ECE 310 Digital Signal Processing

Syllabus Fall 2020

Course Description:

Review of Laplace and z-transforms. Minimum-phase and all-pass functions. Multidimensional signals, systems and Fourier analysis. Analog filter design, digital IIR and FIR filter design. Sampling, multirate systems and filter banks, A/D and D/A converter models. Discrete-time state-space. Filter structures, quantization effects and design to mitigate quantization effects. DFT and FFT. Spectral analysis of deterministic and random signals. Introduction to adaptive filters. Differential coding, transform coding. Speech, audio and video signals. Extensive use of MATLAB.

Textbook:

Oppenheim and Schafer, *Discrete Time Signal Processing,* Prentice Hall, 3rd ed., 2009.

Reference books:

- D. C. Hanselman, B. L. Littlefeld, *Mastering MATLAB 7,* Prentice-Hall, 2004.
- S. K. Mitra, *Digital Signal Processing,* 3rd ed., McGraw-Hill, 2006.
- J.G. Proakis, D.G. Manolakis, *Digital Signal Processing*, 4th. ed, Prentice Hall 2007.
- P.P. Vaidyanathan, *Multirate Systems & Filter Banks*, Prentice Hall, 1

Homework:

Roughly bi-weekly homework will be assigned but not graded. Significant time will be spent going over homework problems in the zoom, to prepare for quizzes.

Quizzes:

There will be 5 quizzes, they will be worth 10 points each, taken during 1 hour of class time. The quizzes will be open book, and you will be on the honor system to not discuss with your classmates during quiz time. After the quiz has been graded, if you wish to earn back additional points, you can rework the quiz and discuss your answers with me via Zoom until you get it right. In this manner, you can theoretically earn 10 points on all quizzes, if you do the work.

MATLAB exercises:

There will be 5 MATLAB programming exercises to complement the material. Small groups (2-3) are acceptable, but not required, in completing these exercises. Short write-ups using the MATLAB publisher will be required for each.

Grading rubric for MATLAB exercises:

7 points: Technical correctness of project

2 points: Quality of code (well organized, well commented, etc)
1 point: Summary of results. What did you learn in this project? Why did the algorithm perform the way it did? Etc.

Anti-Plagiarism method

Unfortunately, coding exercises are easily plagiarised. It is normal and productive to share snippets of code with colleagues, or to find code on the internet to use. It is not acceptable to turn in code you do not understand. In industry, a common practice is code review, in which before your code gets accepted into a larger code base, you sit with another coder and explain what your code does and why. We will employ this method to reduce plagiarism in this course. You and your group will need to explain each project to me, over zoom/teams. Time during class will be allocated for this, with sign up slots.

The above anti-plagiarism method is in addition to the policies found here:
https://cooper.edu/engineering/curriculum/academic-standards-regulations