EC E 432, Digital Signal Processing Laboratory

1. Credits: 3  Contact Hours: 2.5
2. Textbook and Materials: None

a. Other Supplemental Materials: None

- Specific Course Information:

  a. Brief description of the content of the course (Course Catalog Description):
  Implementation of digital signal processing algorithms on special-purpose and general-purpose hardware. Use of assembly and high-level languages, and simulator to develop and test IIR, FIR filters and the FFT for modern DSP chips. Scaling for fixed point arithmetic. Use of high level languages to implement real time, object oriented component based DSP systems in general purpose computers. DSP applications, including data and voice communication systems.

  b. Pre-requisites or Co-requisites: ECE 431, Comp Sci 302

  c. This is a Selected Elective course.

- Specific Goals for the Course:

  a. Course Outcomes:

  1. Students will be able to design fixed-coefficient IIR (infinite impulse response) and FIR (finite impulse response) digital filters to performance specifications for pass band, stop band, roll off and computational efficiency.

  2. Students will be able to write a computer software module implementing a digital filter in an algorithmic and object-oriented language such as Java or C++. Write such a module to an interface specification that allows that module to be incorporated into a
larger software system.
3. Test such a computer software module for conformance to specification and correctness.
4. Students will be able to develop specifications, design, implement, and test digital filters as part of the solution of an engineering problem.

- **ABET Student Learning Outcomes**:

(a) Ability to apply mathematics, science and engineering principles.
(b) Ability to design and conduct experiments, analyze and interpret data.
(e) Ability to identify, formulate and solve engineering problems.
(g) Ability to communicate effectively.
(i) Recognition of the need for and an ability to engage in life-long learning.
(k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- **Brief List of Topics to be Covered**:

2. Realization of filters in software modules, testing of such software modules.
3. Bi-linear transform design of IIR (infinite impulse response) filters, the digital Butterworth filter.
5. Window-design FIR (finite impulse response) filters.
6. Frequency sample-design FIR filters.
8. Application of digital filters in analog communication systems.
10. Filter trees and their application in sub band coding.