SCUPI
Sichuan University - Pittsburgh Institute

ME 1042 Mechanical Measurements 2

(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.)

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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;
- Use your university email account.

Lecture time/location: Thu 16:45 - 18:25 AM/Zone 4-204
Laboratory location: Zone 3-113/116
Laboratory times: Tuesday 8:15 AM– 9:55 AM

    Tuesday 10:15 AM– 11:55 AM
    Tuesday 13:50 PM – 15:30 PM
    Tuesday 15:40 PM – 17:30 PM

Catalog Description:

3 Credits; this course is the second in a sequence of courses that pertain to engineering laboratory measurements. This course aims to advance the understanding of measurement systems and analyzing experimental data. Students will test laboratory scaled mechanical engineering systems and apply fundamental knowledge from mechanical engineering topics to analyze and rate those systems. Laboratory exposure is an important component in this course that will help prepare students for future laboratory setting environments.

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 advanced engineering laboratory tools and how engineering systems are tested.
- Learn how to effectively analyze data sets and apply statistical techniques (i.e. uncertainty analysis).
- Design and implement an experimental approach for hypothesis testing.

Prerequisites:

ME 1041 Mechanical Measurements 1

Textbook:

Theory and Design for Mechanical Measurements, 7th Edition, Figliola and Beasley, Wiley, 2019. Other resources will be released on BB platform.

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

Topics Covered:

Topic 1: Solid Mechanics and Design
Geared Systems
Forced and Free Vibrations
Uniaxial Tension Test of Materials
Heat Treatment of Materials

Topic 2: Control System
Automated Level Control using Programmable Logic Controllers (PLCs)
Fundamentals of Feedback Control
PD Control of Unstable Systems
Robot Manipulator Control

Topic 3: Thermal & Fluid Labs
Fluid Mechanics
Bench-top Heat Exchangers
Radiation Heat Transfer

Course Schedule:

Week	Lecture	Lab
1	Feb 23 Course Introduction	Feb 28 Lab Introduction and Safety
2	March 2 Gear Systems	March 7 Gear Systems
3	March 9 Uniaxial Tension Test	March 14 Uniaxial Tension Test W1
4	March 16 Forced and Free Vibrations	March 21 Uniaxial Tension Test W2 Forced and Free Vibrations W1
5	March 23 Heat Treatment of Materials	March 28 Forced and Free Vibrations W2 Heat Treatment of Materials W1

6	March 30 Course Review	April 4 Heat Treatment of Materials W2
7	April 6 Exam I	April 11 No lab
8	April 13 Programmable Logic Controllers	April 18 Programmable Logic Controllers
9	April 20 Fundamentals of Feedback Control	April 25 Fundamentals of Feedback Control
10	April 27 Unstable Systems	May 2 Unstable Systems
11	May 4 Robot Manipulator Control	May 9 Robot Manipulator Control
12	May 11 Exam II	May 16 No Lab
13	May 18 Fluid Mechanics	May 23 Fluid Mechanics W1
14	May 25 Heat Exchangers	May 30 Fluid Mechanics W2 Heat Exchangers W1
15	June 1 Radiation Heat Transfer	June 6 Heat Exchangers W2 Radiation W1
16	June 8 Course Review	June 13 Radiation W2
17	Final Exam (TBD)	

Course Gradings:

- Studio   10 %
- Class attendance   5 %
- Lab reports   25 %
- Midterm exam I   20 %
- Midterm exam II   20 %
- Final exam   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:

- 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.
- Late submission for studio or homework is calculated based on the following equation
$$\textcolor{red}{\textbf{Late submission full mark} = \textbf{100\%} \times \textbf{\textit{r}}^{\textbf{\textit{n}}}}$$
$r = 0.8$: discounted return coefficient; n : number of late weeks and n is an integer number which will be round up, e.g. $n = 1$ for the late submission within a week
- Any questions regarding the grading discrepancy should be brought up **within a week** after returning the homework, report 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.