San José State University

ME120-Experimental Methods – FALL 2019

Course and Contact Information

Instructor:

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 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)

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• University Syllabus Policy S16-9 at http://www.sjsu.edu/senate/docs/S16-9.pdf. • Office of Graduate and Undergraduate Programs' Syllabus Information web page 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 practical. 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) 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."

10% for Final Exam, scheduled on: Friday, Dec 13th 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 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 2019 Lecture Schedule

		Course Introduction & Enrollment Administration.
Week1	08/21/19	Experimentation and Validity of Measurement (Chapters 1 & 2)
Week2	08/28/19	Data Acquisition and Sampling (Chapter 4)
Week3	09/04/19	Measuring Displacement and Motion (Chapter 8)
Week4	09/11/19	Measuring Force,9(S)-4(a)-3traefa(a)-3(n)-3(d)-3(Mo)-(a)-3tra

ME120 FALL 2019 Lab Schedule*

LabVIEW 1	8/26/2019	8/27/2019	8/29/2019	8/30/2019	
LabVIEW 2	9/9/2019	9/3/2019	9/5/2019	9/6/2019	Quiz 1
LabView 3	9/16/2019	9/10/2019	9/12/2019	9/13/2019	Quiz 2
Waveform Data Acquisition	9/23/2019	9/17/2019	9/19/2019	9/20/2019	Quiz 3
Metrology & SPC	9/30/2019	9/24/2019	9/26/2019	9/27/2019	Report Waveform
Load Cells	10/7/2019	10/1/2019	10/3/2019	10/4/2019	Report Metrology
Beam Vibration	10/14/2019	10/8/2019	10/10/2019	10/11/2019	Report Load Cell & Project Proposal
Pitot Tube	10/21/2019	10/15/2019	10/17/2019	10/18/2019	Report 4
Gage R&R	10/28/2019	10/22/2019	10/24/2019	10/25/2019	Report 5
Term Project	11/4/2019	10/29/2019	10/31/2019	11/1/2019	Report 6
Term Project	11/18/2019	11/5/2019	11/7/2019	11/8/2019	
Term Project	11/25/2019	11/12/2019	11/14/2019	11/15/2019	
Project Presentation	12/2/2019	11/19/2019	11/21/2019	11/22/2019	Project Presentation
Project Report	12/9/2019	12/9/2019	12/9/2019	12/9/2019	Project Report

*The schedules are subject to change with fair notice.