FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Actuators and Power Electronics

Information :

Course Code :	EPR 442	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Mechatronics Engineering

Instructor Information :

Title	Name	Office hours
Professor	Abdel Monem Abdel Hamid Ahmed Seif	9
Assistant Lecturer	Rana Mohamed Abdel Rahman Saleh	

Area Of Study :

To be familiar with the different sensors, signal conversion methods, actuators and final control elements and the design of process control and instrumentation systems used in industrial process including analogue and digital signal conditions.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Understand requirements for application of measurement and instrumentation sensors (Temperature sensors, Mechanical sensors, Optical sensors).
2 -	Design the application of an RTD temperature sensor to specific problems in temperature measurement.
3 -	Design the application of a thermistor to specific temperature measurement problems.
4 -	Design the application of a thermocouple to specific temperature measurement problems.
5 -	Develop the design of a system to measure temperature using a solid state temperature sensor.
6 -	Describe three types of sensors for the measurement of displacement, location, or position.
7 -	Design the application of a strain gauge for the measurement of strain and stress.
8 -	Describe the operating principle of an accelerometer
9 -	Explain the operating principles of different pressure sensors
10 -	Describe the operating mechanisms of different flow sensors
11 -	Compare between photoconductive, photovoltaic, and photodetector sensors.
12 -	Describe how optical fiber sensors work for different type of measurement
13 -	Define the three parts of final control element operation
14 -	Explain different types of signal conversion
b.Intellectual Skills: :	
1 -	Interpreting
2 -	Analyzing
3 -	Storing, manipulating, and retrieving information

4 -	Creative thinking.
5 -	Problem Solving.
c.Professional and Practical Skills: :	
1 -	Engineering skills.
2 -	Ability to diagnose.
3 -	Ability to identify the problem.
d.General and Transferable Skills: :	
1 -	Brainstorming inside the class in replying to the questions
2 -	Act through a teamwork in preparing a report on design problem using technological tools.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Thermal Sensors	6	3	3
Displacement, Location or Position Sensors	2	1	1
Strain Sensors	4	2	2
Motion Sensors	2	1	1
Pressure Sensors	2	1	1
Flow Sensors	2	1	1
Optical Sensors	6	3	3
Electrical and Pneumatic Signal Conversion	4	2	2
Switching Devices: SCR, GTO,TRIAC, DIAC	4	2	2
Controlling Devices: BJT, MOSFET, IGBT	4	2	2
Electrical Actuators	4	2	2
Pneumatic Actuators	2	1	1
Hydraulic Actuators	2	1	1
Final Control Elements	2	1	1
Control Valves	2	1	1

Teaching And Learning Methodologies :

Lectures (Using Power points & Data show)
Assignments
Presentation & Discussion
Brain storming
Lab activities (In the laboratory collective subject)

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
1st Mid term	20.00	7	Assess Knowledge and Understanding
2nd Mid term	20.00	12	Assess Knowledge and Understanding

Final-term Exam	40.00	15	Assess The Knowledge & understanding and Intellectual skills
Quizzes	10.00	1	Assess Data collections and analysis
Report	10.00	1	Assess information collection, team work, analysis, and design

Course Notes :

In MS Power Point or PDF format

Recommended books :

ÅIndustrial Process Sensors, David M. Scott, 1st edition, 2008 CRC Press
ÅCondensed Handbook of Measurement and Control, N. E. Battikha, 3rd Edition, 2007 ISAï The Instrumentation, Systems and Automation Society
ÅFundamental of Industrial Instrumentation and Process Control, William C. Dunn, 1st edition, 2005 McGraw-Hill