

# ECE 421/ECE 592-104

## Introduction to Digital Signal Processing

**Instructor(s)**: Alexandra Duel-Hallen, sasha@ncsu.edu

**Objective or Description**: This course is the introductory course in digital signal processing. It develops essential tools required for a broad range of disciplines (e.g. communications, geophysics, medical image processing, etc.). The objective is to provide students with understanding of discrete-time signals and systems and to develop digital signal processing design and analysis skills.

**Prerequisites**: Signals and Systems (ECE 301 or Equivalent), MATLAB experience.

**Textbook**: J. G. Proakis, D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications," Pearson, Fourth or Fifth Edition. Optional Textbooks:(one of these is recommended to assist with Matlab assignments): J. G. Proakis, V. K. Ingle, "Student Manual for Digital Signal Processing with MATLAB," Prentice Hall; Vinay K. Ingle, John G. Proakis, "Digital Signal Processing Using Matlab," Cengage Learning. Additional resources will be provided.

**Topics**: The course topics include properties and implementation of discrete-time signals and systems, analysis techniques using Z-Transform, Discrete-Time Fourier Transform, and Discrete Fourier Transform, sampling and reconstruction of signals, efficient computation methods using Fast Fourier Transform, and digital filter design.

### **Grading:**

Homework 17%, broken down as:

Matlab/Problems 9% (drop the two lowest scores)

WebWork 8% (drop the two lowest scores)

Peer grading 5% (drop the two lowest scores)

Matlab Project(s) 8% (one group project; one individual project)

WebWork Quizzes 10% (drop the two lowest scores)

Midterm (in-class) 25%

Final exam 35%

+/- grading system will be used.

The individual project will be optional for undergraduate students enrolled in ECE 421, but required for the students enrolled in ECE 592-104