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	Naser Mohammed Bayoumy AbdelRahim	
Lecturer	Sayed Ahmed Zaki Ahmed	3
Assistant Lecturer	Mohamed Abdallah Mahmoud Shaheen	

Area Of Study :

The Overall aims of this course are:
ÅGet familiar with the basic concepts of Single phase induction motors, Two phase machines, Special AC machines and applications in control systems
ÅUnderstand Power Electronics Switching Devices,
ÅUnderstand Power Electronics Controlling Devices,
ÅUnderstand Computer simulation of power electronic circuits,
ÅDescribe other types of actuators and signal conversion
ÅDesign of process control and instrumentation systems used in industrial process.

Description :

Single phase induction motors, Two phase machines and applications in control systems, Special AC machines. Power diodes, Power bipolar junction transistors, Thyristors, Rectifiers, Principles of power conditioning, Switching characteristics of power semiconductor devices, Computer simulation of power electronic circuits, Analysis, design, and applications of power converters.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Select the suitable final control element
2 -	Define computer simulation of power electronic circuits, analysis, design and applications of power converters.
3 -	Describe different types of power electronics switching devices and controlling devices.
4 -	Explain other different types of actuators (electrical, pneumatic and hydraulic actuators).
5 -	Define requirements for application of single phase induction motors, two phase machines and special ac machines in control systems.
6 -	Describe different control components
b.Intellectual Skills: :	
1 -	Select appropriate solutions for engineering problems based on analytical thinking.
2 -	Design process control systems applying appropriate knowledge and principles.

c.Professional and Practical Skills: :	
1 -	Apply gained hardware and software skills to design in diverse mechatronics applications
2 -	Select international standards for developed design methods.
d.General and Transferable Skills: :	
1 -	Communicate effectively
2 -	Collaborate effectively within multidisciplinary team.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Single Phase Induction Motors	4	2	2
Two Phase Machines	4	2	2
Special AC Machines	4	2	2
Applications of Electrical Machines in Mechatronics	4	2	2
Principles of Signal Conversion	4	2	2
Other Electrical Actuators	4	2	2
Switching Power Electronics Devices	6	3	3
Controlling Power Electronics Devices	6	3	3
Computer Simulation of Power Electronic Circuits	4	2	2
Final Control Elements	4	2	2
Case Studies	8	4	4
Pneumatic Actuators	4	2	2
Hydraulic Actuators	4	2	2

Teaching And Learning Methodologies :

Interactive Lecturing
Problem based learning
Discussion
Project
Search

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
1st Mid term	15.00	6	
2nd Mid term	15.00	11	
Assignments	10.00		
Final Exam	40.00	15	
Participation	10.00		
Quizzes	10.00		

Course Notes :

Course Notes (in MS Power Point or PDF format)

Recommended books :

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

Periodicals :

Periodicals, Web Sites, é etc

Web Sites :

Any web site on control systems