



Jordan University of Science and Technology
Faculty of Engineering
Electrical Engineering Department

EE710 Linear Systems - JNQF Level: 9

First Semester 2025-2026

Course Catalog

3 Credit Hours. This course introduces the analysis and control of linear dynamic systems using state-space and linear algebraic methods. Topics cover Mathematical descriptions of systems; Properties of linear and linear time-invariant (LTI) systems; State-space representations and solutions; System realizations; and Stability concepts. The course further covers Controllability and observability analysis; Minimal realizations; Coprime fraction representations; and State-space transformations. Design topics cover State feedback, State estimation, Pole placement, and Model matching techniques for regulation, tracking, and disturbance rejection. Emphasis is placed on both theoretical foundations and practical system analysis and control design.

Teaching Method: On Campus

Text Book

Title	Linear System Theory and Design
Author(s)	Chi-Tsang Chen
Edition	3rd Edition
Short Name	Textbook
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #1	Modern Control Engineering	Katsuhiko Ogata	5th Edition	
Ref #2	Control Systems Engineering	Norman S. Nise	7th Edition	
Ref #3	Class Notes, Instructor-Prepared Handwritten Notes, and PPT Slides	Instructor	1st Edition	

Instructor

Name	Dr. Mohammad Adnan Magableh
Office Location	-
Office Hours	Sun : 15:00 - 16:00 Mon : 09:30 - 10:30 Mon : 12:00 - 13:00 Tue : 08:30 - 09:00 Tue : 12:00 - 13:00 Wed : 09:30 - 10:30 Wed : 13:30 - 14:00
Email	mkmagableh@just.edu.jo

Class Schedule & Room
Section 2: Lecture Time: Tue : 09:00 - 12:00 Room: LAB

Tentative List of Topics Covered		
Weeks	Topic	References
Weeks 1, 2	Mathematical Descriptions of Systems	From Textbook , From Ref #3
Week 3	Linear Algebra	From Textbook , From Ref #3
Weeks 4, 5	State-Space Solutions and Realizations	From Textbook , From Ref #1 , From Ref #3
Week 6	Stability	From Textbook , From Ref #3
Weeks 7, 8, 9	Controllability and Observability	From Textbook , From Ref #1 , From Ref #3
Week 10	Minimal Realizations and Coprime Fractions	From Textbook , From Ref #3
Weeks 11, 12, 13	State Feedback and State Estimators	From Textbook , From Ref #1 , From Ref #2 , From Ref #3
Weeks 14, 15, 16	Pole Placement and Model Matching	From Textbook , From Ref #3

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
The student will be able to define the fundamental concepts and mathematical descriptions of dynamic systems, including causality, linearity, time invariance, stability, and distributed and lumped system representations. [1L9K1]	15%	
The student will be able to explain linear algebra concepts such as basis representation, similarity transformations, eigenvalues, eigenvectors, and canonical forms, and their application in system analysis. [1L9S2]	15%	
The student will be able to demonstrate proficiency in formulating and solving linear time-invariant (LTI) state-space models and deriving equivalent system realizations. [1L9K2]	5%	
The student will be able to analyze input-output and internal stability of LTI systems using state-space methods. [1L9K1]	15%	
The student will be able to evaluate controllability and observability properties of dynamic systems and interpret their implications for system stabilization and estimation. [1L9K1]	15%	
The student will be able to construct minimal realizations of state-space systems and compute coprime fraction representations of transfer matrices. [1L9K1]	10%	
The student will be able to develop and assess state feedback controllers and state estimators for stabilization, regulation, tracking, and disturbance rejection, applying modeling and analysis techniques to real system scenarios. [1L9S2]	15%	
The student will be able to design and implement pole placement and model matching control strategies, including unity-feedback and two-parameter compensator configurations, to achieve regulation, tracking, and robust disturbance rejection, applying state-space and linear algebra methods to practical system problems. [1L9S2]	10%	

Relationship to NQF Outcomes (Out of 100%)		
L9K1	L9K2	L9S2
55	5	40

Policy	
Attendance Policy	- Students are expected to attend all synchronous and on-campus sessions in their entirety. If a student is unable to attend a session, they must inform the instructor in advance or within 10 days of the absence and provide a valid medical excuse. Regular attendance is strongly recommended to ensure a thorough understanding of course concepts and is required for successful completion of the course.
Makeup Exam and Assignment Policy	- Makeup exams, quizzes, or assignment deadline extensions will not be granted unless a valid medical excuse is submitted, certified by one of the university medical centers, and officially approved by the Faculty Dean and/or Department Chair.

Academic Integrity	<ul style="list-style-type: none"> - Academic integrity is strictly enforced. Cheating, including the use or attempted use of unauthorized materials, information, or assistance in exams, quizzes, or assignments, is strictly prohibited. This also includes unauthorized collaboration, except in projects where collaboration is explicitly permitted by the instructor. - Plagiarism, defined as presenting another person's work, ideas, or words as one's own without proper acknowledgment, is considered a form of cheating according to university regulations. - Students found engaging in cheating or plagiarism may receive a failing grade in the course and may be subject to further disciplinary action in accordance with university policies. Students are responsible for understanding what constitutes cheating and plagiarism and are encouraged to consult university or department regulations if clarification is needed.
Problem-Solving Practice	<ul style="list-style-type: none"> - Consistent practice of analytical and problem-solving techniques is essential for mastering the course material.
Office Hours	<ul style="list-style-type: none"> - Office hours will be announced during the first week of the course.

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