(EEE.4.1, 4-0) Signals and Systems

Signal classification. Continuous and discrete time signals. Signal transformation in the time domain. Basic continuous and discrete time signals. Continuous and discrete time systems. System properties. Memory, causality, stability, time invariance and linearity. Linear and Time Invariant (LTI) systems. Continuous and discrete time convolution. System impulse response. Description of continuous time LTI systems with differential equations. Description of discrete time LTI systems with difference equations. Fourier series of periodic continuous time signals. Fourier series and LTI systems. Continuous time Fourier transform, properties. Discrete time Fourier transform, properties. LTI system analysis, system frequency response. Hilbert transform, analytic signals, applications. Magnitude and phase of the system frequency response. Bode plots. Ideal and nonideal filters. First and second order continuous and discrete time systems. Sampling of continuous time signals. Signal reconstruction of its samples. Aliasing. Discrete time processing of continuous time signals. Laplace transform, properties, analysis of continuous time LTI systems, transfer function. Block diagram representations of LTI continuous time systems. Unilateral Laplace transform. Z transform, properties, analysis of discrete time LTI systems, transfer function. Block diagram representations of LTI discrete time systems. Unilateral Z transform.