

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	Signals and Systems
Course Code:	2ET1090504T
Pre-requisite Course:	-

Course Objectives:

1. The objective of the course is to Understand mathematical description and representation of continuous and discrete time signals and systems.
2. To analyze the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.
3. To understand and resolve the signals in frequency domain using Fourier series.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Signals and Systems: Continuous-time and discrete-time signals, Basic operations on signals, Classification of signals, Exponential and sinusoidal signals, The unit impulse and unit step functions, Classification of systems, Basic system properties.	07	15
2	Linear Time-Invariant Systems. Continuous-Time LTI Systems: The Convolution integral, Discrete-Time LTI Systems: The convolution sum, Properties of linear time-invariant systems, Causal LTI systems described by differential and difference equations.	11	25
3	Fourier Series Representation of Periodic Signals: The Response of LTI systems to complex exponentials, Fourier series representation of continuous-time periodic signals, Convergence of the Fourier series, Properties of continuous-time Fourier series, Fourier series representation of discrete-time periodic signals, Properties of discrete-time Fourier series.	10	25
4	The Continuous-Time Fourier Transform: Representation of aperiodic signals, Continuous-time Fourier transform, Fourier transform for periodic signals, Properties of the continuous-time Fourier transform, Convolution property, Multiplication property, Tables of Fourier properties and basic Fourier transform pairs, Systems characterized by linear constant-coefficient differential equations.	09	20

5	The Discrete-Time Fourier Transform: Representation of aperiodic signals, Discrete-time Fourier transform, Fourier transform for periodic signals, Properties of the discrete-time Fourier transform, Convolution property, Multiplication property, Tables of Fourier transform properties and basic Fourier transform pairs, Duality, Systems characterized by linear constant coefficient difference equations	08	15
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Text Books:

1. Alan V. Oppenheim, Alan S. Willsky & S. Hamid, "Signals and Systems", Pearson Education, 6th edition-2014.
2. A. Anandkumar, "Signals and Systems", PHI Learning Pvt Ltd, 10th edition-2017.

Reference Books:

1. John G. Proakis, "Digital Signal Processing", PHI Learning Pvt Ltd, 2012.
2. Tarun Kumar Rawat, "Signals and Systems", Oxford University Press, 2nd edition- 2015.
3. Simon Haykin, Barry Van Veen, "Signals and Systems", John Wiley & Sons (Asia) Private Limited, 2010.

List of Open Source Software/learning website:

1. <https://nptel.ac.in/courses/117101055/1>
2. <https://nptel.ac.in/courses/117101055/2>
3. <https://nptel.ac.in/courses/117101055/3>
4. <https://nptel.ac.in/courses/117101055/8>
5. <https://nptel.ac.in/courses/117101055/9>
6. <https://nptel.ac.in/courses/117101055/10>
7. <https://nptel.ac.in/courses/117101055/14>
8. <https://nptel.ac.in/courses/117101055/16>
9. <https://nptel.ac.in/courses/117101055/19>
10. <https://nptel.ac.in/courses/117101055/21>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand mathematical description and representation of continuous and discrete time signals and systems.	2 Understanding
CLO2	Classify systems based on their properties and determine the response of LTI system using convolution.	5 Evaluating
CLO3	Analyze the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.	2 Understanding
CLO4	Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms.	6 Creating

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	H	M	M	M	M	L	L		L	L	H	M			L
CLO2	H	H	H	M	M	M		L	L	L	L	M	L	L		H
CLO3	H	H	H	M	M	M		L	L	L		H	L		L	L
CLO4	H	H	M	L	M	M		L	L	L		H	L	L		

H: High, M: Medium, L: Low