

Digital Signal Processing and Applications

Detailed Course Content (Sep 04 – Sep 08, 2017)

Topics	Instructor	No of hrs of lecture	Days
Introduction to discrete linear systems linearity, linear convolution, stability, Digital filter design - Finite impulse response (FIR) filters, Infinite impulse response (IIR) filters, Structures and properties of FIR and IIR filters and review	Dr. Prasanta Kumar Ghosh, EE, IISc	6	Sep 04, Sep 06
sampling theory, system functions, z-transforms, A/D and D/A conversion, Discrete-Time Fourier Transform	Dr. Soma Biswas, EE, IISc	4	Sep 04, Sep 05
Linear Time Invariant Systems, discrete Fourier transform, relationship of DFT to DTFT, fast computation of DFT	Prof. Chandra Sekhar Seelamantula, EE, IISc	4	Sep 05
Linear algebra and orthogonal transforms, DCT, DST, and rectangular transforms, non orthogonal Gabor transform and applications	Prof. A G Ramakrishnan, EE, IISc	4	Sep 06
Applications of DSP in speech processing, Introduction to CDF, PDF for a random variable, expectation, uniform and Gaussian distribution, Linear prediction, homomorphic filtering	Dr. Sriram Ganapathy, EE, IISc	4	Sep 07, Sep 08
Application to image processing - Basics of convex optimization, L1 minimization and sparsity-driven algorithms, Convex models and algorithms for image restoration	Dr. Kunal Narayan Chaudhury, EE, IISc	4	Sep 07
Multirate Digital Signal Processing (a) Interpolation and Decimation i. Frequency Interpretation, ii. Implementation using Polyphase Structures, iii. Multistage Implementation (b) Multirate Filter Banks i. Uniform Filter Banks, ii. Quadrature Mirror Filter Banks, iii. Digital Wavelet Transform	Dr. Muthuvel Arigovindan, EE, IISc	4	Sep 08