

## 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
Lecturer	Sayed Ahmed Zaki Ahmed	1
Assistant Lecturer	Howaida Mohamed Abd Elmonem Ismael Ragab	
Assistant Lecturer	Rana Mohamed Abdel Rahman Saleh	

#### Area Of Study :

The Overall aims of this course are:

- Get familiar with the basic concepts of Single phase induction motors, Two phase machines, Special AC machines and applications in control systems
- Understand Power Electronics Switching Devices,
- Understand Power Electronics Controlling Devices,
- Understand Computer simulation of power electronic circuits,
- Describe other types of actuators and signal conversion
- Design 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 -	Describe different control components
2 -	Define requirements for application of single phase induction motors, two phase machines and special ac machines in control systems.
3 -	Explain other different types of actuators (electrical, pneumatic and hydraulic actuators).
4 -	Describe different types of power electronics switching devices and controlling devices.
5 -	Define computer simulation of power electronic circuits, analysis, design and applications of power converters.
6 -	Select the suitable final control element

##### b.Intellectual Skills: :

1 -	Design process control systems applying appropriate knowledge and principles.
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- 2 - Select appropriate solutions for engineering problems based on analytical thinking.

**c. Professional and Practical Skills: :**

- 1 - Select international standards for developed design methods.
- 2 - Apply gained hardware and software skills to design in diverse mechatronics applications

**d. General and Transferable Skills: :**

- 1 - Collaborate effectively within multidisciplinary team.
- 2 - Communicate effectively

**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 :**

Condensed Handbook of Measurement and Control, N. E. Battikha, 3rd Edition, 2007 ISA. The Instrumentation, Systems and Automation Society

Fundamental of Industrial Instrumentation and Process Control, William C. Dunn, 1st edition, 2005 McGraw-Hill

**Periodicals :**

Periodicals, Web Sites, etc

**Web Sites :**

Any web site on control systems