ECE 422 Digital Signal Processing

An elective course for Electrical and Computer Engineering Students

Catalog Data

ECE 422 Digital Signal Processing (5 Credits)

This course provides an introduction to principles of Digital Signal Processing (DSP) including sampling theory, aliasing effects, frequency response, Finite Impulse Response filters, Infinite Impulse Response filters, spectrum analysis, Z transforms, Discrete Fourier Transform and Fast Fourier Transform. Overviews of modern DSP applications such as modems, speech processing, audio and video compression and expansion, and cellular protocols.

Required Textbook

- "Digital Signal Processing—A Computer Based Approach", Author: Sanjit Mitra , ISBN: 978-0077366766.

Recommended Textbook

- "Schaums Outline of Digital Signal Processing, 2nd Edition, Author: Monson Hayes, ISBN: 0071635092.
- "Digital Signal Processing (4th Edition)" Authors: John G. Proakis and Dimitris K Manolakis, ISBN: 978-0131873742.

Coordinators

Hani Mehrpouyan

Relationship to Student Outcomes

This course relates to student outcomes EAC a. b, and e.

Student Learning Outcomes, Students will

1. Apply the principles of signal processing and Fourier analysis to analyze signals, design finite impulse response filters, infinite impulse response filters, which can be in turn applied to solve practical engineering problems such as speech and image processing, channel equalization, signal de-noising, etc (EAC a, e).
2. Write a professional project report that presents the outcomes of the project and present these findings to the class (EAC g).
3. Use modern measurements tools such as Matlab, spectrum analyzers, and digital oscilloscopes, to complete the assigned project (EAC k)

Prerequisite by topic

- Differential and integration calculus
- Vector Calculus

- Freshman level electricity and magnetics
- Signals and Systems
- Algebra
- Trigonometry

Lecture Topics

This one-quarter first course is aimed at providing a firm foundation in Engineering Electromagnetics to both specialist and non-specialists undergraduates.

Class Schedule

Meets for 5 hours of lecture and 2:30 hours of laboratory exercises each week for 10 weeks.

Computer Usage

Matlab.

Laboratory Projects

Quarter based project focusing on the application of digital signal processing to real engineering problems. The projects have a broad perspective such as signal de-noising, speech end-pointing, image processing, channel equalization, etc.

Professional Component

Contributes toward the Electrical Engineering Topic Courses.

Design Content Description

- *Approach*: The design component is provided through lecture materials, a class project, homework, and tests.
- *Lectures:* 70%
- *Project:* 30%

Prepared by

Hani Mehrpouyan

Approved by

Approved by CEE/CS Department on December 2012.