EEE 203 Signals and Systems I (3) [F, S, SS]

Course Description:
Introduction to continuous and discrete time signal and system analysis, linear systems, Fourier, and z-transforms.
Lecture. Required course.

Prerequisite:
EEE 202

Pre- or Co-requisites:
MAT 342 (or 343)

Textbook:
Oppenheim and Willsky with Nawab, *Signals and Systems, 2nd Ed.*, Pearson, 1997.

Supplemental Materials: None.

Coordinator:
Systems Area Committee

Prerequisites by Topic:
1. Linear Circuit Theory
2. Laplace Transforms
3. Infinite Series

Course Objectives:
- Students understand continuous-time and discrete-time linear systems
- Students can apply Fourier analysis to important problems in communication and signal processing.

Course Outcomes:
1. Students can state and apply time-domain properties of continuous-time (CT) and discrete-time (DT) linear time-invariant (LTI) systems.
2. Students have the ability to apply the CT Fourier transform in signal analysis
3. Students understand and can use fundamental frequency-domain properties of CT LTI systems

Course Topics:
1. Continuous-time (CT) and discrete-time (DT) signals
2. CT and DT systems
3. Linearity, time-invariance, causality, and block diagrams of systems
4. Impulse response and FIR/IIR systems
5. CT and DT convolution
6. Transient and steady state responses
7. Fourier transform and its properties

8. Frequency response and frequency-domain analysis of CT systems
9. Laplace transform and its properties
10. Z transform and its properties
11. Introduction to frequency-domain analysis of DT systems
12. Sampling theorem
13. BIBO stability

Computer Usage:

Exercises and demonstrations using MATLAB and/or LABVIEW

Laboratory Experiments: None

Course Contribution to Engineering Science and Design:

Engineering design is emphasized in EEE 203 through the use of open-ended exercises. Most of these involve specification of a filter to accomplish a particular goal or design of signals having desired properties. An example of the first type of problem is to specify the impulse response of an analog filter that will pass a radio transmission while rejecting a signal in a nearby frequency band. Since there are many possible solutions to such a problem, students are able to consider design tradeoffs and issues involved in practical implementation.

Course Relationship to Program Outcomes:

a: Considerable math background; fundamental EE background in signals and systems, which is a cornerstone of DSP, communications, controls, as well as applications in power systems and circuits.
e: Identify and formulate engineering problems, e.g., filtering, sampling.
k: Use of modern engineering tools (software) to solve problems

Person(s) preparing this description and date of preparation: K. Tsakalis, September 8, 2008, June 2015.