UTTyler ENGINEERING

Department of Mechanical Engineering
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MENG 3210 – Experimental Measurements and Techniques
Course Syllabus

Semester / Year	Fall 2025
Catalog Description	This is an experiential learning course based on Laboratory experiments. It exposes the students to concepts of accuracy, uncertainty, and usefulness of measurements. Sensors for measuring physical phenomena such as: strain, force, displacement, acceleration, pressure, and temperature will be introduced. Data acquisition and signal processing techniques will also be applied to actual measurements. Student teams will design, analyze, and document an experimental procedure. All procedures will result in a professional quality laboratory report.
Prerequisites	A Grade of C or better in: - ENGR 2302 Dynamics - PHYS 2326 University Physics II - PHYS 2126 University Physics II Laboratory
Section Number	**Lecture**: 051 **Lab.**: 031L, 032L, 033L
Instructor Name	Ola Al-Shalash
Contact Information	**Office:** Houston Engineering Center: **A212** **E-mail:** oalshalash@uttyler.edu
Class Type / Location	**Lecture:** Hybrid / HEC C204 **Lab:** Face-to-face / HEC B222
Class Time	**Lecture**: Monday 10:10 am - 11:05 am Attend the required lab meeting based on myuttyler enrollment: **031L**: Monday 2:00 pm - 4:45 pm **032L**: Friday 10:00 am -12:45 pm **033L**: Friday 2:00 pm - 4:45 pm
Office Hours	**Tuesdays and Thursdays** 11:00 am – 12:30 pm or by appointment
Credit Hours	2 (1 hour lecture and 3 hours laboratory per week)
Required Textbook	There is no required textbook for the lab, however, an equivalent of the price of a typical experimental textbook may be required as a contribution from each student for material needed to execute the assigned experiments and project. **Course materials will mostly come from the following book: Introduction to Engineering Experimentation**, Third Edition, Anthony J. Wheeler and Ahmed R. Ganji.
Optional References	1. **Measurement and Instrumentation -Theory and Application**, Second Edition, by Alan S. Morris and Reza Langari. 2. **Theory and Design for Mechanical Measurements**, Fifth Edition, by Richard S. Figliola and Donald E. Beasley.

	3. **Measurement and Instrumentation Principles**, Third Edition, by Alan S Morris. 4. LabVIEW Tutorial. https://learn.ni.com/learn/article/labview-tutorial 5. Additional Material on Canvas: Websites, Class Handouts, Tutorials on MATLAB and Simulink by Mathworks, Inc.
Additional Rules and Requirements	- Laptop requirement (see policy below) - LabVIEW by National Instruments, and MATLAB, Simulink & Simscape by MathWorks, Inc. (available through virtual desktop – one.uttyler.edu) - AI is permitted only for specific assignments or situations, and appropriate acknowledgment is required. - AI is permitted for use in lab reports for providing writing feedback and suggested edits. However, wholesale generation of content is NOT permitted. - It is NOT permitted to use AI for solving homework, quiz, or exam questions unless explicit written approval is given in the assignment instructions. However, it is permitted to ask AI chatbots general questions about how to solve certain types of problems if the chatbot is not providing the solution.
Evaluation Method	Grading: Exam **20** % Assignments **30** % Laboratory Reports **30** % Project **20** %
Grading Policy / Scale	Letter grades Scale: ***A**: 90 – 100; **B**: 80 – 89; **C**: 70 – 79; **D**: 60 – 69; **F**: < 60* **Grade appeal** Grades can be appealed by sending an email then meeting the instructor during office hours, but no later than three days after the grade has been posted. Moreover, students may appeal any grade reduction to the instructor if valid excuse with documentation is provided.
Important events/ dates	**Census date:** September 8 **Last day to withdraw:** November 3 **Midterm Exam:** October 27 **Project due:** December 5 https://www.uttyler.edu/academics/academic-calendar-25-26/academic-calendar-15-week-and-summer.php
Attendance/ Makeup policy/ other rules	• Attendance is expected per university policy. Regular attendance is highly recommended whenever we have an in-person or zoom meeting. It is imperative if you want to do well in this course. • Lab attendance is required. Failure in attending a lab will result in a zero grade in the corresponding lab report.

	• Attendance will be taken and regularly checked using Canvas. Students who come to class after attendance is taken will be considered absent. • In case you have to miss a class, it is your responsibility to keep up with the class work and be informed of all the announcements made in the class. • Students will not be permitted to leave the classroom during lectures/labs except for extreme emergencies. • Lectures and everything regarding the course are posted on Canvas, make sure to check your course canvas regularly. It is your responsibility to keep up with the class work and be informed of all the announcements made on canvas. • No email submission of assignments, HomeWorks, etc. All assignments MUST be submitted to Canvas for grading. • No makeup unless students provide a university accepted excused absence with proper documentation justifying the absence. • A student missing a laboratory activity by 10 minutes or more (e.g. arrive at 2:10:01 pm instead of at 2:00:00 pm) will have a zero grade in the laboratory assignment. • Questions involving knowledge covered in class will be answered if the student proves that they have tried to come up with the answer. Solutions to homework will not be given. However, students can work on the right solution by checking their work with the instructor. • Students with SAR status should contact the UT Tyler Office of Student Accessibility and Resources for exam arrangements. • Any minor violation of the Student Behavior (see below) or the lab safety rules by a student as deemed by the instructor will result in a full letter grade reduction for each incident while any major violation(s), such as cheating and plagiarism, by a student as deemed by the instructor will result in automatic failing grade in the course. • The use of cellular phones during lectures/labs is prohibited. If a student uses the cellular phone (call, text, internet), he/she will be asked to leave the classroom and penalties of missing the class will apply. It is highly recommended to keep your cellular phone off. • No food is allowed in the classroom or laboratories. • Late submissions of assignments, lab reports (e.g. if due at 11:59:00 pm, then any time after such as 11:59:30 pm is late) will result in **20 % deduction per day** from the graded score. • Given this is a professional, educational setting you are expected to dress and behave appropriately including wearing full pants and closed-toed shoes. A positive, mature attitude/behavior is expected from the students in all classes. Students disturbing directly or indirectly the class or other

	students will be asked to leave the classroom with the consequences associated to an absence. • Since the mechanical engineering program is intended to train students to be engineering professionals, it is expected that all work products (e.g. homework, lab reports, projects, presentations, etc.) submitted for class to be of professional quality. Failure to submit professional quality work may result in grade reductions, regardless of whether any grading scheme or rubric for an assignment explicitly includes professionalism in the grade calculation. • Students are encouraged to utilize any tutoring services available if needed and come prepared to each week's class and lab. Each student is expected to work with the group in a professional manner in case of any group activities. It is important to communicate clearly and professionally of any concerns or issues to the instructor. • Canvas should be the primary mode of contacting the instructor so check the Canvas announcements and discussion board to check for information about the course. In addition, university provided patriots email should be the official communication method, and you should check your email regularly. Use the above email address or Canvas messaging if you want to email the instructor. Please use **MENG 3210- your section, your question or concern title** in the email subject line. Please allow the instructor at least one to two business days to respond to your email. Emails with improper language will not be answered. Emails with same concerns or questions from multiple students will be answered/covered during class time. • The syllabus is subject to change during the semester as deemed necessary. Students will be notified for any major changes.
Course Learning Objectives / ABET & PEOs relation	By the end of this course, students will be able to: 1. Select and use sensors and instrumentation to report engineering measurements and to perform calculations using the corresponding governing equations. (SO6) 2. Interpret and analyze data, obtained from Engineering Experimentation, using statistical methods and uncertainty analysis. (SO6) 3. Design, perform, and report results of a mechanical engineering experiment. (SO5) 4. Use software for data acquisition. (SO6) 5. Write clear and well documented laboratory reports. (SO5)
Tentative Topics	• Basic Measurements and Uncertainty • Statistical Analysis • Signal Conditioning • Temperature • Displacement • Strain

University Policies	https://www.uttyler.edu/offices/academic-affairs/files/syllabus-information.pdf
Evaluation activities	• **Exams**: there will be one exam during the semester. Late or no submission for the exam results in automatic grade of zero. • **Assignments**: Assignments include but not limited to pre-lab draft reports, in-class activities, LabVIEW assignments and MATLAB homework. Most assignments need to be completed before each lab. • **Lab Reports**: For each laboratory activity, a report must be submitted before the beginning of the following laboratory class for grading on Canvas. Instructions on lab report format/style and grading rubric will be given separately. In addition, each lab report should include an appendix section that shows a list that shows which team members worked on what parts of the lab and how many hours they spent (this applies to the project report as well). Peer Evaluation will have to be completed for couple selected lab reports if not all. • **Project Report**: Each student, part of a group, will work on one lab project of a topic approved by the instructor. The default project will be given separately. Students working in groups must propose the concept, demonstrate the experiment, and show the results of the project and finally discuss them.

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Tentative course schedule:

#	Week of	Lecture Activity	Lab Activity
1	Aug. 25	Course Introduction/ Syllabus	**Lab A** - MATLAB onramp tutorial certificate credit
2	Sep. 1	Monday, Sep. 4: Labor Day holiday - No Classes	Monday, Sep. 4: Labor Day holiday - No Classes
3	Sep. 8	Significant Digits	**Lab B** - Lab Safety Presentation and Quiz
4	Sep. 15	Measurement Systems I	**Lab C** - LabVIEW I
5	Sep. 22	Measurement Systems II	**Lab D** - LabVIEW II
6	Sep. 29	Statistical Analysis I	**Lab E** - LabVIEW III
7	Oct. 6	Statistical Analysis II	**Lab F** - Report Writing/Project expectations and instructions
8	Oct. 13	Statistical Analysis III	**Lab 1**- How to use a Digital Multimeter
9	Oct. 20	Uncertainty Analysis	**Lab 2** - Uncertainty in Measurements
10	Oct. 27	**Mid-Term Exam**	Work on Student Design Lab Project
11	Nov. 3	Signal Conditioning	**Lab 3** - Signal Conditioning
12	Nov. 10	Measuring temperature	**Lab 4** - Temperature Measurements
13	Nov. 17	Measuring Displacement	**Lab 5** - Displacement Measurements
14	Nov. 24	**Thanksgiving holidays – No Classes**	
15	Dec. 1	Supplemental topic	Project Report due on Dec. 5
16	Dec. 8	**Final Exam Week**	