SYLLABUS
MENG 3123- 201: MEASUREMENTS AND INSTRUMENTATION
(Required Course - Spring 2023)

COURSE INSTRUCTOR
Dr. Pranaya Pokharel (pranaya.pokharel@msutexas.edu)

LAB INSTRUCTOR
Dr. Yu Guo (yu.guo@msutexas.edu)

COURSE & LAB SCHEDULE

Days	*Time*	*Location*
Monday	12:00 pm – 12:50 pm	MY 131
Tuesday	01:30 pm – 03:20 pm*	MY 116
Wednesday	12:00 pm – 12:50 pm	MY 131
Thursday		
Friday		

**Lab sessions are indicated with an asterisk.*

OFFICE HOURS

Days	*Time*	*Location*
Monday	09:00 am – 10.00 am	MY 219C
Tuesday	10:00 pm – 10.50 am	MY 219C
Wednesday	09:00 am – 10.00 am	MY 219C
Thursday		
Friday	09:00 am – 10.00 am	MY 219C

MSU CATALOG DESCRIPTION
Fundamentals of measurement systems, standards, treatment of data, statistics, uncertainty analysis, data acquisition, transducers, strain, force, acceleration, pressure, temperature, and fluid flow, Companion lab. Student will need to learn how to use data acquisition system and process the data as required.

COURSE PRE-REQUISITES
MENG 2204 Electronics, and MATH 3433 or concurrent enrollment therein.

OTHER PREREQUISITES
Basic computer skills, MS Excel, hand calculator

TEXTBOOK
Experimental Methods for Engineers. J. P. Holman. Seventh Edition

SUPPLEMENTAL MATERIAL
Additional material will be distributed in the form of handouts if any.

LIST OF TOPICS COVERED

• Characteristics of Instruments	• Stress and Strain Measurements
• Calibrations	• Mass, Force, and Torque Measurement
• Measurement Uncertainty	• Displacement and Acceleration
• A/D Conversion and Data Acquisition	• Rotational Motion Transducers
• Signal Processing and Filters	• Pressure Measurement
• Temperature Measurements	

Additional material may be covered as time permits.

SPECIFIC GOALS OF INSTRUCTION

Table 1: A detailed list of course objectives matched with the ABET outcomes (1-7).

	ABET OUTCOMES*						
COURSE OBJECTIVES	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Understand the characteristics of instruments (HW, Lab, Exam)	**X**					**X**	**X**
Understand the basics of instrument calibration (Lab)	**X**					**X**	**X**
Ability to analyze the uncertainty of measurements (HW, Exam)	**X**					**X**	**X**
Understand the basics of binary numbers and Analog to Digital conversion (HW, Exam)	**X**					**X**	**X**
Ability to identify a data acquisition device base on the need of resolution and sampling frequency (HW, Exam)	**X**					**X**	**X**
Understand Nyquist frequency and aliasing phenomenon (HW, Lab, Project, Exam)	**X**					**X**	**X**
Ability to perform data analysis using MATLAB (HW, Lab, Project, Exam)	**X**				**X**	**X**	**X**
Ability to perform frequency analysis and design digital filters (HW, Lab, Project, Exam)	**X**				**X**	**X**	**X**
Understand the basics of temperature measurement (Lab)	**X**					**X**	**X**
Understand the basics of Stress and Strain Measurements (HW, Lab, Exam)	**X**					**X**	**X**
Understand the basics of force and torque measurement (HW, Lab, Exam)	**X**					**X**	**X**
Understand the basics of displacement and acceleration measurement (Lab, Exam)	**X**					**X**	**X**
Understand the basics of rotational motion measurement (Lab, Exam)	**X**					**X**	**X**
Understand the basics of pressure measurement (Lab)	**X**					**X**	**X**

***Table 2:** Detailed descriptions of the ABET outcomes (1-7) listed in Table 1.

ABET Outcome	**DESCRIPTION**
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2	an ability to apply engineering design to produce solutions that meets specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3	an ability to communicate effectively with a range of audiences.
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Prepared by Pranaya Pokharel, Jan 2023.

COURSE ORGANIZATION AND STUDENT PERFORMANCES ASSESSMENT

- Lecture Format
  This course consists of a two 50-minutes sessions per week and one 110 minutes lab session per week. The lecture class will be spent mostly explaining and discussing concepts, and solving relevant case problems. Lectures will not be used to communicate the entire textbook course content and thus, students will have to study a set of course paragraphs specified by the instructor on their own to further their understanding. Student participation in class discussions is highly recommended and rewarded.

- Attendance
  Attendance is required for each student. Absences of more than five lectures without proofs of legitimate excuses will result in a failing grade. **For each absences without proofs of acceptable excuses there will be 1 point off from Attendance & Class performance.**

- Student Attitude
  Once class starts, the use of cell phones, reading of newspapers, conducting private discussions, using the computer (unless requested by the instructor), working on anything that is not directly related to the course, and making derogatory remarks about your classmates or instructor will not be accepted and may result in your dismissal from the class. **Each time you are caught will result in 1 point off from Attendance & Class performance. Total grade for Attendance & Class performance is 10 points at beginning and it could become negative.**

- Homework
  Homework will be assigned from a set of chosen chapters. It will be turned in each week, unless specified by the instructor. **Homework must be turned in at the due date in class or online. Once solutions are posted, late homework will be graded 60% of the full grade.** If you copied from solution manual or from your classmates, you will receive zero points.

- Exams
  There will be two regular exams plus one comprehensive exam at the end of the semester. Exam will be close book, a formula sheet is allowed. Each exam is based on the course materials developed between two consecutive exams, except for the final which is comprehensive. Students are expected to take the exam on the scheduled date and time it is given. However, if for some acceptable reason the student is not able to do so, then he must inform the instructor in advance in writing. The instructor will then decide whether he will be allowed to take a makeup exam, depending on the validity of his excuse. There is only one chance of makeup exam no matter what.

- Evaluation Method
  Your performance will be tested regularly throughout the semester by quizzes, in-class exams and homework assignments. There will be three exams. While homework assignments may contain a number of problems, it may be the case that only a subset of problems will be graded. However, you must attempt all problems. Do not try to guess which (if any) problems will not be graded.

- Midterm Progress Report
  In order to help students keep track of their progress, a Midterm Progress Report will be provided for each at-risk student through WebWorld. The grades reported will not be reflected on the students' transcript; nor will they be calculated in the cumulative GPA. However, at-risk students should put more effort and seek out tutoring.

- Course Grade

2	Midterms	20% (together)
	Quizzes	5%
1	Final	30%
1	Final Project	15%
	Homework & Labs	20% (together)
	Attendance & Class performance	10%

Bonus point in any case will only apply to those with a final grade lower than C.

GENERAL GUIDELINES

- Plan on spending at least 6 hours outside of class to study the material and to work on homework assignments, and lab experiments. Do not wait until the last day to start working on your assignment, or prepare for the exam.
- Read the course material before coming to class.
- Utilize the office hours throughout the semester to seek explanations from the instructor.
- In engineering, neatness is a must, not a luxury. Be advised that you will be penalized for lack of neatness.
- You are strongly encouraged to study in group. You must choose different partner for the lab experiments.

CONFLICT RESOLUTION

a. The student should contact the instructor face to face or via e-mail if there is an issue with the course or the instructor. The faculty and the student will discuss this face to face or via email. Hopefully, a resolution is reached on the issue.

b. The student should notify the faculty via email again if the issue still did not get resolved after the first encounter or communication.

c. The student can then contact the Chair of the McCoy School of Engineering, Dr. Desai, face to face or via email, (raj.desai@msutexas.edu), and discuss this issue. Dr. Desai will discuss the issue at hand with the faculty member. Dr. Desai will discuss the result of this discussion with the student. Hopefully, a resolution is reached on the issue after this.

d. The student should notify the Chair via email if the issue still did not get resolved.

e. The Chair will contact the Dean and try to resolve the conflict. In case the conflict deals with the student grade, she will forward the case to the Grade Appeals Committee if necessary.

GENERAL EDUCATION STATEMENT

Students in this course must demonstrate their proficiency in oral and written communication through written homework assignments and exams, and solving problems on the board. They must also demonstrate their ability to use the English language.

ACADEMIC INTEGRITY POLICY

Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook regarding student responsibilities & rights, and the intellectual property policy information about procedures and what constitutes acceptable on-campus behavior. More details can be found at https://msutexas.edu/student-life/_assets/files/handbook.pdf

The Grade Appeal Checklist provides the timeline for appealing from the instructor to the next in line (dean of the college). The Academic Honesty Checklist describes the timeline for appealing from the instructor to the next in line (chair of department) and who must be notified of academic honesty infractions.

DISABILITY SUPPORT SERVICES

If you have a documented disability that will impact your work in this class, please contact me to discuss your needs.

DISCLAIMER STATEMENT

Information contained in this syllabus other than grading policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

CAMPUS CARRY STATEMENT

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. The new Constitutional Carry law does not change this process. Concealed carry still requires a License to Carry permit, and openly carrying handguns is not allowed on college campuses. For more information, visit Campus Carry.

ACTIVE SHOOTER STATEMENT

The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by MSU Police Department regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit Safety / Emergency Procedures. Students are encouraged to watch the video entitled

"*Run. Hide. Fight.*" which may be electronically accessed via the University police department's webpage: "Run. Hide. Fight."

Student Resources https://msutexas.edu/academics/scienceandmath/student_resources.php

Prepared by: Pranaya Pokharel, Date: 01/10/2023