1. **Number and title of course**: EECS 123, Digital Signal Processing

2. **Course objectives**: To develop skills for analyzing and synthesizing algorithms and systems that process discrete time signals, with emphasis on realization and implementation.

3. **Topics covered**:
   - Signal Processing and its Applications
   - LTI, Discrete Time Fourier Transform
   - Symmetry properties of DTFT, Convergence of DTFT
   - Sampling, Downsampling
   - Upsampling
   - Region of Convergence for Z.T.
   - C.R.T. To Compute Inverse Z.T.
   - Difference Equations and LTI Systems
   - Realizations of L.C.C.D.E.
   - Realizations of IIR Filters with Rational Transfer Function
   - Cascade + Parallel Implementation of ± IR Filters with Rational Transfer Function
   - Realization of FIR Filters
   - Linear Phase Filtering
   - Conditions for Achieving Linear Phase
   - Filter Design
   - FIR Filter Design using Windows
   - Optimum FIR Filter Design
   - Algorithms for Optimal Filter Design
   - IIR Filter Design
   - IIR Filter Design Transformation, Discrete Fourier Series, and DFT = Discrete Fourier Transform
   - Properties of DFT
   - Using DFT to do Linear Convolution
   - Fast Fourier Transform
   - FFT: Decimation in Frequency
   - DCT and its Relation to DFT

4. **Relationship of course to program objectives**: This course requires students to apply their fundamental knowledge of mathematics, science and engineering to analyze and solve electrical and computer engineering problems. Students learn to apply modern skills, techniques and tools in digital signal processing. They learn to solve challenging engineering problems.

5. **Prepared by**: Avideh Zakhor (3/23/06)