

ME 1041 – MECHANICAL MEASUREMENTS 1**2024-2025 Fall**

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

Catalog Description:

This course is the first in a sequence of courses that pertain to engineering laboratory measurements. Its primary objective is to provide fundamental knowledge of mechanical measurements. This encompasses aspects such as measurement system components, data acquisition, standards, instrument calibration, signal characteristics, measurement system behavior, signal conditioning, statistical treatment of data, uncertainty analysis, and technical report writing. (3 credit hours).

Prerequisites:

- ENGR 0145 Statics and Mechanics of Materials 2
- MEMS 0031 Electrical Circuits or equivalent

Lecture time/location: Tuesday 08:15 - 09:55 / N213

Laboratory time/location: Tuesday 10:15-11:55 / N206

Note: Studios will be conducted from 10:15-11:55 in N213 during weeks with no lab.

Textbook & References:

- Theory and Design for Mechanical Measurements, 7th Edition, Figliola and Beasley, Wiley, 2019.
- Additional references and supplementary materials will be posted on Blackboard.

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Office Hours: Monday 13:00 – 16:00 and Tuesday 13:00 – 16:00

For consultation outside office hours, please send an email to make an appointment. Note: please include the course name/number, your name and student number in the message. In the subject field of your email indicate the issue (and use your university email account).

Course Objectives:

- Introduce students to basic concepts of measurement methods.
- Acquaint students with development of experiment test plans.
- Develop the students' skills in the analysis and reporting of measured data sets.

Course Learning Outcomes:

After the successful completion of this course students should be able to:

- Apply sensing and data acquisition techniques to measure force, temperature, strain, etc.
- Develop experiment test plans to design measurement systems and procedures taking into consideration safety issues.
- Apply statistical methods to analyse data sets with uncertainties.
- Communicate the measurement results to appropriate audiences.

This course contributes to the following ABET Criterion 3 outcomes:

- (1) Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- (5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- (6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- (7) Acquire and apply new knowledge as needed, using appropriate learning strategies.

Tentative Course Schedule (changes will be announced):

Week	Text	Lecture	Lab
1	Ch. 1	L1 Course Introduction	
2	Ch. 2	L2 Signal Characteristics	Lab Safety Introduction
3		Holiday	Holiday
4	Ch. 7	L3 Sampling & Digital devices & studio 1	Lab 1 (Ch. 2 & 7)
5		Holiday	Holiday
6	Ch. 3	L4 Measurement system behavior	No Lab (studio 2)
7	Ch. 12	L5 Mechatronics sensors	Lab 2 (Ch. 3 & 12)
8	Ch. 4, 8	L6 Probability & Statistics 1	L7 Temperature Measurements Studio 3 (23-25 Oct).
9		Midterm Exam	Lab 3 (Ch. 1, 3, 4, & 8)
10	Ch. 11	L8 Strain Measurement	No Lab (studio 4)
11	Ch. 6	L9 Analog Electrical Devices	Lab 4 (Ch. 11)
12	Ch. 4	L10 Probability & Statistics 2	No Lab (studio 5)
13	Ch. 5	L11 Project Introduction	Lab 5 (Ch. 6 & 7)
14		Project (Step 1: Develop measurement plan)	
15		Project (Step 2: Implement measurement plan)	
16		Project (Step 3: Analyze the data)	
17		Final exam	

Grading Policy:

ACTIVITIES	PERCENTAGES
Studios	10%
Labs	30%
Group project	20%
Midterms	20%
Final	20%

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:

- Sichuan University attendance policy will be enforced. Attendance will be taken at the start and checked at the end of the class. Students who come to class more than 15 minutes late (without valid reasons) will be considered as absent. Students who leave class early (without valid reasons) will be considered as absent. Students who sign the attendance for another student will be considered as absent and will be reported to the University as a misconduct. Students performing activities not associated with the course while in class (e.g. sleeping, watching video, playing games, doing other course assignments or personal work) will be considered as absent.
- Students with 3 unexcused absences (including lateness or leaving class early) will receive zero for all studios, labs, and projects (i.e., only the midterm and final exams' marks will be considered towards their final grades).
- Students who missed more than a third of the classes (these absences included classes missed with and without approval and valid reasons) will lose the right to be assessed and will receive zero for the course.
- All studios, labs, projects and exams have clearly stated submission requirements. No marks will be given if the submission requirements are not met.
- Late submissions will not be accepted for studios. There is no makeup for studios.
- Late submissions for lab and project reports are calculated based on the following equation.

$$\text{Late submission full mark} = 100\% \times r^n$$

$r=0.8$: discounted return coefficient; n : number of late weeks and n is an integer number which will be rounded up, e.g. $n=1$ for the late submission within a week.

- If a student cannot attend the midterm examinations, the student must contact the instructor immediately with a valid reason. If the reason stated is consistent with University Policy, arrangements can be made for alternate assessments. Otherwise, the student will get zero

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for the midterm examinations. If a student has a valid reason and cannot attend the final exam, the student must apply to the administration for a deferred examination.

- Challenge to the grading must be made within 7 days after the returned of the graded assessment item. No challenges to the grading will be entertained after the 7-day period.

Laboratory Policies:

- **Students must attend all scheduled labs.** Failure to attend the labs will result in **zero** for all lab report grades. Exceptions can 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 to reschedule. While in the laboratory, all safety guidelines and procedures must be followed.

Academic misconduct and non-academic misconduct will not be tolerated. All misconduct will be reported and dealt with by SCUPI.

Academic misconduct:

All students in attendance at the Sichuan University are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University expects from its students a higher standard of conduct than the minimum required to avoid discipline. Academic misconduct includes all acts of dishonesty in any academically related matter and any knowing or intentional help or attempt to help, or conspiracy to help, another student. The Academic Misconduct Disciplinary Policy will be followed in the event of academic misconduct.

Non-academic misconduct:

All cell phones, and mobile phones are to be turned off and put out of sight during lectures and labs (mobile phones and computers can be turned on during studios). All newspapers and other materials not related to the class are to be put away once class or lab begins. Operating these devices and reading unrelated materials while in class or labs is disrespectful to your instructor and fellow classmates. If you fail to abide by this rule, the instructor has the right to confiscate the device or materials and mark you as absent. If you have an emergency and need to have your phone turned on during class or lab, ask your instructor for permission.