MUTAH UNIVERSITY
Faculty of Engineering
Department of Electrical Engineering

Course Syllabus

Course Code	Course Name	Credits	Contact Hours
0401543	Digital Automatic Control	3	3T

INSTRUCTOR/COORDINATOR	
Name	Dr.Talal Aljaafreh
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TEXTBOOK	
Title	Digital Systems
Author/Year	Ronald Tocci , Neal Widmer, Greg Moss ,2016
Other Supplemental Materials	
Title	Discrete time control systems
Author/Year	K, Ogata, 1995
Electronic Materials	

SPECIFIC COURSE INFORMATION

A. Brief Description of the Content of the Course (Catalog Description)

Introduction to discrete signals and systems; difference equations; state space methods; analysis of discrete systems by Z transform methods; mathematical modeling; response; steady state response; sampled data systems; Routh-Hurwitz criterion; Jerry's stability test; bilinear transformation; root locus; Nyquist criterion; bode diagram; PID controllers, and compensation.

B. Pre-requisites (P) or Co-requisites (C)

Automatic control (0401441) **(P)**

C. Course Type (Required or Elective)

Required

SPECIFIC GOALS

A. Specific Outcomes of Instruction
By the end of this course, the student should be able to: **CLO1**: Develop the necessary mathematical tools to understand and analyze the stability and steady state errors of closed loop control systems [1]. **CLO2**: Emphasize the difference between closed loop feedback control systems and open loop methods by demonstrating robustness of closed loop systems to disturbance and modeling errors [1]. **CLO3**: To apply Z transform to design different control problems [2]. **CLO4**: To understand and apply different control theories to check systems responses in time and frequency domains [2]. **CLO5**: To find various systems stability margins using different stability theorems [1].
B. Student Outcomes (SOs) Addressed by the Course

1	2	3	4	5	6	7				
✓	✓									

BRIEF LIST OF TOPICS TO BE COVERED		
List of Topics	**No. of Weeks**	**Contact Hours**
Introduction to continuous and discrete time signals and systems.	1	3
Analog, continuous, discrete, and digital signals.	2	6
Sampled Data Systems, their applications and merts	1	3
Finding the one sided z-transform from the Laplace transform	1	3
Review of continuous time systems, their properties	1	3
Transfer function and convolution, stability of continuous time system and its relation to the locations of the poles and zeros.	2	6
Mapping the s-plane into the z-plane, properties, and implementation	1	3
Properties of the starred transform and Z transform,	1	3
Frequency responses, Stability, Bode Plot, Root Locus Technique, features and characteristics	3	9
Design of controllers in Z domain	2	6
Total	*14*	*42*

EVALUATION		
Assessment Tool	**Due Date**	**Weight (%)**
Mid Exam	According to the university calendar	30

Course Work (Homeworks, Quizzes, Projects, …etc.)	One week after being assigned	20
Final Exam	According to the university calendar	50

ABET's Students Learning Outcomes (Criterion # 3)		
	Relationship to program outcomes	
ABET 1-7		**Engineering Student Outcomes**
1	√	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	√	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3		an ability to communicate effectively with a range of audiences.
4		an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5		an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6		an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7		an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.