**ESE 337**
**Digital Signal Processing: Theory**
Fall 2017

**Instructor:** Yue Zhao

**Time and Location:** Tuesday, Thursday 7:00pm - 8:20pm, Javits Lecture Center 109

**Contact:** Email: yue.zhao.2@stonybrook.edu, Office: 261 Light Engineering

**Office Hours:** Tuesday, Thursday 3:30pm - 5:00pm, or by appointment

**Teaching Assistants, and Office Hours:**

- Kezi Yu (kezi.yu@stonybrook.edu): Wed 1:00pm - 3:00pm, or by appointment,
  Location: 204 Light Engineering
- Hossein Khazaei (hossein.khazaei@stonybrook.edu): Mon 3:00pm - 5:00pm, or by appointment,
  Location: 208 Light Engineering.

(Changes of hours, if any, will be updated on Blackboard.)

# Overview

Digital Signal Processing (DSP) lies at the heart of modern information technology in many fields including digital communications, audio/image/video compression, speech recognition, medical imaging, sensing for health, touch screens, space exploration, etc. This class covers the basic principles of digital signal processing and digital filtering. Skills for analyzing and synthesizing algorithms and systems that process discrete time signals will be developed.

3 *credits.*

# Textbook

- A.V. Oppenheim and R.W. Schafer, *Discrete Time Signal Processing*, Prentice Hall, Third Edition, 2009

# Prerequisite

- ESE 305, *Deterministic Signals and Systems*

# Course Outline

- Discrete time signals and systems, review of Fourier Transform
- Z Transform
- Discrete Fourier Tranform (DFT), convolution
- Fast Fourier Transform (FFT) algorthms
- Sampling and restoration
- FIR and IIR filter design

# Grading

- 1st Midterm exam 25%
- 2nd Midterm exam 25%
- Final exam 50%

(Homework will still be graded.)

# Student Learning Outcomes

Upon completing this course, students will achieve the following learning objectives:

- Analyze discrete time signals and systems using frequency domain transforms.
- Process continuous time signals using discrete time systems.
- Design samplers for C/D and D/C converters with no or low losses.
- Design techniques for FIR and IIR digital filters.

More generally, students will achieve the following learning outcomes:

a) an ability to apply knowledge of mathematics, science, and engineering;

e) an ability to identify, formulate, and solve engineering problems;

k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## Disabilities Statement

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

## Academic Integrity Statement

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

## Critical Incident Management Statement

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures.