



**Jordan University of Science and Technology**  
**Faculty of Engineering**  
**Electrical Engineering Department**

EE341 Measurement Systems And Sensors

First Semester 2023-2024

**Course Catalog**

3 Credit Hours. Units, Dimensions, and standards. Measurement errors. Statistical analysis of experimental data. Operational amplifier circuits in instrumentation. Transducers: mechanical, thermal, optical. Measurements of basic electrical quantities: electromechanical indicating instruments, electronics multi-meters, digital multi-meters, ac bridges. Digital-signal conditioning: analogue-to-digital convertors, digital-to-analogue convertors, sample-and-hold circuits, data acquisition hardware, IEEE 488 instrumentation bus. Oscilloscopes: vertical deflection system, horizontal deflection system, digital storage oscilloscopes. Spectrum analyzers.

**Text Book**

<b>Title</b>	Process Control Instrumentation Technology
<b>Author(s)</b>	Johnson C.
<b>Edition</b>	8th Edition
<b>Short Name</b>	TextBook
<b>Other Information</b>	

**Course References**

Short name	Book name	Author(s)	Edition	Other Information
TextBook2	Measurement and Instrumentation Principles	Morris A. S.	3rd Edition	
Ref#1	Experimental Methods for Engineers	Holman, J. P.	7th Edition	
Ref#2	Modern Electronic Instrumentation and Measurement Techniques	Helfrick, A. D., and Cooper, W. D.	3rd Edition	

**Instructor**

Name	<b>Mr. MOHAMMAD AL-SHRIDA</b>
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Office Location	E2 L-3
Office Hours	Sun : 10:00 - 11:30 Mon : 12:00 - 13:30 Tue : 10:00 - 11:30 Thu : 10:00 - 11:30
Email	mzshrida@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue : 08:30 - 09:30 Room: E2114

Prerequisites		
Line Number	Course Name	Prerequisite Type
242601	EE260 Signal And Systems Analysis	Prerequisite / Pass
243202	EE320 Electronic Circuits	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	Topic	References
Week 1	Definitions; Standards; SI system of units; Types of errors; Limiting errors; Statistical analysis of experimental data	From <b>TextBook</b>
Weeks 2, 3, 4, 5	Analog and Digital Signal Conditioning: Op-Amp circuits in instrumentation, analog-to-digital converters, digital-to-analog converters, sample-and-hold circuits; data-acquisition hardware, IEEE 488 Instrumentation bus.	From <b>TextBook</b>
Weeks 6, 7, 8, 9, 10	Transducers: The strain gauge, the linear variable differential transformer, capacitive sensors, the thermistor, the resistance temperature detector, the thermocouple, the bimetal switch and reed relay, the light-dependent resistor, the photodiode and phototransistor, the photovoltaic cell.	From <b>TextBook</b>
Weeks 11, 12, 13	Measurements of basic electrical quantities: Electromechanical indicating instruments, electronic multi-meters, digital multi-meters, AC bridges, the spectrum analyzer	From <b>Ref#2</b>
Weeks 14, 15	Oscilloscopes: The cathode-ray tube, the vertical and horizontal deflection systems, oscilloscope probes, the digital-storage oscilloscope.	From <b>Ref#2</b>

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Learn the SI system of units and measurement standards, and understand terminologies related to data, including accuracy, precision, sensitivity, resolution, linearity, and error. Also learn how to use the standard deviation for the statistical analysis of data [4ABET1, 4ABET2]	8%	First exam

Learn how to use Op-Amp circuits in instrumentation and be able to use these circuits for signal conditioning. Learn the principles of operation of analog-to-digital and digital-to-analog converters and the use of sample-and-hold circuits. Also be able to describe the function of each part of a typical data-acquisition system and the application of the IEEE 488 bus to data acquisition	32%	First exam
Learn the characteristics of major types of mechanical, thermal, and light transducers, and be able to design signal-conditioning circuits for them	32%	
Learn the construction and operation of analog, electronic, and digital meters for measuring basic electrical quantities. Learn the operation of various types of AC bridges. Also be able to explain the operating principle of the spectrum analyzer.	23%	
Learn the construction and operation of the cathode-ray tube, the vertical and horizontal deflection systems of an oscilloscope. Also compare the digital storage oscilloscope with the general-purpose analog oscilloscope	5%	

Relationship to Program Student Outcomes (Out of 100%)						
ABET1	ABET2	ABET3	ABET4	ABET5	ABET6	ABET7
4	4					

Evaluation	
Assessment Tool	Weight
First exam	20%
Works	20%
Final Exam	40%
Second exam	20%

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