Spring
2025

SCUPI
Sichuan University - Pittsburgh Institute

ME 1041 Mechanical Measurements 1

(Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be announced in class or posted on the course website.)

Instructor: Dr. Dong Liang

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Office hours:
Wednesday :2:00-5:00 PM

Note: when emailing the instructor or the teaching assistants, please

- Include the course number, your name and your student number in the subject field of your message;
- And use your university email account.

Lecture time/location: Wednesday 10:15-11:55 AM / SCUPI Building N-213

Laboratory location: SCUPI Building Mechanical Measurement Lab

Laboratory times: Wednesday 1:50-3:30 PM

Wednesday 10:15-11:55 PM (Week 16 for Final Project)

Catalog Description:

3 Credits; this course is the first in a sequence of courses that pertain to engineering laboratory measurements. This course aims to provide a basic knowledge of measurement systems that include instruments used to collect data, sensors used to monitor mechanical systems, tools used to condition measurements signals and statistics for analyzing experimental data. Laboratory exposure is an important component in this course that will help prepare students for the second course in the sequence, ME 1042.

Course Objective:

This course aims to provide a well-founded, fundamental background in the theory of engineering measurements and hands-on experience with common laboratory instrumentation. Integrated throughout are the necessary elements to conduct engineering measurements through the design of measurement systems and measurement test plans, with an emphasis on the role of statistics and uncertainty analyses in that process.

Learning Outcomes:

At the completion of this course, students will be able to

- Develop an understanding of a laboratory environment and safe practice techniques.
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- Become familiar with common laboratory tools like power supplies, multimeters, oscilloscopes, data acquisition units, strain gages, etc.
- Collaborate effectively as a team to plan tasks and achieve objectives.

Prerequisites:

ENGR 0145 Statics and Mechanics of Materials 2, MEMS 0031 Electric Circuits

Textbook: Theory and Design for Mechanical Measurements, 7th Edition, Figliola and Beasley, Wiley, 2019.

Website: https://pibb.scu.edu.cn/

Topics Covered:

Laboratory 1: Introduction to Instrumentation and Data Acquisition

Data Acquisition (Ch. 2)
Sampling Concepts (Ch. 7)

Laboratory 2: Use of Accelerometers in the Measurements of Dynamic Systems

Measurement System Behavior (Ch. 3)
Accelerometers (Ch. 12)

Laboratory 3: Temperature Sensors and Statistical Analysis of Data

Measurement System Behavior (Ch. 3)
Finite Statistics (Ch. 4)
Uncertainty Analysis (Ch. 5)
Temperature Measurements (Ch. 8)

Laboratory 4: Use of Strain Gages to Determine the Strain in Cantilever Beams

Strain Gages, Resistance Bridges, Bridge Constants (Ch. 11)
Apparent Strain, Temperature Compensation (Ch. 11)

Laboratory 5: Characteristics of Passive & Active Filters

Filters and Amplifiers (Ch. 6)

Group Final Project

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Course Schedule:

Week	Lecture	Lab
1	Feb 26 Course Intro., Ch. 1	Feb 26 No Lab
2	March 5 Ch. 1, Ch. 2	March 5 Lab Safety Intro.
3	March 12 Ch. 2, Ch. 7	March 12 Lab 1
4	March 19 Ch. 3	March 19 No Lab
5	March 26 Ch. 12, Group 1&2	March 26 Lab 2
6	April 2 Ch. 8	April 2 No Lab
7	April 9 Ch. 4, Group 3&4	April 9 Lab 3
8	April 16 Ch. 4, Ch. 11	April 16 No Lab
9	April 23 No class	April 23 Midterm Exam
10	April 30 Ch. 11,Group 5&6	April 30 Lab 4
11	May 7 Ch. 6	May 7 No Lab
12	May 14 Ch. 6, Group 7&8	May 14 Lab 5
13	May 21 Ch. 5	May 21 No Lab
14	May 28 Project Introduction, Group 9	May 28 Final Project-Step 1
15	June 4 Course review	June 4 Final Project-Step 2
16	June 11 Final Project-Step 3	June 11 Final Project-Step 4
17	June 18 Final Exam	

Course Gradings:

- Attendance 10%
- Studio 10 %
- Lab reports+Group project 30 %
- Midterm exam 20%
- Final exam 30 %

Note: 3-student group for studio, lab reports and project submission, every group member receive the same score.

Grading Scale:

Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Percentage (%)	100~90	89~85	84~80	79~76	75~73	72~70	69~66	65~63	62~61	60	<60

Class Policies:

- On-time attendance at all class activities is expected. Student is responsible for any material that was covered, and any changes to the exam dates and homework assignments announced in class.
- In general, no late assignment or make up exams will not be accepted. If you have a serious conflict with an exam schedule, you must discuss it with the instructor and **take the exam early**. Failure to contact the instructor prior to the exam or assignment due date will result in **a zero** on that exam/assignment. Exams missed due to a serious illness or a family emergency (these must be documented) will be dealt with on a case-by-case basis according to the University Policy.
- Any questions regarding the grading discrepancy should be brought up within a week of returning the homework or exam.
- Violations of academic integrity include, but are not limited to, cheating, plagiarism, or misrepresentation in oral or written form. Such violations will be dealt with severely, in accordance with University policy.

Laboratory Policies:

- **Students must attend all scheduled labs.** Absence from any lab project will result in a score of **zero** for that project. Exceptions will be made for a valid excuse consistent with University Policy. If you cannot attend a laboratory, you must contact the instructor prior to the lab session in order to reschedule.
- Late submission of a lab report within one week will result in an **20%** deduction of the total marks. Late submission of a lab report exceeding one week will result in a **50%** deduction of the total marks.
- While in the laboratory, all safety guidelines and procedures must be followed. Failure to comply with safe laboratory practices will result in removal from the course.