

**MENG 3210: Mechanical Engineering Lab I**  
**The University of Texas at Tyler**  
**Sections 001, 001L, 003L**

<b><u>Instructor:</u></b>	<i>Dr. Wathiq Ibrahim, Mechanical Engineering. Ratliff Building North (RBN) 3008, <a href="mailto:Aibrahim@uttyler.edu">Aibrahim@uttyler.edu</a></i>
<b><u>Office Hours</u></b>	<i>Tuesday and Friday 10:00 am – 11:30 am or by appointment.</i>
<b><u>Lectures:</u></b>	<i>Monday 9:05 – 10:00 am, Room RBN 02007</i>
<b><u>Labs:</u></b>	<i>Lab 001L: Wednesday 2:00 – 4:45 pm, Room RBN 02022<sup>1</sup>/RBN 1035  Lab 003L: Friday 3:00 – 5:45 pm, Room TBA/RBN 1035  <sup>1</sup> Laboratory classes related to LabVIEW will take place in RBN 2022 (first half of the semester).</i>
<b><u>Lecture Text:</u> (T)</b>	<i>Required: Introduction to Engineering Experimentation, Third Edition, A. J. Wheeler and A. R. Ganji, Prentice Hall, 2010, ISBN 0-13-174276-0.</i>
<b><u>Lab Text:</u> (L)</b>	<i>Recommended: LabVIEW 2009 Student Edition, R. H. Bishop, Prentice Hall, 2010, ISBN 0-13-214129-9.</i>
<b><u>Prerequisites:</u></b>	<i>- ENGR 1200 Engineering Methods or completion of a technical writing course,  - MENG 2201 Mechanical Engineering II,  - PHYS 2126 University Physics II Laboratory,  - PHYS 2326 University Physics II.</i>

### **Course Description:**

- This course is required for all mechanical engineering students and is taken in the junior year. It serves as an introduction to the fundamental principles of instrumentation and measurement, along with statistics, and integrates and applies what you have learned in your math, physics, and mechanical and electrical engineering courses.
- The course includes a 3-hour-per-week laboratory where you apply the material learned in the lecture.
- Predict, analyze, and test the performance of sensors of various kinds, using measurement equipment, such as oscilloscopes, breadboards, function generators, digital data acquisition systems, integrated circuits, strain gages, displacement, force, pressure, acceleration, and temperature.
- Statistical analysis is integrated into the course, especially in the hands-on laboratories, where statistics is used to analyze, manipulate, plot, and interpret acquired data.

### **Evaluation activities:**

- **Exams:** There will be two exams during the semester, the Mid-Term Exam and the Final Exam. The final exam will be comprehensive.
- **Lab Assignments:** for each laboratory activity a report must be submitted at the beginning of the following laboratory class. Instructions for the presentation of the report will be given separately.
- **Homework and Quizzes:** homework/quizzes will be assigned/applied according with the topics covered in lectures and lab activities. **Homework will not be graded**, but students must turn in the homework in order to be able to take the quiz. In other words, the homework is a prerequisite to take a quiz.
- **Student Design Lab Project:** students will design an experiment of a topic approved by the instructor, conduct the experiment, submit a report, and present the project to the class

**Grading:** All exams and homework assignments are *comprehensive*. Mark your calendars!

<b>Mid-Term Exam</b>	<b>20%</b>	Scale: A 90 – 100 B 80 – 89 C 70 – 79 D 60 – 69 F < 60
<b>Lab Assignments</b>	<b>20%</b>	
<b>Quizzes</b>	<b>20%</b>	
<b>Student Lab Project</b>	<b>20%</b>	
<b>Final Exam</b>	<b>20%</b>	

### **Grade Disputes:**

If you feel that an exam, quiz, or lab report was graded unfairly, or if there is an error in the grading, grades can be appealed by meeting the instructor during office hours, but no later than a week after the grade has been given.

### **Cheating Policy:**

Cheating is not tolerated in this course. Regulations about academic dishonesty are contained in *A Student Guide to Conduct and Discipline at UT Tyler*, which may be obtained from the Office of Student Affairs, which explains what behaviors are in violation of academic integrity, and the review process for such violations. Specifically, for this course:

- **First offense: Zero score for the item in question, and infraction reported to the college.**
- **Second offense: Failure of the course, and infraction reported to the college.**

### **Additional Class/Instructor Policies:**

- A quiz applied during a lecture class cannot be retaken. However, the lowest grade under “Quizzes and class participation” will be dropped to compute the average.
- Homework **will not** be graded but it is required to take the quiz.
- Unless otherwise stated, all assignments are due one week after been assigned.
- Questions involving knowledge covered in class (lecture/laboratory) will be answered if the student proves that has 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.
- **A writing guide for lab report will be provided on CANVAS.**
- There **will not be makeup quizzes.**
- I reserve the right to make changes to the syllabus or course schedule during the semester.

### **Course Objectives:**

- Understand basic statistics and develop proficiency in the application of statistical tools.
- Interpret and analyze data obtained from Engineering Experimentation.
- Apply statistical methods to experimental data.
- Analyze experimental uncertainty.
- Design, perform, and report results of a mechanical engineering experiment.
- Develop basic LabVIEW code for data acquisition.
- Write clear and well documented laboratory reports.

### **Course Outcomes:**

- Upon completion of this course, students should be able to:
- Apply statistical analysis to data samples to calculate mean, standard deviation, etc. and to determine the accuracy, precision, and sensitivity of sensors and instruments.
- Apply statistical and error analyses to measured data to identify and remove outliers and predict uncertainties.
- Apply differential equation analysis of first- and second-order dynamic systems to predict the behavior of sensors and instruments.

- Predict, analyze, and test the performance of sensors of various kinds, including strain, displacement, force, pressure, acceleration, and temperature.

### Attendance

- Attendance to lecture classes is strongly recommended but not mandatory. However, attendance to laboratory classes is mandatory.
- All students must remain in the lab until the instructor dismiss them. Leaving the laboratory without the instructor consent will be considered as an absence and the following penalty will be applied.
- A student missing a laboratory activity will have zero in the laboratory assignment (report or other) and must work in a makeup assignment in order to avoid 10 points being dropped in the mid-term or final exam.
- An opportunity to make up the mid-term exam may be available to students with a university accepted excused absence. Other makeups are granted only in extreme cases and at the discretion of the instructor. Excused absence due to illness will require evidence of treatment by medical personnel or at a medical facility.

### Student Behavior

- Academic dishonesty, in the form of cheating, fabrication, falsification, multiple submissions, plagiarism, and complicity, will not be tolerated. Regulations about academic dishonesty are contained in A Student Guide to Conduct and Discipline at UT Tyler, which may be obtained from the Office of Student Affairs.
- The use of cellular phones during the class is prohibited.
- No food or drink is allowed in the classroom or laboratories.

### University policies

#### **UT Tyler Honor Code**

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

#### **Students Rights and Responsibilities**

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

#### **Campus Carry**

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>

#### **UT Tyler a Tobacco-Free University**

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors.

Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products.

There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit [www.uttyler.edu/tobacco-free](http://www.uttyler.edu/tobacco-free)

#### **Grade Replacement/Forgiveness and Census Date Policies**

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. (For Fall, the Census Date is Sept. 12.) Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date (Sept. 9th) is the deadline for many forms and enrollment actions of which students need to be aware. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a “W” grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

### **State-Mandated Course Drop Policy**

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

### **Disability/Accessibility Services**

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <http://www.uttyler.edu/disabilityservices>, the SAR office located in the University Center, # 3150 or call 903.566.7079.

### **Student Absence due to Religious Observance**

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

### **Student Absence for University-Sponsored Events and Activities**

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

### **Social Security and FERPA Statement**

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

### **Emergency Exits and Evacuation**

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

### **Student Standards of Academic Conduct**

Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

i. “Cheating” includes, but is not limited to:

- copying from another student's test paper;
- using, during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;

- possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed “crib notes”. The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
  - using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
  - collaborating with or seeking aid from another student during a test or other assignment without authority;
  - discussing the contents of an examination with another student who will take the examination;
  - divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
  - substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
  - paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
  - falsifying research data, laboratory reports, and/or other academic work offered for credit;
  - taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
  - misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.
- ii. “Plagiarism” includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another’s work and the submission of it as one’s own academic work offered for credit.
- iii. “Collusion” includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.
- iv. All written work that is submitted will be subject to review by plagiarism software.

**UT Tyler Resources for Students**

- [UT Tyler Writing Center](#) (903.565.5995), [writingcenter@uttyler.edu](mailto:writingcenter@uttyler.edu)
- [UT Tyler Tutoring Center](#) (903.565.5964), [tutoring@uttyler.edu](mailto:tutoring@uttyler.edu)
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- [UT Tyler Counseling Center](#) (903.566.7254)

## MENG 3210 - Class Schedule - Fall 2019

Meeting	Day	Date	Activity/Topic	Reading Assignment	Homework
1	Mo	Aug 26	Course Introduction		
	Mo	Sep 2	<b>Holiday - No class</b>		
2	Mo	9	Measurement Systems	T: 1.3; 2.1; 2.2	T: 2.2; 2.3; 2.7; 2.13; 2.18; 2.21; 2.28; 2.31
3	Mo	16	Statistical Analysis	T: 6.1; 6.2; 6.3 (6.3.1; 6.3.2 - Normal Dist.); 6.5; 6.6 (6.6.1 & 6.6.2)	T: 6.3& 6.7; 6.6; 6.52; (Excel); IP.6.1 6.79
4	Mo	24	Statistical Analysis	T: 6.4	T: 6.57(95% & 99%); (65% & 99%); 6.59 6.58
5	Mo	30	Uncertainty	T: 7.1; 7.2; 7.3; 7.4; 7.8	T: 7.5; 7.8
6	Mo	Oct 7	<u>Midterm Exam</u>	-	
7	Mo	14	Signal Conditioning	T: 3.1; 3.2 (3.2.1 to 3.2.5)	T: 3.14 (+ additional question)
8	Mo	21	Pressure	T: 9.1 (9.1.1 & 9.1.2)	T: 9.2; 9.11; IP
9	Mo	28	Temperature	T: 9.2	T: 9.17; 9.20; 9.22
10	Mo	Nov 4	Displacement	T: 8.2	T: 8.24; 8.26; 8.27; 8.28
11	Mo	11	Strain	T: 8.1	T: 8.1; 8.2; 8.3; 8.4
12	Mo	18	Force, Angular Velocity, and Acceleration	T: 8.4; 8.5; 8.6; 8.7	T: 8.37; 8.38; 8.41; 8.47; 8.48; 8.49
	Mo	25	<b>Thanksgiving Holiday - No class</b>		
13	Mo	Dec 2	Review for Final Exam		
14	Mo	9	Final Exam		

IP: instructor problem

## MENG 3210 - Class Schedule - Fall 2019

Lab	Day	Date	Remarks	Reading Assignment
Lab 1	W	Aug 28	Lab Introduction	
	F	30		
Lab 2	W	Sep 4	LabVIEW - Fundamentals	L: 1 (1.8 to 1.10); 2 (2.1, 2.3, 2.4, 2.6, 2.7); 3 (3.1.1 to 3.1.12) (3.2.1 to 3.2.4-Probes)
	F	6		
Lab 3	W	11	LabVIEW - Programming	L: 5 (5.1, 5.2, 5.5); 6 (6.1, 6.2, 6.3); 7 (7.1, 7.2)
	F	13		
Lab 4	W	18	LabVIEW - DAQ	L: 8 (8.1, 8.2 (8.2.2), 8.3, 8.4, 8.8, 8.9; T: 5 (5.1)
	F	20		
Lab 5	W	25	LabVIEW - Signal Processing	L: 11 (11.6.3, 11.7, 11.7.2, 11.7.3, 11.7.4)
	F	27		
Lab 6	W	Oct 2	Basic Measurements and Uncertainty	Laboratory Handout
	F	4		
Lab 7	W	9	LabVIEW - Practicing	
	F	11		
Lab 8	W	16	Signal Processing	Laboratory Handout
	F	18		
Lab 9	W	23	Pressure	Laboratory Handout
	F	25		
Lab 10	W	30	Temperature	Laboratory Handout
	F	Nov 1		
Lab 11	W	6	Displacement	Laboratory Handout
	F	8		
Lab 12	W	13	Student Design Lab Project	
	F	15		
Lab 13	W	20	Student Design Lab Project	
	F	22		
Lab 13	W	27	<b>Thanksgiving Holidays - No Lab</b>	
	F	29		
Lab 14	W	Dec 4	Student Design Lab Project - Presentations	
	F	6		