Spring
2023

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: Dong Liang

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Friday :8:30 AM-12:00 AM

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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: Tuesday 10:15- 11:55 PM / Zone 3-102

Laboratory location: Zone 3-120

Laboratory times: Friday 8:15 – 9:55 AM

Friday 10:15– 11:55 AM (Week 15 to 17 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, in which laboratory assignments become more involved.

Fall
2022

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Course Objective:

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

- Develop an understanding of a laboratory environment and safe practice techniques.
- Learn how to organize experimental procedure and operate laboratory equipment.
- Become familiar with common laboratory tools like power supplies, multimeters, oscilloscopes, data acquisition units, strain gages, etc.
- Learn how to effectively analyze data sets and apply statistical techniques (i.e. uncertainty analysis and variance).
- Design and implement an experimental approach for hypothesis testing.

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)

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Course Schedule:

Week	Lecture	Lab
1	Feb 21 Course Introduction, Ch. 1	Feb 24 No Lab
2	Feb 28 Ch. 1, Ch. 2	March 3 Lab Safety Introduction
3	March 7 Ch. 2, Ch. 7	March 10 Lab 1
4	March 14 Ch. 3, Ch. 12	March 17 No Lab
5	March 21 Ch. 12	March 24 Lab 2
6	March 28 Ch. 8	March 31 No Lab
7	April 4 Ch. 4	April 7 Lab 3
8	April 11 Ch. 4, Ch. 11	April 14 No Lab
9	April 18 Midterm Exam	April 21 No Lab
10	April 25 Ch 11	April 28 Lab 4
11	May 2 Ch. 6	May 5 No Lab
12	May 9 Ch. 5	May 12 Lab 5
13	May 16 Project Introduction	May 19 Final Project-Step 1
14	May 23 Course Review	May 26 Final Project-Step 2
15	May 30 Final Project-Step 3	June 2 Final test
16	June 6 Final test	
17	June 13 Final Exam	

Course Gradings:

- Attendance 5%
- Studio 10 %
- Lab reports 20 %
- Group project 20 %
- Midterm exam 20%
- Final exam 25 %

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**. 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. 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.