

ECE 6750: Linear Systems Theory

Course Description

In-depth treatment of linear dynamical systems. State equations solution. Controllability and observability. Canonical forms. Internal and external stability. Linear feedback and observer design. Geometric theory.

Prior Course Number: 5754 (750)

Transcript Abbreviation: Linear Sys Theory

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Graduate

Student Ranks: Masters, Doctoral

Course Offerings: Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 6.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites:

Exclusions: Not open to students with credit for 5750 (750).

Cross-Listings:

Course Rationale: Renumbering of existing course.

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001

Subsidy Level: Doctoral Course

Course Goals

Provide necessary system theoretic background for analysis of linear systems using state-space methods
Provide a comprehensive treatment of stability of linear state-space systems
Learn feedback control systems design by pole placement (state feedback) and state observers
Learn how to design feedback control systems for disturbance decoupling, disturbance rejection, tracking and regulation

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
State space representation	2.0							
Vector spaces and linear operators	4.0							
State equations solution	3.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Controllability and observability	6.0							
Realization theory	3.0							
Internal and external stability	5.0							
Canonical forms	3.0							
Linear feedback and state observer design	4.0							
Servo-mechanism theory and regulator design	4.0							
Geometric theory	3.0							

Grades

Aspect	Percent
Homework	30%
Midterm Exam	30%
Final Exam	40%

Representative Textbooks and Other Course Materials

Title	Author
<i>A Linear Systems Primer</i>	Antsaklis and Michel

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
*	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
*	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

updated prereqs, exclusion, goals and topics to match university format.

deleted text Linear System Theory and Design, 3rd Edition, C-T. Chen 3/29/12

Renumber from 5750 5/8/14 BLA

changed text to Antsaklis and Michel 3/29/13

Re-number from 5754 3/25/14 BLA

remove prereqs, make grade only, correct exclusions 8/19/14 BLA

Change semester of offering to spring 4/22/15

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