**ECE310 Fall 2020: List of Topics and examples of problem types for the Final Exam**

**I.** Material from the List of Topics for Exam 1

II. Material from the List of Topics for Exam 2

II. Material from Weeks 10-15 of the course:

- Fast Fourier Transform
    - Radix-2 decimation-in-time FFT
    - Radix-2 decimation-in-frequency FFT
    - Fast convolution using the FFT
    - Block convolution (overlap-and-add method) using the FFT
- System Structures
    - Block Diagrams and Flow Graphs
    - Finding the system transfer function, impulse response, or description by difference equation from a flow graph or block diagram
    - Flow graph transposition
    - FIR and IIR filters
    - Digital filter structures
        - Direct Form I
        - Direct Form II
        - Cascade form
        - Parallel form
        - Transpose Direct Form I
        - Transpose Direct Form II
        - Cascade or parallel forms using transpose forms
        - Efficient system structures for GLP FIR filters
        - Determining system flow graph as above, given a different description of an LTI system.
- Generalized linear phase
- FIR filter design by windowing
    - Effect of filter parameters (length, window type, symmetries) on the frequency response of FIR filters
    - Determine impulse response given desired magnitude frequency response of a GLP filter, its length, and window type
    - Determine impulse response of a GLP filter given desired magnitude frequency response and tolerances on deviations from it (pass-band and stop band start and end points and errors).
- Zero-order hold (ZOH)
    - Description and analysis of the ZOH in the time domain and frequency domain
    - Digital processing of analog signals using a system with a ZOH
- Multirate signal processing
    - Upsampling and digital interpolation
    - Downsampling and decimation
    - Rate conversion by a rational factor
    - Oversampling D/A
- Digital processing of analog signals using a system with an oversampling D/A