

SUBJECT: EE-233: **Signals and Systems**

CREDIT HOURS: 2-0

CONTACT HOURS: 2 Hours per Week

TEXT BOOKS: Signals And Systems by Alan V. Oppenheim 2nd ed.
Prentice Hall, 1996

REFERENCE BOOKS:

Signals And Systems – Analysis Using Transform Methods and MATLAB by M.J.
Roberts

Signals And Systems – Continuous and Discrete by
Rodger E. Ziemer, William H. Tranter, D. Ronald Fannin.
Digital Signal Processing – A Computer Based Approach
Third Edition by Sanjit K. Mitra.

PREREQUISITE: None

MODE OF TEACHING: Lectures

COURSE OBJECTIVES: The course provides an insight to theory and applications of signal and systems. It covers the fundamentals of signal and system analysis, focusing on representations of discrete-time and continuous-time signals and representations of linear, time-invariant (LTI) and linear time-variant (LTV) system using block diagrams, system functions, poles and zeros, convolution, impulse and step responses, frequency responses. Applications are drawn broadly from engineering and physics, including feedback and control, communications, and signal processing.

LEARNING OUTCOMES:

Upon successful completion of the course, the student will demonstrate competency by being able to:

1.	To demonstrate a mastery and understanding of the founding principles of Signal and Systems.
2.	To investigate the different classes of problems in signal processing and to

	decide upon appropriate methodologies for their solution.
3.	To apply different algorithms in Signal and Systems to the real-world problems.

PRACTICAL APPLICATION: The role of Signal and Systems is indispensable in the modern era of computer and communication technologies. Moreover, Signal processing also plays an important role in the modern world of intelligent machines and systems. Every machine or system has its specific digital signature in the form of vibrations, acoustics, etc., through which its health or condition can be diagnosed for predictive and proactive maintenance purposes. Studying this subject would equip the students to achieve this aim and therefore apply the knowledge they have earned to any system whether communication system or machines.

TOPICS COVERED:

Topics	Week/Lecture
1. Continuous-time (CT) and discrete-time (DT) signals	1
2. CT and DT Complex Exponential and Sinusoidal Signals	
3. Signal energy and power, time shift, reversal, and scaling	2-3
4. Periodic signals, even and odd signals	
5. Periodicity Properties, unit impulse and unit step signals	
6. Memory	
7. Invertibility	
8. Causality	3-4
9. Stability	5
10. Time Invariance	
11. Linearity	
12. DT and CT representation in terms of impulses	6-7
13. DT Unit Impulse Response	
14. Convolution-Sum representation of LTI Systems	
15. CT Unit Impulse Response	8-9
16. Convolution-Integral Representation of LTI Systems	

17. Fourier Series Representation of Continuous and Discrete Time Periodic Signals	10
18. Properties of Continuous and Discrete Time Fourier Series	11
19. Continuous and Discrete time Fourier Transform	12
20. Sampling	13
21. Laplace and Z transforms	14-15
22. Region of convergence	
23. BIBO stability	16
24. LTV systems	

COURSE TARGETS:

S.No	Outcomes	Level of Learning	PLO
1	To demonstrate a mastery and understanding of the founding principles of Signal and Systems.	C2	1
2	To investigate the different classes of problems in signal processing and to decide upon appropriate methodologies for their solution.	C4	4
3	To apply different algorithms in Signal and systems to the real-world problems.	C3	1