Digital Signal Processing

Geological Sciences
Univ. of Texas at El Paso

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Spring 2023 • GEOP 5460
CRN: 26800

Lecture: MW, 10:20 - 11:50 pm, GEOL 302
Lab: MW 11:50-12:20PM
Office Hrs.: MW 12:30-1:20 PM or Appt.
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Course Goals and Objectives:

The main goal of this course is for students to understand and be able to apply key concepts of digital signal processing. These fundamental concepts will help students with manipulating and processing time-series data, and includes discrete time series, deconvolution, filtering, Fourier Analysis, and wavelets. The labs will give you an understanding how the theory is applied to real data. This will be accomplished by obtaining a solid background with theory in lecture and hands-on applications to solidify the concepts covered in lecture.

Textbooks:

Digital Signal Processing Using Matlab Ingle and Proakis

Grades:

Grades will be calculated on the basis of homework/lab assignments (computer-based and analytical), a mid-term exam, and a final exam.

Homework assignments will account for 60% of the grade, a mid-term exam 20%, and a final exam (20%). Lab and lecture will be graded together.

Homework:

Problem Sets
You will be assigned problem sets on Blackboard. The problem sets/labs are due one week after they are assigned. Homework will be due one week from the date assigned and turned in using Blackboard.

Course Topics:

The table below shows the planned topics, readings, and exam schedule. Although I will attempt to stay on schedule, the timing of the scheduled topics will likely change during the semester. I also may be on travel for some lectures. The exam schedule will likely not change.

Table 1: Course Schedule and Course Topics

Wk.	Date	Lecture	HW Topic	Chapter
1	Jan. 18, 23	Introduction to Class, Computers, Math Review	No lab	Ch.1
2	Jan. 25, 30	Discrete Time Series	Getting Started	Ch. 2
3	Feb. 1, 6	Discrete Time Series	Introduction to Matlab	Ch. 2
4	Feb. 8, 13	Fourier Analysis	Seismograms	Ch. 3
5	Feb. 15, 20	Fourier Analysis	Decimation, Correlation, Convolution	Ch. 3, Ch. 5
6	Feb. 22, 27	Fourier Analysis	Catch up	Ch. 5
7	Mar. 1, 6	Z – Transform	Code Improvement	Ch. 4
8	Mar. 8	Z – Transform,	Fourier Transforms	Ch. 4
	Mar. 8-10	**Exam 1**		
	Mar. 13, 15	**Spring Break**		
9	Mar. 20, 22	Z – Transform	More on FT	Ch. 4
10	Mar. 27, 29	Filter Structures and Design	Z-Transforms	Ch. 5
11	Apr. 3, 5	Filter Structures and Design	Filters	Ch. 6
12	Apr. 10, 12	Filter Designs	More Filters	Ch. 7
13	**Apr. 17, 19**	**SSA Meeting – No Class**	Catch up	
14	Apr. 24, 26	Wavelet Transform	No lab	Ch. 8
15	May 1, 3	Wavelet Transform	WT and the FFT	Ch. 8
16	May. 12 (Tues.)	**Final Exam (10 AM - 12:45 PM)**		