EEE 598
Switch-Capacitor Analog Filter & Signal Processing Circuit Design

Prerequisites:
- EEE 433 Analog Design
- EEE 523 Analog Circuits
- Or equivalent

Course Description:
This course will cover VLSI continuous and discrete time filters and signal processing circuits. This course is intended for the graduate students covering the fundamentals and design techniques of switched-capacitor filters and other analog filters, such as active-RC, MOS-C, Gm-C, CTI, and SI filters. The objective of this course is to build a practical knowledge of filter circuit design and applications to other circuit design areas, such as A/D, D/A converters, etc. There will be weekly (bi-weekly) homework and/or design projects. CAD tools, such as CADENCE, SPICE, etc. will be used during the class.

Topics:

- Analog Filter Fundamental:
    1. Filter Type & Descriptive Terminology
    2. Transfer Function & Frequency Response
    3. Block Diagram & Signal-Flow Graph
    4. Laplace, Fourier, & Z-Transforms
    5. Frequency Scaling & Transformations
    6. Sampling Process & Sampling Theory
    7. S- To Z- Transformations
- VLSI Implementation of Various Components for Analog Signal Processing and Filters:
    1. Resistor, Capacitor &VCR Realizations
    2. Op ,OTA, Gm &GIC Circuits
- VLSI Implementation of Analog Filters:
    1. Active RC, MOS-C, Gm-C, CTI, SI, & SC Filter Structures
    2. 1st-order Blocks, Biquads, & Simulation Units
    3. Cascade, Component Simulation & Ladder Based Design Techniques
    4. Mapping Techniques from Continuous-Time Filters to Discrete-Time Filters
- Design/Application Examples and Practices