Signals & Systems (IEC-402)

Class Period	As per class schedule
Classroom	As per class schedule
Instructor	Shrish Bajpai
Office	Room Number 315, Second Floor, ECE Department, Civil Building
Office Hours	Lunch Time or by appointment
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Course Web Page	ShrishBajpai.YolaSite.Com

Motivation : Signals convey information. Systems transform signals. This course introduces the mathematical models used to design and understand both. It is intended for students interested in developing a deep understanding of how to digitally create and manipulate signals to measure and control the physical world and to enhance human experience and communication. Systems are defined as mappings on signals. The notion of the state is discussed in a general way. Feedback systems and automata illustrate alternative approaches to modeling state in systems. Frequency domain models for signals and frequency response for linear time-invariant systems are investigated. Sampling of continuous signals is discussed to relate continuous time and discrete time signals. You may find this course to be one of the more challenging junior courses in the ECE degree plan. This course feeds into several ECE technical specializations such as Digital Signal Processing, Communications, and Control Theory.

Syllabus : This is a working document to help us plan activities for the course. Your input on how to make this a better course is always appreciated.

Catalog Description : This course focuses on analyzing signals (sound, voltage, communication transmissions, pressure, images, etc.) and the systems that act on them (circuits, physical echos, mechanical dynamics, modulation, etc.). We concentrate on the Fourier transform and linear-time invariant systems, providing a depth of tools for sampling, manipulating, preserving, and interpreting information signals.

Pre-requisite: Clear knowledge of Engineering Mathematics & Engineering Physics.

Textbook (Required) Oppenheim and Willsky with Nawab, "Signals and Systems", 2th Edition Prentice Hall Press. India. ISBN : 978-8-12-0312463

Library TBS 621.34

There is a *plethora* of books on electromagnetic field theory available at the central library. You are urged to check one out and use it as a reference.

Reading Assignments : You need to prepare for lecture so you can get the most benefit out of it. You are responsible for reading the sections in the book ahead of time as indicated in the lecture plan.

Course Outline : This course draw a distinction between the fundamentals of signal modeling in time and frequency domains, and indicate the significance of alternative descriptions. The basic concepts of Fourier series, Fourier transforms, Laplace transforms and related areas are developed. The idea of convolution for linear time-variant systems are introduced and expanded on from a range of perspectives. The transfer function for continuous and discrete time systems is used in this context. Stability is discussed with respect to the pole locations. Some elements of statistical signal description are introduced as signal comparison methods. The Discrete Fourier Transform is discussed as a Z-transform evaluation and its consequences examined. Some basic filtering operating for both continuous and discrete signals are developed.

Course Outcomes : By the end of the semester you will demonstrate the ability to:

1. To understand representation & classification of signal.
2. To study the basic of signal analysis using different transforms.
3. To study the analysis of Continuous & Discrete time signal using Fourier Series, Fourier Transform & Z Transform.
4. To understand the sampling of the signal & reconstruction of signal from it's sample form.

Contribution to Professional Component: Signals & Systems (IEC-402) is a junior core course that builds on topics covered primarily in sophomore physics and electrical engineering courses.

Test and Final Examination: There will be two midterms during the semester. Typically, a test will have four or five problems. Three problems you have to attempt. The final End Semester Examination will be an opportunity to challenge any problem scores you wish to improve upon.

Important: No make-up exam will be granted without prior permission from the Head of Department. Students are strongly advised to refrain from copying the assignments of their classmates or works submitted at other places. Also they should not do any sort of malpractices during any examinations. Any student found to have violated these rules will be awarded "zero" mark for the respective test/assignment and the matter will be reported to HoD for suitable further action. Also students have to offer perfect discipline in the classroom in all respects.