



Arab Academy for Science, Technology & Maritime Transport  
College of Engineering & Technology  
Department of electrical and Control Engineering

**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: <b>EE 416</b>	Course Title: <b>Microcontroller Applications</b>	Academic Year/Level: <b>4th year / 8th semester</b>
Specialization: <b>Mechatronics Engineering</b>	No. of Instructional Units	Lecture
	<b>3 Credits</b>	<b>2hrs.</b>
		Practical <b>2hrs.</b>

**2- Course Aim**

Covering the measurement and signal conditioning interfacing and data acquisition continuous and discrete state control and microprocessor

**3- Intended Learning Outcome (ILO's)**

<b>a- Knowledge and Understanding</b>	<p>K.1 Types of signals and corresponding signal conditioning.</p> <p>K.4 Analog signal conditioning.</p> <p>K.17EE Digital signal conditioning.</p> <p>Signal conversion; Analog to Digital (A/D) and Digital to Analog (D/A) converters.</p> <p>K.17EE Data acquisition system.</p> <p>K.17EE Discrete and continuous control system.</p> <p>K.4 Basic components of microcomputer and interface circuit</p> <p>K.8 Microprocessor and Microcontroller as a digital controller.</p> <p>K.17EE Accuracy calculation in digital voltmeters.K.1 Types of signals and corresponding signal conditioning.</p> <p>K.4 Analog signal conditioning.</p> <p>K.17EE Digital signal conditioning.</p> <p>Signal conversion; Analog to Digital (A/D) and Digital to Analog (D/A) converters.</p> <p>K.17EE Data acquisition system.</p> <p>K.17EE Discrete and continuous control system.</p> <p>K.4 Basic components of microcomputer and interface circuit</p>
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	<p>K.8 Microprocessor and Microcontroller as a digital controller.</p> <p>K.17EE Accuracy calculation in digital voltmeters.</p>
<b>b- Intellectual Skills</b>	<p>I.1,4,5,6 Ability to design a conditioning circuit for different types of signals.</p> <p>I.1,4,5,6 Build a digital control system using microprocessor or microcontroller.</p> <p>I.5,6,9,15EE Develop applications for process control using microprocessor and microcontroller</p>
<b>c- Professional Skills</b>	<p>P.1 Ability to identify basic components of conditioning circuits.</p> <p>P.1 Select the suitable digital system either Microprocessor or microcontroller.</p> <p>P.4 Plan and perform laboratory experimental tests to build and complete digital control system.</p> <p>P.4 Implement the designed digital control system.</p> <p>P.4 Program microprocessor to perform the control task.</p>

**7- Course Content**

- Week Number 1:* \*Types of Process Control Strategy.
- Week Number 2:* \*Type of Signal and Signal Conditioning
- Week Number 3:* \*Analogue Signal Conditioning.
- Week Number 4:* \*Digital Signal Conditioning.
- Week Number 5:* \*Discrete State Process Control.
- Week Number 6:* \*A/D and D/A Conversion.
- Week Number 7:* \*7th week exam +Digital Control System Fundamentals.
- Week Number 8:* \*Data Acquisition Systems.
- Week Number 9:* \*Characteristics of Control System.
- Week Number 10:* \*Microprocessor and Microcontroller as digital control.
- Week Number 11:* \*Microcontroller Principles and Configurations.
- Week Number 12:* \*12th week exam + Microcontroller Programming.
- Week Number 13:* \*Special Instructions of Microcontrollers.
- Week Number 14:* \*Applications 1.
- Week Number 15:* \*Applications 2.

**5- Teaching and Learning Methods**

<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. Tutorials</li> <li>3. Discussion papers</li> <li>4. Designing codes</li> </ol>
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**6-Teaching and Learning Methods for Students with Special Needs**

<ol style="list-style-type: none"> <li>1. Lectures</li> <li>2. Tutorials</li> <li>3. Reports &amp; sheets</li> <li>4. Laboratories</li> <li>5. Seminars</li> </ol> <p><u>Academic Support:</u>                  An academic supervisor for handicapped students is appointed.                  Constant follow up should be done for handicapped students after each assessment to evaluate their academic level of achievement</p>
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**7- Student Assessment**

<b>a- Procedures used:</b>	<ol style="list-style-type: none"> <li>2. Written examinations to assess the Intended learning outcomes.                      Continuous assessment (reports, discussions, etc.....) to assess the Intellectual skills.</li> </ol>
<b>b- Schedule:</b>	Assessment 1: 7 <sup>th</sup> Week Written Exam Assessment 2: 12 <sup>th</sup> Week Written Exam Assessment 3: Continuous Assessments Assessment 4: 16 <sup>th</sup> Week Final Written Exam
<b>c- Weighing of Assessment:</b>	7 <sup>th</sup> Week Examination : 30 % 12 <sup>th</sup> Week Examination: 20 % Final-term Examination: 40 % Oral Examination : 0 % Practical Examination : 0 % Semester Work : 10 % Total : 100%

**8- List of References:**

<b>a- Course Notes</b>	Subjected in documentation
<b>b- Required Books (Textbooks)</b>	Dogan,Ibrahim, “ Microprocessor Based Applied Digital Control ,” John Wiley & Son LTD
<b>c- Recommended Books</b>	M. Tohnson ‘Engineering instrumentation & measurement’, 4 <sup>th</sup> . Edition. Prentice Hall N.Y 1995. B. Bery, ’Introduction to microprocessor 8086 & 8088’, Intel, Prentice Hall.
<b>d- Periodicals, Web Sites, ..., etc.</b>	<a href="http://www.ieee.org">www.ieee.org</a>

**Course coordinator:**

**Program Manager:**