ECE 410 - Principles of Discrete Time Signal Processing

George Mason University
Electrical and Computer Engineering Department
Spring Semester 2014

Instructor

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Instructor's Office Hours

Time: Monday 10:00 - 13:00 (or by appointment)

Lectures

Time: Monday, 16:30 - 19:10
Location: Thompson Hall 1017

Prerequisites

Prerequisite: ECE 320 - Signals and Systems II - with grade of C or better

Textbook


Course Webpage

http://www.luisduffautespinosa.com/courses/GMUspring2014/ECE410.html
References


Course Objectives

The objective of the course is to introduce the fundamental concepts of digital signal processing with emphasis on the theoretical and numerical tools used for frequency domain analysis of sampled signals. The topics covered include sampling, the discrete Fourier transform, fast transform algorithms, spectral analysis, and digital filtering.

Grading Policy

- Quizzes/Homeworks - 30 % (weekly)
- Midterm Exam - 30 %
- Final Exam - 40 %

Course Policies

1. On average homework will be assigned once a week with solutions posted the following week.
2. There will be short weekly quizzes based on the lecture material and the homework. Some solutions will be worked out during lecture by students (it will allow students to increase their homework score). There will be NO make-up quizzes given under any circumstances. The lowest homework/quiz grade will be dropped in computing the overall average.
3. The text is an integral part of the course. You are responsible for the topics in the chapters cited in the course outline below. It will not be possible to cover every topic in detail in lecture. Therefore, you should be reading the text concurrently with the presentation of the material in lecture.
4. The course webpage is the clearinghouse for all information concerning the course. Note that it is not located on Blackboard. It will be updated frequently, so check it first when you have any question or concern about the course.

Honor System

The Honor System at George Mason University is based on individual integrity, and is a required commitment for all students registered in ECE 410.

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this:

“Student members of the George Mason University community pledge not to cheat, plagiarize, steal, and/or lie in matters related to academic work.”

More details about the honor code can be found in http://oai.gmu.edu/honor-code/
1. **Discrete-Time Signals and Systems**
   - Discrete-Time signals (sequences)
   - Basic sequences and sequences operations
   - Properties of sequences
   - Discrete-Time Systems
   - Linear time-invariant Systems
   - Convolution Sum
   - Causality and Stability; difference equations

2. **The Z-transform**
   - ROC for the Z-transform
   - The Inverse Z-transform
   - Properties of the Z-transform

3. **Sampling of Continuous-Time Signals**
   - Periodic Sampling
   - Aliasing
   - Reconstruction and Nyquist Sampling Theorem
   - Frequency Domain Representation of Sampling

4. **Transform Analysis of LTI Systems**
   - Frequency Response
   - Poles and Zeros;
   - Phase and Group Delay
   - Stability; causality, inverse systems of 1st- and 2nd-order systems

5. **The Discrete Fourier Transform**
   - Circular Convolution; Linear Convolution
   - Discrete Fourier Series and their properties
   - Discrete Fourier Transforms and their properties
   - Computation of the Discrete Fourier Transform