EE 322M Signal Processing (3-0-0-6)

Signals and systems: Continuous-time signals- representations in time domain, Fourier transforms and properties, sampling of continuous-time signals-sampling theorem, quantization, discrete-time signals – representations in time domain, representation in frequency domain - discrete Fourier series, discrete-time Fourier transforms, discrete Fourier transform (DFT), z-transform and inverse z-transforms , discrete-time systems- linear, shift-invariance, stability and causality properties, discrete convolution, difference equations; implementations: linear convolution using DFT, overlap - add and overlap-save methods; Spectral Analysis using fast Fourier transform (FFT): Radix-2 Decimation-in-time and Decimation-in-frequency FFT algorthms; *FIR and IIR filters*: impulse response, transfer function and pole-zero representations, basic structures for FIR and IIR systems, FIR filter design- linear phase properties, window-based and frequency sampling designs, IIR filter design from analog filter-Butterworth and Chebyshev filter concepts, IIR filter design by impulse invariance and bilinear transform methods, finite word-length effects: fixed and floating point representation of numbers, quantization noise in signal representations, finite word-length effects in coefficient representation; application of DSP in spectral analysis and speech processing.

Texts:

1. A.V. Oppenhelm and R.W. Schafer, Discrete-Time Signal Processing, 2nd Ed., Prentice Hall, 1998.
2. John G. Proakis Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Application, 3rd Ed., Prentice Hall, 1995

References:

1. S.K. Mitra, Digital Signal Processing A Computer-based Approach, 3rd Ed., Tata McGraw Hill, 2006.
2. Haykin and Van Veen, Signals and Systems, 2 nd Ed., John Wiley & Sons, Inc.,2003.
3. Alan V Oppenheim, Alan S Willsky and S Hamid Nawab, Signals and Systems, 2 nd Ed., Prentice Hall, 1996