

Arab Academy for Science and Technology & Maritime Transport College of Engineering & Technology Electrical and Control Engineering

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:	No. of Instructional Units:	Lecture 2
Electrical and Control Engineering	3	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.	
3-	Intended Learning Outcome		
a-	Knowledge and Understanding	A.4 Principles of design including elements design, process and/or a system related to specific disciplines	
		A.5 Methodologies of solving engineering problems, data collection and interpretation	
		A.27 Analysis, design and implementation of various methods of control using analogue and digital control systems	
		A.31 Formulate the problem, realizing the requirements and identifying the constraints	
	b- Intellectual Skills	B.1 Select appropriate mathematical and computer-based methods for modeling and analyzing problems	
		B.2 Select appropriate solutions for engineering problems based on analytical thinking	
		B.8 Select and appraise appropriate ICT tools to a variety of engineering problems	
		B.11 Analyze results of numerical models and assess their limitations	
		B.19 Design computer programs to analyze and simulate different electrical systems components and control applications	

c- Professional Skills	 C.1 Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems C.5 Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results C.6 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs C.7 Apply numerical modeling methods to engineering problems C.13 Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems
	 C.14 Use laboratory and field equipment competently and safely C.17 Apply modern techniques, skills and engineering tools to electrical power and machines engineering systems C.20 Evaluate different techniques and strategies for solving electrical engineering problems
d- General Skills	D.4 Demonstrate efficient IT capabilitiesD.7 Search for information and engage in life-long self learning disciplineD.9 Refer to relevant literatures

	WW LAT 1	
4- Course Content	Week Number 1:	Introduction to digital control systems.
	Week Number 2:	Z- transform and its properties.
	Week Number 3:	Discrete data system representation.
	Week Number 4:	Inverse Z transform and response.
	Week Number 5:	Sampler and zero order hold in cascade with
		the continuous system.
	Week Number 6:	Discrete closed loop transfer function.
	Week Number 7:	Stability analysis of discrete control systems.
	Week Number 8:	Error analysis of discrete control systems.
	Week Number 9:	Root locus technique for discrete data control
		systems.
	Week Number 10:	Design of digital control loops using root
		locus technique.
	Week Number 11:	Frequency response analysis of discrete data control systems.
	Week Number 12:	Design of discrete control loops using
		frequency response approach.
	Week Number 13:	
		PID controller in the time domain.
	Week Number 14:	PID tuning in the frequency domain for
		discrete data control system.
	Week Number 15:	General review on discrete control loop
		design.
	Week Number 16:	Final Exam.
5- Teaching and Learning Methods	- Lectures	
5 5	- Tutorials	
	- Discussion paper	rs
	- Practical Trainin	
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6- Teaching and Learning Methods for	- Lectures	
Students with Special Needs	- Tutorials	
	- Discussion paper	
	- Practical Trainin	ng

7- Student Assessment:		
a- Procedures used:	Quiz to asses part of the 7 th week evaluation Quiz to asses part of the 7 th week evaluation Report to asses the 7 th week practical evaluation Written exam to asses the mid term exam Written exam to asses part of the 12 th week evaluation	
b- Schedule:	Assessment 13rd WeekAssessment 25th WeekAssessment 37th WeekAssessment 410th WeekAssessment 512th WeekAssessment 514th Week	
c- Weighing of Assessment:	7th Week Examination30%12th Week Examination20%Final-term Examination40%Oral Examination0%Practical Examination5%Semester Work5%Total100%	
8- List of References:	 D.De Fetta, J.Lucas and W. Hootgkiss, "Digital Signal Processing: A system Design Approach", J. Wiley, 1988 P.Lynn and W. Furest, "Introductory Digital Signal Processing", J. Wiley, 1990 C. Phillips, "Digital Control System Analysis and Design", Prentice Hall, 1990 	
a- Course Notes		
b- Required Books (Textbooks)	C.T.Chen, "Analog & Digital Control Systems Design", Saunders College Pub.	
c- Recommended Books		
d- Periodicals, Web Sites,, etc.		

Course Instructor

Name: Prof. Alaa Khalil

Signature:

Dean of College of Engineering and Technology of <u>AASTMT</u>

Name: **Prof. Moustafa Hussein Aly** Signature:

Head of Department

Name: Prof. Hamdy Ashour

Signature:

Executive Manager of Quality Assurance Center of AASTMT

Name: Prof. Aziz Ezzat

Signature: