Department of Mechanical Engineering
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Uttyler.edu/engineering

MENG 3210 – Experimental Measurements and Techniques
Course Syllabus

Semester / Year	Fall 2023
Catalog Description	This 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	Grade C or better in: - ENGR 2302 Dynamics - PHYS 2326 University Physics II - PHYS 2126 University Physics II Laboratory
Section Number	**Lecture**: 030 **Lab**: 031L, 033L
Instructor Name	Ola Al-Shalash
Contact Information	**Office:** Houston Engineering Center: **A212** **E-mail:** oalshalash@uttyler.edu
Class Type / Location	**Lecture:** Face-to-face / HEC B222 **Lab:** Face-to-face / HEC B222
Class Time	**Lecture - 030**: Monday 11:15 AM - 12:15 PM Attend the required lab meeting based on myuttyler enrollment: **031L**: Monday 2:00 PM - 4:45 PM **033L**: Friday 8:00 AM - 10:45 AM
Office Hours	**Mondays:** 12:20 PM – 1:50 PM **Fridays**: 10:45 PM – 12:15 PM or by appointment
Credit Hours	2 (1 hour lecture and 3 hours laboratory per week)
Required Textbook	**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)
Evaluation Method	Grading: Exam **20** % Quizzes **10** % Assignments, Class Participation and Conduct **25** % Laboratory Reports **25** % 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 1 **Last day to withdraw:** October 30 **Midterm Exam:** Week of October 23 **Project due:** Week of November 27
Attendance/ Makeup policy/ other rules	• Attendance is expected per university policy. Regular attendance is highly recommended. 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 announcements made in the class. • Students will not be permitted to leave the classroom during lectures/labs except for extreme emergencies. • No email submission of assignments, HomeWorks, etc. All assignments MUST be submitted to Canvas for grading. • No makeups unless students provide a university accepted excused absence with proper documentation at the discretion of the instructor. • A student missing a laboratory activity by 10 minute or more (e.g. arrive at 2:10:01 pm instead of at 2:00:00 pm) will have zero in the laboratory assignment. • Questions involving knowledge covered in class (lecture/laboratory) will be answered if the student proves that they have tried to come up with the answer. Solution to homework and quizzes will not be given. However, students can work on the right solution by checking their work with the instructor. • Student 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 form (see Canvas) 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 the class and lab is prohibited. • No food is allowed in the classroom or laboratories. • 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 • Self-directed laboratory investigation
University Policies	https://www.uttyler.edu/academic-affairs/files/syllabus_information_2021.pdf

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Tentative course schedule:

#	Week of	Lecture Activity	Lab Activity
1	Aug. 21	Course Introduction/ Syllabus/ Significant Digits	**Lab A** - MATLAB onramp tutorial certificate credit
2	Aug. 28	Significant Digits	**Lab B** - Lab Safety Presentation and Quiz
3	Sep. 4	Monday, Sep. 4: Labor Day holiday - No Classes	Monday, Sep. 4: Labor Day holiday - No Classes
4	Sep. 11	Measurement Systems I	**Lab C** - LabVIEW I
5	Sep. 18	Measurement Systems II	**Lab D** - LabVIEW II
6	Sep. 25	Statistical Analysis I	**Lab E** - LabVIEW III
7	Oct. 2	Statistical Analysis II	**Lab F** - Report Writing/Project expectations and instructions
8	Oct. 9	Statistical Analysis III	**Lab 1**- How to use a Digital Multimeter
9	Oct. 16	Uncertainty Analysis	**Lab 2** - Uncertainty in Measurements
10	Oct. 23	**Mid-Term Exam**	**Lab 3** - Signal Conditioning
11	Oct. 30	Signal Conditioning	**Lab 4** - Temperature Measurements
12	Nov. 6	Measuring temperature	**Lab 5** - Displacement Measurements
13	Nov. 13	Measuring Displacement	Work on Student Design Lab Project
14	Nov. 20	**Thanksgiving holidays – No Classes**	
15	Nov. 27	Supplemental topic	Project Report due
16	Dec. 4	**Final Exam Week**	