EE 315 Signal and Systems Analysis

**Designation:** Required

**Catalog Description:** EE 315 Signal and Systems Analysis (3) Discrete Fourier transform, Fourier Series, Fourier Transform, Laplace Transform, Fast Fourier Transform, analysis of linear systems. Pre: 213; or consent.

**Credits:** 3

**Prerequisites:** EE 213 "Basic Circuit Analysis II"

**Class/Lab Schedule:** 3 lecture hours per week.

**Topics Covered:**
The course discusses fundamental concepts in the analysis of signals and systems. The course focuses on studying systems that are linear and time invariant and is divided into two parts. In the first part, tools are developed to analyze linear time invariant systems and the second part discusses real world applications of these systems.

The first part of the course analyzes both continuous and discrete time systems. The course first analyzes linear time invariant systems in the time domain by studying the impulse response and convolution. The course then analyzes systems in the frequency domain through the use of Fourier Series, Fourier Transforms, the Laplace Transform, and the Z Transform.

The second part of the course presents applications in the areas of signal processing, communications, and control theory. Some topics to be discussed include the Sampling Theorem, analog modulation systems, and linear filters.

- Introduction to Signals and Systems. (4 hrs)
- Continuous Time LTI Systems. (12 hrs)
- Discrete Time LTI Systems. (9 hrs)
- Applications: Filtering, Communications, Sampling. (9 hrs)
- Laplace and Z Transform. (5 hrs)


**Course Objectives and Their Relationship to Program Objectives:**
A student studies signals and systems that are linear and time invariant. Time and frequency domain tools are used to study signals and systems and their application to problems in communications, filtering, and sampling. [Program Objectives that this course addresses: 1, 3 and 4.]

**Course Outcomes and Their Relationship to Program Outcomes:**
The following are the course outcomes and the subset of Program Outcomes (numbered 1-11 in square braces "[ ]") they address:
- Use advanced mathematics (differential equations, Fourier analysis) to study signals and linear time invariant systems. [1,3,5]
- Develop tools and analytical skills to study signals and linear time invariant systems.
• Classify signals and systems. [3,5]
• Represent signals in time and frequency domain. [1,3,5]
• Study communication and filtering applications. [3,5,8,9]
• Understand sampling theorem, connections between discrete time and continuous time, and advantages of discrete time processing. [3,5,8,10]
• Verify analytical results through computer simulations about signals and linear time invariant systems (e.g. Matlab). [3,5,11]

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

Computer Usage:
Computer usage is minimal. Matlab is used to verify some concepts derived in class.

Design Credits and Features:
EE 315 has 0 design credits.