



**DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.**

Course Syllabus

- 1. Course number and name**
ME 461 Measurements and Instrumentations.
- 2. Credits and contact hours**
(3+0) 3 credit hours, 3 contact hours
- 3. Course type**
Blended Learning Course (2+1)
- 4. Instructor's or course coordinator's name**
Dr. Mohammad Nasir
- 5. Textbook information**
Figliola, Richard S., and Donald Beasley. Theory and design for mechanical measurements. John Wiley & Sons, 2015. ISBN-13: 978-1118881279
 - a. Other supplemental materials**
Harrison, R. Giles, Meteorological measurements and instrumentation, 6th edition, 2015, ISBN-13: 978-1118745809
- 6. Specific course information**
 - a. Catalog description**
Principles of measurements and the analysis of experimental data, the basics of electrical measurements and sensing devices, the measurements of pressure, temperature, level, speed, torque, fluid flow and others.
 - b. Prerequisites or co-requisites**
Prerequisite: Fourth year level
 - c. The course is:**
Required in Mechanical and Industrial Engineering program.
- 7. Specific goals for the course**
 - a. Course outcomes:**
After completion of the course, students are expected to be able to:
 1. Apply error analysis and uncertainty calculations in measurements, convert between different modes of measurement and signals.
 2. Understand the usage of metrology devices.



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3. Discuss the basics of electrical and mechanical measurements.
4. Apply the process variables of analog to digital conversion and digital to analog conversion.

b. The following student outcomes are addressed by the course:

SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.

SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.

8. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Apply error analysis and uncertainty calculations in measurements, convert between different modes of measurement and signals.	-	synchronous active learning	Discussion boards
CO-(2): Understand the usage of metrology devices.	-	Lectures (Example and Problems)	Assignment
CO-(3): Discuss the basics of electrical and mechanical measurements	-	Lectures (Example and Problems)	Project
CO-(4): Apply the process variables of analog to digital conversion and digital to analog conversion.	-	Lectures (Example and Problems)	Final Exam question
Student Outcomes			
SO-(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare,	2	Lectures (Example and Problems)	Midterm Exam



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as well as global, cultural, social, environmental, and economic factors.			
SO-(4) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environmental, and societal context.	1, 3	Term Project	Term Project- Part 2
SO-(pc) The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program.	1	Term Project	Term Project- Part 1

9. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Sun (9-10)	Introduction to measurement	Lecture
	Tue (9-10)	Introduction to measurement	Lecture
	Thu (9-10)	Applications to measurement systems	Online lecture
2	Sun (9-10)	Error analysis and data representation	Lecture
	Tue (9-10)	Error analysis and data representation	Lecture
	Thu (9-10)	Error analysis and data representation examples	Online lecture
3	Sun (9-10)	Linear metrology	Lecture
	Tue (9-10)	Linear metrology	Lecture
	Thu (9-10)	Linear metrology discussion	Online lecture
4	Sun (9-10)	Linear metrology	Lecture
	Tue (9-10)	Linear metrology	Lecture
	Thu (9-10)	Linear metrology discussion	Online Lecture



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5	Sun (9-10)	Surface finish	Lecture
	Tue (9-10)	Surface finish	Lecture
	Thu (9-10)	alignment	Online Lecture
6	Sun (9-10)	Pressure gauges	Lecture
	Tue (9-10)	Pressure gauges	Lecture
	Thu (9-10)	Pressure gauges examples and case studies	Online Lecture
7	Sun (9-10)	Pressure sensors	Lecture
	Tue (9-10)	Pressure sensor	Lecture
	Thu (9-10)	Pressure sensor examples and case studies	Online Lecture
8	Sun (9-10)	fluid flow measurements	Lecture
	Tue (9-10)	fluid flow measurements	Lecture
	Thu (9-10)	fluid flow case studies	Online Lecture
9	Sun (9-10)	Temperature measuring devices	Lecture
	Tue (9-10)	Temperature measuring devices	Lecture
	Thu (9-10)	Temperature measuring devices examples	Online Lecture
10	Sun (9-10)	Temperature measuring sensors	Lecture
	Tue (9-10)	Temperature measuring sensors	Lecture
	Thu (9-10)	Temperature measuring sensors examples	Online Lecture
11	Sun (9-10)	Level measurement	Lecture
	Tue (9-10)	Level measurement	Lecture
	Thu (9-10)	Level measurement case studies	Online lecture
12	Sun	Force measuring devices	Lecture



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	(9-10)		
	Tue (9-10)	Force measuring devices	Lecture
	Thu (9-10)	Case studies	Online lecture
13	Sun (9-10)	Transducers	Lecture
	Tue (9-10)	Transducers	Lecture
	Thu (9-10)	Examples	Online lecture
14	Sun (9-10)	DAC systems	Lecture
	Tue (9-10)	DAC systems	Lecture
	Thu (9-10)	Case studies	Online lecture
15	Sun (9-10)	Project discussions	Lecture
	Tue (9-10)	Project discussions	Lecture
	Thu (9-10)	Online project presentations	Online lecture

10. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7 th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works)	20%	1-16 th Week
- Final Examination	50%	16 th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.