Rutgers University, Department of Electrical and Computer Engineering
ABET COURSE SYLLABUS
COURSE 14:332:347

Course Catalog Description:
14:332:347 Linear Systems and Signals Laboratory (1)
Experimental exercises via simulation using MATLAB to get understanding of frequency and time domain analysis of linear dynamic systems and corresponding signals. Finding the response of continuous- and discrete-time linear systems via simulation.

Pre-Requisites Courses: None

Co-Requisites Courses: 14:332:345

Prerequisites by Topic:
1. Differential equations
2. Linear algebra
3. Complex variables

Textbooks: Laboratory Manual for Linear Systems and Signals Laboratory.
Z. Gajic, *Linear Dynamic Systems and Signals,* Prentice-Hall, 2003.

Overall Education Objective:
1. To understand complex signals and their representation in terms of common signals.
2. To understand the signal frequency content and the system representation in the frequency domain.
3. To understand the concept of signal convolution and its use in analysis of linear dynamic systems.
4. To master the use of the Laplace transform in analysis of continuous-time linear dynamic systems.
5. To master the use of the Z transform in analysis of discrete-time linear dynamic systems.

Course Learning Outcomes:
A student who successfully fulfils the course requirements will have demonstrated:
1. an ability to analysis complex signals in the time domain
2. an ability to study signals and systems in the frequency domain
3. an ability to find the response of both continuous- and discrete-time linear dynamic systems.
4. an ability to prepare laboratory reports.

How Course Outcomes are Assessed:
Pre-lab preparation and performance in laboratory (30%)
Laboratory experiment reports (70%)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by
(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Laboratory work and reports
(b) an ability to design and conduct experiments and interpret data	H	Laboratory work and reports
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	Setting up experiments, performing experiments, and circuit simulations
(d) an ability to function as part of a multi-disciplinary team	N	
(e) an ability to identify, formulate, and solve ECE problems	S	Performing laboratory experiments
(f) an understanding of professional and ethical responsibility	S	Conducting the experiments and reporting the results
(g) an ability to communicate in written and oral form	H	Laboratory reports and active lab participation

(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Reports written at home
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for electrical and computer engineering practice	H	Laboratory work and reports
Basic disciplines in Electrical Engineering	H	Laboratory work and reports
Depth in Electrical Engineering	S	Laboratory work and reports
Basic disciplines in Computer Engineering	S	MATLAB simulations
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	Performing laboratory experiments and MATLAB simulations
Variety of instruction formats	S	Lab instruction and office hour discussions

Topics covered week by week

Week 1: Organization of laboratory.
Weeks 2 and 3: Introduction to MATLAB.
Weeks 4 and 5: Experiment 1: Signals in linear systems.
Weeks 6 and 7: Experiment 2: Frequency domain linear system analysis.
Weeks 8, 9 and 10: Experiment 3: Continuous- and discrete-time convolution.
Weeks 11 and 12: Experiment 4: Continuous-time state space analysis.
Weeks 13 and 14: Experiment 5: Discrete-time state space analysis.
Weeks 15 and 16: Review and preparation for final exams

Computer usage: Extensive use of MATLAB

Design Experiences: No design experience except for designing the system transfer functions.

Independent Learning Experiences: Writing laboratory reports, and conducting MATLAB simulations.

Contribution to the Professional Component:

(a) College-level mathematics and basic science: 0.25 credit hours
(b) Engineering topics (science and/or design): 0.75 credit hours
(c) General education: 0 credit hours.
Total credits: 1

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