UNIVERSITY OF MASSACHUSETTS
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ECE 565 **DIGITAL SIGNAL PROCESSING** **SPRING, 2017**

Class Hours: Tu-Th 1:00 PM – 2:15 PM
Professor: Dr. Douglas P. Looze
Office: KEB 113F **Phone:** (413) 545-0973 **email:** looze@ecs.umass.edu
Office Hours: W 3:00 – 5:00PM

Pre-requisite: ECE565 Introduction to Communications and Signal Processing.

Course Web Page: https://moodle.umass.edu/ (login using OIT ID)
Syllabus is also at http://ece.umass.edu/ece/undergraduate/course-sites
The moodle page contains all the course material to date, including this syllabus, the problem sets, and the lecture figures.

Textbook: J. G. Proakis and D. G. Manolakis, *Digital Signal Processing*, 4th Edition, Prentice-Hall, 2007.

References: Oppenheim and Schafer, *Discrete-Time Signal Processing*, 3rd Edition, Prentice-Hall, 2009.
Hayes, *Schaum's Outline of Digital Signal Processing*, 2nd Edition, McGraw-Hill, 2012.

Grading:
- The course will be graded using a curve and will be approximately B centered.
- There will be three in-class exams given during the semester and a comprehensive final exam given during exam week. The in-class exam average will be 45% of the course grade. The final exam will be worth 35% of the course grade.
- There will be approximately 8 assignments which will be due at the beginning of the lecture on the specified date. **Late homework will not be accepted** – regardless of the excuse. Homework will constitute 20% of the grade.

MATLAB: Some assignments will involve the use of MATLB, which is available on ECS computers. You may also want to purchase the Student Edition of MATLAB for your own computer.

Objectives:
1. How to use discrete-time systems to implement continuous-time signal processing.
2. Multi-rate signal processing and its applications.
3. How to use the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT) for signal analysis and system implementations.
4. How to use z-transforms to characterize discrete-time signal and system properties.
5. How to design and implement finite impulse response (FIR) and infinite impulse response (IIR) discrete-time filters.
6. How to implement filters with adjustable coefficients that adapt to changing conditions (if time allows).

OUTLINE

1. Time and Frequency Domain System Design
   a) Discrete-time Fourier Transform (DTFT)
   b) Sampling, quantization and reconstruction
   c) DT implementation of CT systems
   d) FIR filter design
   e) DFT/FFT and FIR filtering
   f) Multi-rate DSP

2. Transform Domain System Design
   a) z-Transform
   b) Relation of pole and zero locations to magnitude and phase responses
   c) All-pass and minimum phase systems
   d) IIR filter designs
   e) System implementations

3. Signal Estimation and Adaptive Signal Processing (time permitting)