

**MENG 3210 Experimental Measurements and Techniques**  
**Course Syllabus**

<b>Semester / Year</b>	<b>Fall 2025</b>
<b>Catalog Description</b>	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.
<b>Prerequisites</b>	A grade of “C” or a better grade is required in the following: ENGR 2302, PHYS 2326 and PHYS 2126.
<b>Section Number</b>	001, 001L, 002L, 003L
<b>Instructor Name</b>	Dr. Andrew Robbins
<b>Contact Information</b>	Office: RBN 3006 Email: <a href="mailto:arobbins@uttyler.edu">arobbins@uttyler.edu</a>
<b>Lecture Class Type / Instruction Mode / Location</b>	Type: Face-to-Face Instruction Mode: Lecture Location: RBN 4034
<b>Lecture Class Time</b>	M 10:10 - 11:10 AM
<b>Lab Class Type / Instruction Mode / Location</b>	Type: Face-to-Face Instruction Mode: Lab Location: RBN 1035
<b>Lab Class Time</b>	Sec 002L: M 2:00 - 4:45 PM Sec 001L: R 2:00 - 4:45 PM Sec 003L: F 10:00 - 12:45 PM
<b>Office Hours</b>	Wednesdays 8:30-10:00am Thursdays 8:30-10:00am or by appointment
<b>No. of Credits</b>	2 (1 hour lecture, 3 hour lab per week)

<b>Required Textbook</b>	NONE
<b>Optional References</b>	<p>T. G. Beckwith. <b>Mechanical Measurements</b>. 6th edition. Pearson Available to check out form the internet archive for free: <a href="https://archive.org/details/mechanicalmeasur0000beck_q2k3">https://archive.org/details/mechanicalmeasur0000beck_q2k3</a></p> <p>R. S. Figliola. Theory and Design for Mechanical Measurements. 7th edition. Wiley. PDFs of the 5th edition are available online</p> <p>J. P. Holman. Experimental Methods for Engineers. 8th edition. McGraw-Hill. Available to check out for free (8th international) from internet archive: <a href="https://archive.org/details/experimentalmeth0008holm">https://archive.org/details/experimentalmeth0008holm</a></p> <p>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.</p>
<b>Additional Rules and Requirements</b>	<p>AI is permitted for use in lab reports for providing writing feedback and suggested edits. However, wholesale generation of content is NOT permitted.</p> <p>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.</p> <p>Any other assignment for which the use of AI is permitted will have instructions in the assignment instructions detailing the expectations regarding the use of AI on that assignment.</p> <p>Additional instructions regarding the use of AI tools will be provided in class. All instructions given in class are binding requirements to which every student will be held accountable.</p> <p>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 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.</p>

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<p><b>Tentative Topics / Course Plans</b></p>	<ol style="list-style-type: none"> <li>1. Measurement systems and sources of error               <ol style="list-style-type: none"> <li>a. Systematic errors</li> <li>b. Random errors</li> </ol> </li> <li>2. Statistical tests               <ol style="list-style-type: none"> <li>a. z-tests</li> <li>b. Paired and unpaired t-tests</li> <li>c. Chi squared tests</li> </ol> </li> <li>3. Uncertainty propagation</li> <li>4. 1st and 2nd order dynamics in measuring systems</li> <li>5. Measurement techniques and sensors for:               <ol style="list-style-type: none"> <li>a. Length, displacement, and strain</li> <li>b. Velocity and Acceleration</li> <li>c. Temperature</li> <li>d. Mass and Mass properties</li> <li>e. Force and Strain</li> </ol> </li> <li>6. Technical writing</li> </ol>
<p><b>University Policies</b></p>	<p><a href="https://www.utt Tyler.edu/offices/academic-affairs/files/syllabus-information.pdf">https://www.utt Tyler.edu/offices/academic-affairs/files/syllabus-information.pdf</a></p>

## Course Schedule

Week	Lecture	Lab (M)	Lab (R)	Lab (F)	Lecture	Lab Unit	Lab
1	8-25	8-25	8-28	8-29	Intro	Technical Writing	Technical Writing and AI
2	9-8	9-8	9-11	9-12	Statistics Review	Statistics	Statistics
3	9-15	9-15	9-18	9-19	Statistical Tests	Project	Project Preparation I
4	9-22	9-22	9-25	9-26	Confidence & Uncertainty	Manual Measurements	Length
5	9-29	9-29	10-2	10-3	Measurement Error		Pressure
6	10-6	10-6	10-9	10-10	Measurement Linearity		Mass Properties
7	10-13	10-13	10-16	10-17	1st Order Systems	Project	Project Preparation II
8	10-20	10-20	10-23	10-24	2nd Order Systems	Practical	Practical (lecture 1-6, lab1-5)
9	10-27	10-27	10-30	10-31	Temperature	Electronic Measurements	Temperature
10	11-3	11-3	11-6	11-7	Displacement and Strain		Wheatstone Bridge & Strain
11	11-10	11-10	11-13	11-14	Velocity & Acceleration		Velocity
12	11-17	11-17	11-20	11-21	Force & Pressure	Project	Project Presentations
13	12-1	12-1	12-4	12-5	Exam (comprehensive)	Practical	Practical (comprehensive)