



University/Academy: Arab Academy for Science and Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: Electrical and Control Engineering

Form no. (12)
Course Specification

1- Course Data

Course Code: EE 511	Course Title: Discrete Control Systems	Academic Year/Level: 5
Specialization: Electrical and Control Engineering	No. of Instructional Units: 3	Lecture 2 Tutorial/Practical 2

2- Course Aim	This course is designed in order to provide insight into the analysis and design of discrete data control systems using classical control approaches.
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3- Intended Learning Outcome

a- Knowledge and Understanding	<p>A.4 Principles of design including elements design, process and/or a system related to specific disciplines</p> <p>A.5 Methodologies of solving engineering problems, data collection and interpretation</p> <p>A.27 Analysis, design and implementation of various methods of control using analogue and digital control systems</p> <p>A.31 Formulate the problem, realizing the requirements and identifying the constraints</p>
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b- Intellectual Skills	<p>B.1 Select appropriate mathematical and computer-based methods for modeling and analyzing problems</p> <p>B.2 Select appropriate solutions for engineering problems based on analytical thinking</p> <p>B.8 Select and appraise appropriate ICT tools to a variety of engineering problems</p> <p>B.11 Analyze results of numerical models and assess their limitations</p> <p>B.19 Design computer programs to analyze and simulate different electrical systems components and control applications</p>
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<p>c- Professional Skills</p>	<p>C.1 Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems</p> <p>C.5 Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results</p> <p>C.6 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs</p> <p>C.7 Apply numerical modeling methods to engineering problems</p> <p>C.13 Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems</p> <p>C.14 Use laboratory and field equipment competently and safely</p> <p>C.17 Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems</p> <p>C.20 Evaluate different techniques and strategies for solving electrical engineering problems</p>
<p>d- General Skills</p>	<p>D.4 Demonstrate efficient IT capabilities</p> <p>D.7 Search for information and engage in life-long self learning discipline</p> <p>D.9 Refer to relevant literatures</p>

4- Course Content	<p><i>Week Number 1:</i> Introduction to digital control systems.</p> <p><i>Week Number 2:</i> Z- transform and its properties.</p> <p><i>Week Number 3:</i> Discrete data system representation.</p> <p><i>Week Number 4:</i> Inverse Z transform and response.</p> <p><i>Week Number 5:</i> Sampler and zero order hold in cascade with the continuous system.</p> <p><i>Week Number 6:</i> Discrete closed loop transfer function.</p> <p><i>Week Number 7:</i> Stability analysis of discrete control systems.</p> <p><i>Week Number 8:</i> Error analysis of discrete control systems.</p> <p><i>Week Number 9:</i> Root locus technique for discrete data control systems.</p> <p><i>Week Number 10:</i> Design of digital control loops using root locus technique.</p> <p><i>Week Number 11:</i> Frequency response analysis of discrete data control systems.</p> <p><i>Week Number 12:</i> Design of discrete control loops using frequency response approach.</p> <p><i>Week Number 13:</i> Design of discrete data control system using PID controller in the time domain.</p> <p><i>Week Number 14:</i> PID tuning in the frequency domain for discrete data control system.</p> <p><i>Week Number 15:</i> General review on discrete control loop design.</p> <p><i>Week Number 16:</i> Final Exam.</p>
5- Teaching and Learning Methods	<ul style="list-style-type: none"> - Lectures - Tutorials - Discussion papers - Practical Training
6- Teaching and Learning Methods for Students with Special Needs	<ul style="list-style-type: none"> - Lectures - Tutorials - Discussion papers - Practical Training

