

**Course number:** 0402344, 0408384, 04024268

**Course:** Name: Measurement Systems and Sensors

**Prerequisites by course:** 0408282 Electronics, 0402262 Electronics I

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**Credit hours:** 3 hrs

**Contact hours:** 3 hrs

**Textbook:** Alan Morris Reza Langari 'Measurement and Instrumentation Principles, Third Edition.

**References:**

Electronic Instrumentation and Measurements, Second Edition, by D.A. Bell, 2003 Prentice-Hall

Course website: [https://www.youtube.com/playlist?list=PLKWJbbrMdZqteSEfTnd0nvBOgP9nT\\_MUh](https://www.youtube.com/playlist?list=PLKWJbbrMdZqteSEfTnd0nvBOgP9nT_MUh)

Schedule and duration: 16 weeks, 32 lectures (including exams)

Minimum student material: Textbook, Class handout, Personal PC, Internet, Calculators.

Minimum college facilities: Library, computational facilities, PC Labs, Internet.

**Course objectives:**

Analysis and synthesis of data and information, with the use of the necessary Technology.
To make students aware of the measuring instruments, the methods of measurement, and the use of different transducers.
To make students familiar with the constructions and working principles of different types of sensors and transducers.

**Course outcomes and relation to ABET student outcomes: (matrix)**

Course Outcomes	Student Outcomes						
	SO1	SO2	SO3	SO4	SO5	SO6	SO7
To understand strain gauges, characteristics of Op-amps, variable length resistor (transducers), short circuit current and open circuit voltage of photovoltaic cell, mutual inductance in displacement transducers (differential amplifiers).	*	*					*
To understand measurements statistics (mean, standard deviation, median and variance). To find an unknown resistor value using Wheatstone bridges.	*	*					
To understand how to control the environment using sensors.	*	*					
To gain experimental skills and identify the basics of efficient teamwork.	*	*					

**Topic Outline and Schedule:**

Topic
Measurements systems and errors statistics and Analysis
DC Analogue and Electronic meters
AC Analogue and Electronic rectifier Meters
Ohmmeters
Digital and Electronics measuring instruments, Strain gauge
AC and Wheatstone Bridges, Differential transformers

Photoconductive Cells, Thermal Sensors - RTD
Thermocouples, Design of Optical Transducers Interfacing Circuit
Final exam

Computer usage: Faculty PC and Personal Laptop

Attendance: A- Attendance policies: 15% of 32 lectures

B- Absences from exams and handing in assignments on time:

Assessments:

- All quizzes and exams are provided with a solution for a perfect score

Grading policy:

- 20% Quizzes and student activity
- 30% Midterm Exam
- 50% Final Exam

Instructors: Dr Osama Fares

Class time and location: Mon, Wen: 9:30 – 11:00

Student Outcomes (SOs)

An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
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
An ability to communicate effectively with a range of audiences
An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
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
An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
An ability to acquire and apply new knowledge as needed, using appropriate learning strategies