

1.	Title of the course	Advanced Signal Analysis and Processing
2.	Course number	EE527L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To EE5101/12
6.	To be offered by	Department of Electrical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	<p>Course Objective(s): Students will be able to understand the advance concepts, theory and computational algorithms of several real world applications of signal processing. Aid them in understanding how signal processing enables to develop realizable filters, how the sampling rate conversions of the signals can be computationally accomplished to transmit, store and play with real (1D) signals. Understand how this paves a way in several other domains to analyse signals, and design adaptive systems to accomplish the needs of several domains ranging from medical, economics, engineering to state of the art industrial.</p>	
10.	<p>Course Content: Continuous and discrete time signals and systems, LTI systems, Convolution, Difference equations. Frequency domain representation: Fourier transform and its properties. DTFT, DFT and FFT; Z-transform. Digital filters: FIR and IIR filters, Digital-filter realisations and design. Sampling, Quantization; Sampling and reconstruction: Change of sampling rate, Decimation and Interpolation, Polyphase decomposition. Non-stationary Processes; Time Frequency representations; Short time FT, Uncertainty principle, Discrete Wavelet Transforms; Analysis and Synthesis filter banks; Discrete random processes, Linear prediction, Digital Wiener filtering, Kalman filter, Extended and Unscented Kalman filter; Particle filter.</p>	
11.	<p>Textbook(s):</p> <ol style="list-style-type: none"> 1. Oppenheim A V and Schafer R W, <i>Discrete Time Signal Processing</i>, 2nd Edition, PHI (1997). 2. Soman K P, Ramachandran K I, <i>Insight into Wavelets: From Theory to Practice</i>, 2nd Edition, PHI (2010). 	
12.	<p>Reference(s):</p> <ol style="list-style-type: none"> 1. Proakis J G and Manolakis D G, <i>Digital Signal Processing: Principles, Algorithms and Applications</i>, 4th Edition, PHI (1997). 2. Mitra S K, <i>Digital Signal Processing</i>, 4th Edition, TMH (1998). 3. Mallat S, <i>A Wavelet Tour of Signal Processing</i>, 3rd Edition, Academic Press (2008). 	