Jordan University of Science and Technology

Faculty of Engineering

Mechanical Engineering Department

ME771 Advanced Control Systems - JNQF Level: 6

First Semester 2023-2024

Course Catalog
3 Credit Hours. Analog controllers design method: lead and lag compensators, pole -placement, model matching, two-parameter configuration, introduction to state-space control system, state estimator and state feedback, canonical realization, stability, controllability and observability, minimal realizations, introduction to optimal control, linear quadratic regulator, introduction to robustness, introduction digital control system, and intelligent control
Teaching Method: On Campus

Text Book	
Title	Modern Control Theory
Author(s)	William L. Brogan
Edition	3rd Edition
Short Name	Ref 1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #2	Linear Control Systems: Modeling, Analysis and Design	James R. Rowland	6th Edition	
Ref #3	Control Systems Engineering	Nise	5th Edition	

Instructor	
Name	**Prof. Khaled Bataineh**
Office Location	CH1 L2
Office Hours	

Email	k.bataineh@just.edu.jo

Class Schedule & Room
Section 2: Lecture Time: Sun : 11:30 - 14:30 Room: LAB

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	1. Introduction to Control Systems.	
Week 2	2. Mathematical Modeling : Newtonian Dynamics.	
Week 3	Mathematical Modeling : Lagrangian Dynamics CONTENTS	
Weeks 3, 4	4. Matrix Algebra: Eigenvalues and Eigenvectors	
Weeks 4, 5	State Space representation: State space representation in Canonical form	
Weeks 5, 6	Cayley-Hamilton Theorem	
Weeks 7, 8	Sability of Linear System	
Week 8	Controllability and Observability of linear system.	
Weeks 9, 10	Control System Desgin in State Space : Pole Placement, State Observer, Quadratic Optimal Requlator Systems	
Weeks 12, 13, 14	Advanced Topics in Modern Control Theory	
Week 15	Review	
Week 16	Exam	

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Develop the state variable representation of physical systems [1L6K1]	15%	
Analyze the performance of linear and nonlinear systems using state variable approach [1L6K2]	15%	
Design state feedback controller for a given system and investigate stability of linear system [1L6S1]	30%	
Introduce concept of controllability and observability of linear system [1L6K2]	10%	
Introduction to optimal control, linear quadratic regulator, Advanced Topics in Modern Control Theory	20%	

Relationship to NQF Outcomes (Out of 100%)		
L6K1	L6K2	L6S1
15	25	30

Policy	
Exam	There will be a closed book (and other resources) First/ second exam during the scheduled exam period. The exam will not be rescheduled except in the case of legitimate.

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