ENG EC401: Signals and Systems

2008-2009 Catalog Data:

Prereq: CAS MA 226 and ENG EK 307. Continuous-time and discrete-time signals and systems. Convolution sum, convolution integral. Linearity, time-invariance, causality, and stability of systems. Frequency domain analysis of signals and systems. Filtering, sampling, and modulation. Laplace transform, z-transform, pole-zero plots. Linear feedback systems. Includes lab. Cannot be taken for credit in addition to ENG BE 401. 4 cr.

Class/Lab Schedule:

LEC: 4 hrs/wk, LAB:1 hr/wk

Textbooks and other required materials:

"Signals & Systems," Second Edition, Oppenheim, Willsky, Nawab (Prentice Hall)

Coordinator:

Jeffrey Carruthers, Associate Professor, ECE Department

Prerequisites by topic:

CAS MA226: Differential Equations, ENG EK307: Electric Circuit Theory

Goals:

To provide students with:

- Complete understanding of the nature of continuous and discrete signals and their applications in engineering systems.
- Knowledge of the terminology of and concepts of both analog and digital signals and systems.
- Experience in the characterization of signals
- Understanding of and experience in the use of transforms for signal classification and analysis.
- Experience in signal processing and system analysis using Matlab

Course Outcomes:

As an outcome of completing this course, students should be able to:

1) *Understand* the terminology of signals and basic engineering systems.
2) *Understand* the role of signals and systems in engineering design and society.
3) *Understand* the use of signals and basic system building blocks and their roles in large/complex system design.
4) *Understand* signal representation techniques and signal characteristics.
5) *Understand* the difference and the applications of analog versus discrete signals and the conversion between them.
6) *Understand* the process of sampling and the effects of undersampling.
7) *Understand* the Fourier, Laplace and z-transforms.
8) *Understand* the use of transforms in signal/system analysis, characterization, and manipulation.

9)*Understand* the relations between the Fourier, Laplace and z-transforms.
10)*Understand and design* basic feedback systems.
11)*Perform* group work in system analysis and design.
12)Write clear and cohesive reports on laboratory experiments and team design exercises.
13)*Communicate* the primary concepts of signals and systems effectively to team members, instructors and others.
14) *Design* and perform Matlab experiments to verify concepts.

Course Outcomes mapped to Program Outcomes:

Program Outcomes	A	B	C	D	E	F	G	H	I	J	K
Course Outcomes	**1,3-9**	**10-12,14**	**10-11**	**10**	**1,3-9**	**2**	**12-13**	**2**	**8-11**	**2**	**10-12,14**
Emphasis (1-5)	**5**	**2**	**2**	**3**	**5**	**2**	**2**	**3**	**3**	**2**	**3**

Contribution of Course to Meeting the Professional Component:
Engineering topics: 100%

Prepared by: Jeffrey Carruthers, Associate Professor **Date:** Jun 22, 2009