

Course Description

This is an introductory course for signal and system analysis. The course covers signal analysis tools including continuous- and discrete-time Fourier series and Fourier transform, and Laplace Transform; interactions between signals and linear time invariant (LTI) systems, and differential and difference equations as LTI systems, sampling theorem; and application examples in communication and control systems. MATLAB introduced as an integral part of this course.

*Exclusion(s):* ELEC 2100H *Prerequisite(s):* MATH 2011 OR MATH 2023 OR MATH 2111 OR MATH 2350 OR MATH 2351 OR MATH 2352

List of Topics

1. Signals & Systems
2. Linear Time-Invariant Systems
3. Fourier Series Representation of Periodic Signals
4. The Continuous-Time Fourier Transform
5. The Discrete-Time Fourier Transform
6. Sampling
7. Communication Systems
8. Differential equations and Laplace Transform

Statement of Objectives/Outcomes:

On successful completion of this course, students will be able to:

CO1 - Describe Basic Continuous Time and Discrete Time signals and different ways to make use of and manipulate them

CO2 - List the Properties of LTI systems and to determine the output of an LTI system using the impulse response and the convolution sum/integral, and the frequency response and transform

CO3 - Correctly apply the appropriate transform (FS, DTFS, FT DTFT) to produce a Frequency domain representation for continuous-time/discrete-time and periodic/apperiodic signals, and relate basic operations in the time and frequency domains

CO4 - State and prove the sampling theorem

CO5 - Analyze differential and difference equations as causal LTI systems and to realize them in different block diagram forms

CO6 - Apply theories learnt to the analysis of communication systems including Amplitude Modulation and Frequency Division Multiplexing, mechanical systems, and new problems

CO7 - Use the Software Tools Matlab to manipulate, process, analyze and plot signals

Textbook(s):

Alan V. Oppenheim, Alan S. Willsky and S. H. Nawab, *Signals and Systems*, Prentice-Hall International Editions, 2nd Edition

Relationship of Course to Program Outcomes:

Please refer to the Report Section 4.3.2 (iii).

Grading Scheme:

Homework	8%
Laboratory exercises	8%
In-class quiz	4%
Pre-midterm Quiz	8%
Midterm Examination	30%
Final Examination	42%