



Arab Academy for Science, Technology & Maritime Transport
College of Engineering & Technology
Mechanical Engineering (Mechatronics) Program

University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Mechanical Engineering

Form no. (12)
Course Specification

1- Course Data

Course Code: ME 593	Course Title: Electromechanical systems & microprocessors	Academic Year/Level: 4th year / 8th semester
Specialization: Mechanical	No. of Instructional Units 3 credits	Lecture 2 hrs.
		Practical 2 hrs.

2- Course Aim

- To deal with and apply electromechanical systems and understand microprocessor applications
- Understand the operating principles of electromechanical actuators, motors, sensors, drives and analogue motion control.
- Provide an overview of the applications of microprocessors and micro controllers for smart products and process control.

3- Intended Learning Outcomes

v- Knowledge and Understanding	Through knowledge and understanding, students will be able to: K15 _{ME}) The principles of sustainable design and development.
w- Intellectual Skills	Through intellectual skills, students will be able to: I13 ME) Identify at an appropriate level the design, production, interfacing and software needs of different parts of Mechatronics systems.
x- Professional Skills	Through professional and practical skills, students will be able to: P2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, Products and/or services P3) Create and/or re-design a process, component or system, and carry out specialized engineering designs P5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results P13 _{ME}) Compete, in-depth, in at least one engineering discipline, namely mechanics, electronics or Interfacing and software P16 _{ME}) Apply the principles of sustainable design and development
y- General Skills	Through general and transferable skills, students will be able to:

4- Course Content

Week No.1	Introduction to Power Electronics and Industrial Control Systems, Devices and characteristics (diodes, thyristors, triacs, power BJT, MOSFETS, IGBTs)
Week No.2	DC motors: types and characteristics
Week No.3	DC motors speed control: analog, PWM
Week No.4	DC motors speed control: choppers, rectifiers
Week No.5	DC motor braking control, H-bridge , control of speed direction
Week No.6	Stepper motors: Types and operation
Week No.7	7th week exam / 7th week evaluation
Week No.8	Stepper motor speed and direction control, micro-stepping.
Week No.9	AC types and theory of operation
Week No.10	PWM, AC Motor Control, Inverters, vector drive control.
Week No.11	Introduction to PLC
Week No.12	12th week exam / 12 th week evaluation
Week No.13	PLC input-output modules.
Week No.14	PLC Ladder diagram
Week No.15	PLC Ladder case-study
Week No.16	Final Examination

5- Teaching and Learning Methods

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

6-Teaching and Learning Methods for Students with Special Needs

<ul style="list-style-type: none"> • Lectures • Tutorials • Reports & sheets • Laboratories • Seminars <p><u>Academic Support:</u></p> <ul style="list-style-type: none"> • The general academic advisor appoints an academic supervisor for handicapped students. • Continuous follow ups are made for handicapped students after each assessment to evaluate their academic level of achievement
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7- Student Assessment

a-Procedures used	1-Written Examinations to assess The Intended Learning Outcomes.	
	2-Class Activities (Reports, Discussions, -----) to assess The Intellectual Skills.	
b- Schedule:	Assessment 1	7 th Week Assessment
	Assessment 2	12 th Week Assessment
	Assessment 3	Continuous Assessments
	Assessment 4	16 th Week Final Written Exam
c- Weighing of Assessment	7 th Week Evaluation	30 %
	12 th Week Evaluation	20 %
	Final-term Examination	40 %
	Oral Examination	00 %
	Practical Examination	00 %
	Semester Work	10 %
	Total	100%

8- List of References:

a- Course Notes	N/A
b- Required Books (Textbooks)	• M. Rashid "Power Electronic devices, circuits and systems", 3rd Edition.
c- Recommended Books	<ul style="list-style-type: none"> • W. Sheperd, L. Zhang, "Power Converter Circuits", 2004, Marcel Decker • B. W. Williams, "Power Electronics - Devices, Drivers, Applications, and Passive Components", 2007 • Siemens PLC S7-200 Reference Manual
d- Periodicals, Web Sites, etc.	N/A

Course coordinator:

Program Manager: