

ABET COURSE SYLLABUS

ECSE-2410 Signals and Systems

Course Catalog Description: Time and frequency domain representation of continuous- and discrete-time signals and systems, and solutions of their response. Simulation of linear systems. Fourier series and transform. Laplace transform and z-transform. Stability, feedback systems, and root-locus analysis and design. Applications involving communication and control systems.

Pre-Requisite Courses: ECSE-2010 Electric Circuits

Co-Requisite Courses: None

Prerequisites by Topic:

1. solutions to linear differential equations
2. complex arithmetic
3. RC, RL and RLC circuit analysis

Textbook: *Required:* A.V. Oppenheim and A.S. Willsky, *Signals and Systems*, 2nd edition, Prentice Hall, 1997.
(and/or other required material)

Supplemental: Schaum's Outline on Signals and Systems.

References: The class WebCT website has a link to the videostreams. Videos include old exam problems and selected concept problems worked out in detail. *These videos are strongly recommended for help with the homework.*

Course Coordinators: Alan Desrochers and Michael Wozny

Overall Educational Objective: On completion of the course, students should be sufficiently familiar with the theoretical structure, formal representation, computational methods, notation, and vocabulary of linear models to be able to apply them to the analysis and design of digital and analog communications and control systems.

Course Learning Outcomes:

1. Be able to find the response of linear systems in the time domain.
2. Be able to represent and analyze systems in the frequency domain.
3. Be able to apply time and frequency domain methods to gain an understanding of communication systems and feedback control systems.
4. Understand the basics of discrete-time systems and signal processing.

How Course Outcomes are Assessed:

3 exams (one hour and 50 minutes each, in class)	(10%, 15%, 15%)	
Final Exam (three hours)		30%
Homework (weekly)		15%
Quizzes (in class, weekly)		15%

Homework is due at the *beginning* of class. Late homework will not be accepted. The lowest homework grade and the lowest quiz grade will be dropped when computing the overall grade. *This is done only to provide for sickness, interviews, emergencies, personal problems and other such exigencies that inevitably occur every semester.* No official excuses are necessary.

Relation to EE/CSE/EPE Outcomes

N = none
M = moderate

Outcome	Level	Demonstrate Proficiency
	N, M, H	e.g. Exams, projects, HW
Mathematics, science and engineering	H	Exams, HW, quizzes
Basic disciplines in Electrical Engineering	H	Exams, HW, quizzes
Depth in Electrical Engineering	N	

H = high

Basic disciplines in Computer & Sys. Eng.	H	Exams, HW, quizzes
Depth in Computer and Systems Eng.	N	
Electromagnetics, electromechanics, power semiconductors	N	
Power system behavior	M	Exams, HW, Activities
Electrical energy conversion	N	
Conduct experiments and interpret data	N	
Identify, formulate and solve problems	M	C
Design a system, component or process	N	
Communicate in written and oral form	N	
Function as part of a multi-disciplinary team	N	
Preparation for life-long learning	N	
Ethical issues; safety, health, public welfare	N	
Humanities and social sciences	N	
Laboratory equipment and software tools	M	HW
Variety of instruction formats	M	Exams, HW, quizzes

Topics Covered:
(number of hours or classes for each)

1. Signal Representations (1 week)
2. Linearity and Superposition (1 week)
3. Convolution in the time domain (1 week)
4. Fourier series (1 week)
5. Fourier transform and properties (2 weeks)
6. Modulation techniques for communication systems (1 week)
7. Nyquist Sampling Theorem (1 week)
8. Bode Plots and Steady-State Frequency Analysis (1 week)
9. Laplace transforms and pole-zero plots (1 week)
10. Modeling and Feedback Control Systems (2 weeks)
11. z-transforms (1 week).

Computer Usage:

The MATLAB analysis and design software is used throughout the course. Describe any computer usage for the class.

Laboratory Experiences:

None

Design Experiences:

None

Independent Learning Experiences:

Video examples are available online for supplemental instruction.

Class/Lab Schedule:

Three classes/week with 80 minutes/class

Contribution to the Professional Component:

- (a) College-level mathematics and basic sciences: 1.5 credit hour
- (b) Engineering Topics (Science and/or Design): 2.5 credit hours
- (c) General Education: 0 credit hours

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Date:	April 7, 2006