

Faculty of Engineering & Technology

Mechatronics

Information :

Course Code : MKT 411

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Specialization of Mechatronics Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	MOHAMED ABDELBAR SHAMSELDIN ALY	12
Lecturer	MOHAMED ABDELBAR SHAMSELDIN ALY	12
Teaching Assistant	Fady Ayman Mohamed Naguib Mahmoud Noah	4
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Area Of Study :

Upon the completion of the course, students should be able to:

• Introduce Mechatronics specialization in general and the concept of Multidisciplinary and synergistic integration of different engineering areas with emphasis on Parallel design concept.

• Enrich the students' basic knowledge about interfacing and data acquisition in Mechatronics Systems.

• Train students to design, simulate, build, and test an elementary Mechatronics Subsystem.

Description :

Mechatronics system configuration; Modeling of mechanical translational and rotational systems; Mechanisms systems; Mechanical and electrical actuators; Pneumatic and hydraulic systems; Sensors and encoders; Data acquisition and signal conditioning; Computer-aided drawing (CAD) and interpretation of 3-D technical drawings; Mini project to design, model, implement, and test a mechatronics system.

Course outcomes :

a. Knowledge and Understanding: :

- | | |
|-----|---|
| 1 - | a1. Define Mechatronics systems, sensors, actuators, signal conditioning, |
| 2 - | a2. List the different arrangements of the operational amplifier circuits |
| 3 - | a3. Explain how to properly sample a signal for digital processing, |
| 4 - | a4. Describe the analogue to digital (A/D) and digital to analogue |

b. Intellectual Skills: :

- | | |
|-----|--|
| 1 - | b1. Analyse the different arrangements of operational amplifiers considering |
| 2 - | b2. Calculate the proper sampling frequency and the resolution for |
| 3 - | b3. Select the proper data acquisition card to solve a given signal processing |

4 -	b4. Analyse the results of simulation models for a simple mechanical,
c. Professional and Practical Skills: :	
1 -	c1. Analyse lab experimental results of sampling a signal with different
2 -	c2. Use the suitable hardware components and software for drafting and
d. General and Transferable Skills: :	
1 -	d1. Work in stressful environment and within constraints through assignments
2 -	d2. Effectively manage tasks, time, and resources.
3 -	d3. Search for information and engage in life-long self-learning discipline

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction: Course outlines & Information - Mechatronics . Mechatronics Engineer- Mechatronics system design approach-		2	0
Mechatronics system . Sensors-Actuators -Control unit- Signal Conditioning.		6	2
Analog Signal Processing Using Operational Amplifiers: Ideal model for Operational Amplifier (Different arrangements . Sample & Hold circuit- Comparator), Real OP Amp: Important Parameters from Data Sheets.		6	6
Data Acquisition: Quantization Theory- A/D Converters- D/A Converters- Virtual Instrumentation - Data Acquisition and Control.		10	8
Modelling of Mechatronics systems: Hard & Soft Models- Model validation and verification- Modelling of Mechanical, Electrical, and Electromechanical Systems. Simulation using MATLAB/SIMULINK		6	2
Lab Experiments: Use of a CAD software for PCB Design & Application- Basic circuits of amplifiers - Signal sampling using DAQ - Simulation of a simple Mechatronics System.		0	6
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 :

- Lecture notes on the course moodle page, FUE website.
- Recommended Readings:
Bolton, William; Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering - Prentice Hall, Latest editions.