	Mysore
	Lab	04	22542	Tue	17:30-20:15	ENG 133	Mysore

* Lab sections are subject to change, based on enrollment

Classroom: E339(Lecture) & E133(Lab)

Prerequisites: CE 112, ENGR 100W, ME 130 all with C- or better grades
AE Majors can substitute AE 162 and AE 169, each with a C- or better, for ME 130

Faculty Web Page and MYSJSU Messaging

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on my faculty web page at: <http://www.sjsu.edu/people/ananda.mysore/> or accessible through the Quick Links>Faculty Web Page links on the SJSU home page. You are responsible for regularly checking with the messaging system through MySJSU (or other communication system as indicated by the instructor).

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 and Student Learning Objectives

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.

Student Learning Objectives

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). Available at Robert's Bookstore <http://www.robertsbookstore.com/>, 330 S. 10th Street, San Jose, CA 95112.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, academic renewal, etc. Refer to the current semester's [catalog policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html> for any add/drop deadlines, policies, and procedures section and specific registration information. [Late drop policy](http://www.sjsu.edu/aars/policies/latedrops/policy/) is available at <http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Assignments and Grading Policy

15% for Theory Homework

15% for Mid-Term Exam

20% for Final Exam, scheduled on	Friday, May 18 0715-0930
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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 Policies

Academic integrity

Students should know that the University's [Academic Integrity Policy](http://sa.sjsu.edu/judicial_affairs/faculty_and_staff/academic_integrity/index.html) is available at http://sa.sjsu.edu/judicial_affairs/faculty_and_staff/academic_integrity/index.html. Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University's integrity policy, require you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sa.sjsu.edu/judicial_affairs/index.html) is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Policy F06-1 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the [Disability Resource Center](http://www.drc.sjsu.edu/) (DRC) at <http://www.drc.sjsu.edu/> to establish a record of their disability.

Policies or information required by the Department of Mechanical and Aerospace Engineering

The MAE Department does not permit retroactive adding of courses. The MAE 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".

Student Technology Resources

Computer labs for student use are available in the Academic Success Center located on the 1st floor of Clark Hall and on the 2nd floor of the Student Union. Additional computer labs may be available in Engineering room E213 (Special Lab fee may be applicable). Computers are also available in the Martin Luther King Library.

A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include digital and VHS camcorders, VHS and Beta video players, 16 mm, slide, overhead, DVD, CD, and audiotape players, sound systems, wireless microphones, projection screens and monitors.

Learning Assistance Resource Center (Optional)

The Learning Assistance Resource Center (LARC) is located in Room 600 in the Student Services Center. It is designed to assist students in the development of their full academic potential and to motivate them to become self-directed learners. The center provides support services, such as skills assessment, individual or group tutorials, subject advising, learning assistance, summer academic preparation and basic skills development. The [LARC website](http://www.sjsu.edu/larc/) is located at <http://www.sjsu.edu/larc/>.

SJSU Writing Center (Optional)

The SJSU Writing Center is located in Room 126 in Clark Hall. It is staffed by professional instructors and upper-division or graduate-level writing specialists from each of the seven SJSU colleges. Our writing specialists have met a rigorous GPA requirement, and they are well trained to assist all students at all levels within all disciplines to become better writers. The [Writing Center website](http://www.sjsu.edu/writingcenter/about/staff/) is located at <http://www.sjsu.edu/writingcenter/about/staff/>.

Peer Mentor Center (Optional)

The Peer Mentor Center is located on the 1st floor of Clark Hall in the Academic Success Center. The Peer Mentor Center is staffed with Peer Mentors who excel in helping students manage university life, tackling problems that range from academic challenges to interpersonal struggles. On the road to graduation, Peer Mentors are navigators, offering “roadside assistance” to peers who feel a bit lost or simply need help mapping out the locations of campus resources. Peer Mentor services are free and available on a drop-in basis, no reservation required. The [Peer Mentor Center website](http://www.sjsu.edu/muse/peermentor/) is located at <http://www.sjsu.edu/muse/peermentor/>

ME120 Experimental Methods, Spring 2012 Course Schedule*

Lecture Schedule		
Week	Date	Topics
Week 1	01/31	Course Introduction & Enrollment Administration. Experimentation and Validity of Measurement (Chapters 1 & 2)
Week 2	02/07	Data Acquisition and Sampling (Chapter 4)
Week 3	02/14	Measuring Displacement and Motion (Chapter 8)
Week 4	02/21	Measuring Force, Stress, and Strain (Chapter 8)
Week 5	02/28	Measuring Temperature and Light (Chapter 9)
Week 6	03/06	Measuring Pressure and Sound (Chapter 9)
Week 7	03/13	Measuring Fluid Flow (Chapter 10)
Week 8	03/20	Mid-Term Exam
Week 9	04/03	Signal Conditioning (Chapter 3)
Week 10	04/10	Dynamic Signal Analysis (Chapter 5)
Week 11	04/17	Statistical Analysis I: Probability Distributions (Chapter 6)
Week 12	04/24	Statistical Analysis II: Parameter Estimation (Section 6.4)
Week 13	05/01	NO CLASS
Week 14	05/08	Statistical Analysis III: Correlation and Regression (Section 6.6)
Week 15	05/15	Uncertainty Analysis (Chapter 7)
Final Exam	05/18/2012	Final Exam – Friday – 0715-0930

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

ME120 Lab Schedule* Spring 2012

ME120 Lab Schedule					
Week	Experiment	Monday Section	Report/Quiz Due	Tuesday Section	Report/Quiz Due
1	LabVIEW 1	30-Jan		31-Jan	
2	LabVIEW 2	6-Feb	Quiz 1	7-Feb	Quiz 1
3	LabVIEW 3	13-Feb	Quiz 2	14-Feb	Quiz 2
4	Waveform Logger	20-Feb	Quiz 3	21-Feb	Quiz 3
5	Metrology & SPC	27-Feb	Lab Report - Waveform Logger	28-Feb	Lab Report - Waveform Logger
6	Fan Noise	5-Mar	Lab Report - Metrology & SPC	6-Mar	Lab Report - Metrology & SPC
7	Beam Displacement	12-Mar	Lab Report- Fan Noise	13-Mar	Lab Report- Fan Noise
8	Beam Vibration	19-Mar	Lab Report - Beam Displacement	20-Mar	Lab Report - Beam Displacement
9	Viscosity	2-Apr	Lab Report - Beam Vibration	3-Apr	Lab Report - Beam Vibration
10	Term Project	9-Apr	Lab Report - Viscosity	10-Apr	Lab Report - Viscosity
11	Term Project	16-Apr		17-Apr	
12	Term Project	23-Apr		24-Apr	
13	Project Presentation	30-Apr	Project Report	1-May	Project Report

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