SIGNALS AND SYSTEMS

Code	Credit Hours
EE-232	3-1

COURSE DESCRIPTION:

This is an introductory course to Signals and Systems. The course will provide an insight into how physical processes can be mathematically modelled using signals and systems. The course will also focus on how signals can be represented in time domain and how they can be transformed into other domains. The transform domain allows more intuitive/ simpler solutions to various engineering problems. The students will also learn about analytical techniques that allow modelling the behavior of the systems and gain an insight into the characteristics of systems. The course will provide skills to model, analyze and design signals and systems.

TEXTBOOK:

Signals and Systems by Alan V. Oppenheim, Alan S. Willsky with S. Hamid Nawab (2nd Edition)

REFERENCE BOOK:

1. Linear Systems and Signals by B.P. Lathi
2. Signal Processing First by James H. McClellan, Ronald W. Schafer and Mark A. Yoder

PREREQUISITES

EE-211

Math-121

ASSESSMENT SYSTEM FOR THEORY

Quizzes	5-15%
Assignments	5-10%
Mid Terms	25-35%
ESE	40-50%

ASSESSMENT SYSTEM FOR LAB

Quizzes	10%-15%
Assignments	5% - 10%
Lab Work and Report	70-80%
Lab ESE/Viva/Project	20-30%

TEACHING PLAN

WEEK NO	TOPICS	LEARNING OUTCOMES
1	Introduction	Course Outline, objectives, teaching plan, assessment method, Introduction
2-5	Time Domain	Types of Signals, Signal Transformations/Signal Fundamentals, Types of Systems, System Classification, Linear Time Invariant Systems, Properties of LTI Systems, CT & DT Convolution
6-8	Fourier Series	Frequency domain view of LTI systems, Concept of complex frequency, Fourier series representation of CT periodic, signals (CTFS), Properties of CTFS, Fourier series representation of DT periodic signals (DTFS)
9	**MID TERM EXAM**	
10-12	Fourier Transform	Fourier Transform of continuous time aperiodic signals (CTFT), Properties of CTFT, Fourier Transform of discrete time aperiodic signals (DTFT), Properties of DTFT
13-17	Basic Sampling and Transformation Domains	Introduction to Sampling (Time Domain and frequency domain description; Nyquist criterion), Aliasing; Under/Over sampling, Laplace Transform and Its Properties, Basic of Pole Zeros Plots, Convergence of CTFT and relationship with Laplace Transform, Z Transform and Its Properties, Convergence of DTFT and relationship with Z-Transform
18	**END SEMESTER EXAMS**	

Lab Experiments:

NO	DESCRIPTION
1	Introduction to Matlab
2	Plotting and Array Processing in MATLAB
3	Signal Transformations
4	Introduction to Complex Exponentials
5	Introduction to Properties of Systems
6	Convolution
7	Simulink
8	Continuous Time Fourier Series
9	Discrete Time Fourier Transform
10	Fourier Transform
11	Sampling
12	Modulation
13	Laplace Transform
14	Z Transform
15	Semester Project