ECE 350 Signals and Systems

Catalog Data:
EE 350 Signals and Systems Analysis (4 cr.). Continuous and discrete, linear time-invariant systems; Laplace transforms; frequency transforms; Fourier series and transforms, DTFT and DFT; modulation; sampling and reconstruction; Z-transforms and discrete time systems. Prereq: EE 212 and Math 330. Meets for 50 min 4 times/week.

Textbook:
Signals, Systems and Transforms, Charles Phillips and John Parr, Prentice Hall, 1995.

References:
None

Coordinator:
Karen Z. Frenzel, Assistant Professor of Electrical Engineering

Objectives:
1. Learn to analyze linear, time-invariant systems in the time domain using differential equations, difference equations, and convolution.
2. Learn to analyze LTI systems using Laplace Transforms.
3. Learn to analyze LTI systems in the frequency domain using Fourier methods.
4. Learn to model and analyze LTI systems using state variable models.
5. Learn to use MATLAB to simulate LTI systems.

Relationship to Program Objectives:
The support of program objectives (lettered) by course objectives (numbered) is identified by the bulleted entries in the following table.

	A	B	C	D	E
1	•	•	•		
2	•	•	•		
3	•	•	•	•	
4	•	•	•		
5		•	•		

Prerequisites by Topic:
1. Differential Equations
2. Circuit Analysis
3. Calculus

Topics:
1. System Characteristics
2. Difference Equations
3. Differential Equations
4. Continuous and Discrete Convolution
5. Laplace Transforms
6. Fourier Series
7. Fourier Transforms
8. Z Transforms
9. Continuous and Discrete Time State Variable Models

Computer Usage:
MATLAB

Laboratory Projects:
None

ABET engineering topics content:
Engineering Science: 3 credits
Engineering Design: 1 credit

Assessment Tools:
1. Homework problems (weekly)
2. Weekly quizzes
3. Three one-hour exams
4. One two-hour final exam

Desired Course Outcomes:
1. The student will demonstrate the ability to analyze LTI systems in the time domain using differential equations or difference equations.
2. The student will demonstrate the ability to analyze LTI systems in the time domain using impulse response models and convolution.
3. The student will demonstrate the ability to use Fourier Analysis to find outputs to LTI systems given a transfer function model.
4. The student will demonstrate the ability to analyze basic AM systems in the frequency domain.
5. The student will demonstrate the ability to analyze basic discrete filters using z transforms.
6. The student will demonstrate the ability to model discrete and continuous time systems using state variable models.
7. The student will demonstrate the ability to use MATLAB to model LTI systems and plot output functions.

Relationship of Desired Course Outcomes to Desired Program Outcomes:
The relationship between desired course outcomes (numbered) and desired electrical engineering program outcomes (lettered) is illustrated by the bulleted entries in the following table.

	a	b	c	d	e	f	g	h	i	j	k	l	m
1	●				●		●				●	●	●
2	●				●		●				●	●	●
3	●		●		●		●				●	●	●
4	●		●		●		●				●	●	●
5	●		●		●		●				●	●	●
6	●				●		●				●	●	●
7	●				●		●				●		