Faculty of Engineering & Technology

Electromechanical Design

Information :

Course Code :	MAN 515	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Mechatronics Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	Mohamed Ahmed Mahmoud Abdelwahab	1
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Area Of Study :

This course aims to:
ÅIntroduce the integration of Mechanical and Electrical System as a building block of ñMechatronics Systemsò
ÅEnrich the studentôs knowledge in construction, analysis, and design of electromechanical systems.
ÅTrain students to design, build, and test a simple Electromechanical Subsystem.
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Description :

Design of mechanical motion transmission systems: gearing, couplings, belts and lead-screws, Sensing and measurement of mechanical motion, Sensor selection, Electromechanical actuator selection and specification, sequential controller design, Digital I/O, Case studies

Course outcomes :

a.Knowledge and Understanding: :	
1 -	a1. Describe the main steps for design of electromechanical systems.
2 -	a2. Identify the different Electrical components of the Electromechanical
3 -	a3. Identify the different Mechanical components of the Electromechanical
4 -	a4. Describe the function of different transmission mechanisms
5 -	a5. Describe the different motion profiles used in designing electromechanical
b.Intellectual Skills: :	
1 -	b1. Select the suitable mechanical & Electrical components needed
2 -	b2. Develop the needed computer programs for design and control
3 -	b3. Evaluate the performance of Electromechanical Systems and
4 -	b4. Analyze the different motion profiles used in designing the
c.Professional and Practical Skills: :	
1 -	c1. Use the available software for design and control of electromechanical
2 -	c2. Use the suitable hardware components and software for implementing

3 -	c3. Prepare a technical presentation report for a given task.
d.General and Transferable Skills: :	
1 -	d1. Work in stressful environment and within constrain.
2 -	d2. Work inside a team (Team work project).
3 -	d3. Effectively manage tasks, time, and resources.
4 -	d4. Search for information and engage in life-long self-learning discipline

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction ï Design principles.		2	0
Basic building blocks (Electrical components): AC/ DC Motors ï Stepper motors ï H drive-PWM ï Stepper motors drive and control- Linear Motors- speed torque curves ï Motor selection.		10	8
Basic building blocks (Mechanical components): Gear heads- multi gear ratio gear boxes (ICE/Auto) ï Rotary motion/Direct drive- Rotary motion/ Gearhead Drive - Rotary motion/Belt& Pulley Drive - Linear motion/Lead (Power)Screw Drive- Linear motion/ Belt& Pulley drive - Linear motion/ Rack and Pinion drive- Linear motion/Roll feed drive- Linear motion/ Linear motor drive. Use of available software for design.		12	6
System analysis ï Position- Velocity- Acceleration- Jerk- Velocity Profile: Trapezoid ï Cosine ï Parabolic.		6	2
Lab experiments: Hydraulic & Pneumatic ï Motor speed & position control- Stepper motor/load control- DC motor/Load control-		0	8
Project follow -up.		0	4
Midterm Exams		0	2

Teaching And Learning Methodologies :

Interactive Lecturing
Problem solving
Discussion
Experiential learning
Project
Research

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments, Participation, & Quizzes	20.00		
Final Exam	40.00		

First Midterm	15.00	5	
Project.	10.00	12	
Second Midterm	15.00	10	

Recommended books :

Frederick G. Moritz, ñElectromechanical Motion Systems Design and Simulationò, John Wiley & Sons, Ltd, 2014

Alciatore, David G.& Histand, Michael B.; ñIntroduction to Mechatronics and Measurement Systemò, McGraw Hill, Latest editions.

Richard G. Budynas & J. Keith Nisbett; ñShigleyôs Mechanical Engineering Designò, Mc Graw Hill; latest edition