CENG 3315 COURSE SYLLABUS

COURSE: CENG 3315-01 Introduction to Digital Signal Processing

COMPUTER NO.: 11202

SEMESTER: Spring 2022

LOCATION: UH-Clear Lake, Synchronous (D136 when safe)
MEETING TIME: Monday-Wednesday 4:00-5:20 pm
   Log on to Blackboard for the Zoom Link when virtual
INSTRUCTOR: Harman, Thomas L.

MESSAGES: Phone Mail: 281-283-3774
             E-MAIL: harman@uhcl.edu

OFFICE HOURS OF INSTRUCTOR: Monday, Wednesday 6-7PM
                             After class Monday and Wednesday
                             Tuesday by Appointment

COURSE DESCRIPTION: Introduction to DSP. Sinusoids, spectrum representation, sampling and aliasing, and various types of digital filters. MATLAB Required.

COURSE PREREQUISITES: C, Calculus, and enthusiasm.

TEXT REQUIRED: *DSP First, 2nd Edition,* By James H. McClellan, Ronald Schafer, Mark Yoder, Published by Pearson Copyright © 2016. Hardcover, 592 Pages, Published 2015 by Pearson; ISBN-13: 978-0-13-601925-1, ISBN: 0-13-601925-0. Other formats are suitable.

The website accompanying the book is particularly helpful to students.

There will be readings from various websites and videos to review from YouTube. These will be assigned as part of the Homework.

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METHODOLOGY: Lectures and homework including assignments in MATLAB.

Course Learning Outcomes:
- Understand Sinusoids and Complex exponentials as signals.
- Learn methods for processing analog signals using digital signal processing methods.
- Understand time-domain and frequency-domain analysis of signals. This includes Fourier analysis.
- Be able to properly sample and analyze signals for processing by computer.
- Know the problems associated with sampling and aliasing of signals.
- Acquire knowledge of digital filters and implement them in MATLAB.
- Understand the use of the Fast Fourier Transform and the z-transform in analysis of signals and systems.

Course Outline: Note that since I am the Chairperson of the Engineering Department, there may be times that my administrative duties require me to change the schedule somewhat. You will be informed in plenty of time for most changes. Zoom Classes for first weeks until February 7th.

Jan 19 W The Course, HOMEWORK RULES, MATLAB and Ch. 1 and Ch. 2 Fundamental Concepts – Sinusoids, Complex Numbers

Jan 24 M Ch2. (cont.) Complex Exponentials and Problem session.

Jan 26 W Finish Ch2. Addition of Sinusoids of same frequency and Problem Session.

Jan 31 M Ch3. Spectrum Representation, Amplitude Modulation, Periodic Waveforms.

Feb 2 W HW1 Due. Introduction to Fourier Series. Problem Session.

(Let's Hope to return to face-to-face classes this week! D136 in Delta.)

Feb 7 M Review HW1. Ch3 cont.

Feb 9 W HW2 Due. More Fourier

Feb 14 M Review HW Ch2 Introduction to Ch 4, Review for Exam 1 over Chapter 1-2, Ch 3, Part of Ch 4

Feb 16 W REVIEW Ch1-Ch3 Exam Preparation

Feb 21 M Exam 1 IN CLASS.

Feb 23 W   **Review Exam 1 Chapter 4 Sampling & Aliasing**

Feb 28 M   **Ch5. FIR Filtering and Applications**
                    Ch5 Problem Session, FIR Filters

March 2 W   **HW 4 Due; Chapter 5 continues**

March 7 M   **Chapter 6, Frequency Response of FIR Filters**

March 9 W   **Chapter 6 Continues**

March 14-20   HAPPY SPRING BREAK ☺

March 21 M   **Chapter 6, Frequency Response of FIR Filters**

March 23W   **Chapter 6 Continues. Homework 5 Due**

March 28 M   **Review of Ch 2-5, MATLAB Examples**
                    Review Ch 4, 5, 6 and HW5

March 30 W   <mark>**Exam 2 over Chapter 4, 5, 6.**</mark>

April 4 M   **Exam2 Review. Start CH 8**

April 6 W   **CH 8. Discrete Fourier Transform DFT.**

April 11 M   **CH 8 Continues and FFT, MATLAB**

April 13 W   <mark>**Exam 3 over CH. 8, Part of CH 9**</mark>

April 18 M   **Ch 9 Z-Transforms. HW 6 Due**

April 20 W   **Ch10. IIR filters**   **More DFT. Problem Session**

April 25 M   **HW 7 Due**   **Problem Session Ch 8-10**

May 2 M   **SUMMARY (The Big Picture!) AND Review for Final Exam**
                    Last Class
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<mark>**May 4**   **Final Exam 4 Whole Course with emphasis on Chapters 8,9,10**</mark>-

      Check Final Exam Schedule to be sure!!

ATTENDANCE POLICY: Attendance in class is expected and you should understand that classroom participation is an important element in the learning process. Students are encouraged to ask questions and make comments. An absence from class does not excuse students from tests and assignment deadlines. **The instructor would appreciate a phone mail or email message from students who are not going to attend class for whatever reason. If informed, the instructor will keep any handouts for the next class.**

FINAL AVERAGES: Final averages will be determined by the following assignments and weighting:

Exam 1		20%
Exam 2	20%	
Exam 3	20%	
Exam 4	20%	
HW	20%	

Honesty Policy:
https://www.uhcl.edu/dean-of-students/documents/academic-honesty-policy.pdf

Every student is expected to follow the honesty policy as described in the catalog. The first honesty violation will result in a grade of 0 on the assignment or test. The second honesty violation will result in a grade of F for the course. Students must remember the honesty pledge on all exams, as a reminder of the honesty code.

"I will be honest in all my academic activities and will not tolerate dishonesty."

American Disabilities Act (ADA)

If you believe that you have a disability requiring an academic adjustment/auxiliary aid, please contact Disability Services by phone at 281-283-2648, or email disability@uhcl.edu, or go to the office in the Student Services Building (SSCB), Room 1.301.

The University of Houston System complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for students with a disability. In accordance with Section 504 and ADA guidelines, each University within the System strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them.

Reference UH System ADA and Section 504 compliance:
www.uh.edu/af/universityservices/policies/sam/1GenAdmin/1D9.pdf

Drop Rule Limitation

Students who entered college for the first time in Fall 2007 or later should be aware of the course drop limitation imposed by the Texas Legislature. Dropping this or any other course between the first day of class and the census date for the semester/session does not affect your 6 drop rule count.   Dropping a course between the census date and the last day to drop a class for the semester/session will count as one of your 6 permitted drops. You should take this into consideration before dropping this or any other course. Visit www.uhcl.edu/records for more information on the 6 drop rule and the census date information for the semester/session.

https://www.uhcl.edu/registrar/enrollment/six-drop-rule

HOMEWORK RULES

A.   -10 POINTS FOR EACH DAY LATE

B.   For all Problems: (-10 points if violated)

1. Briefly describe the problem to be solved before attempting the solution.

2. Show all work.

3. Turn in problems in order

4. Make the results clear (Circle answers, explain results, etc.)

5. When an explanation of the results is requested, the numerical solution will not be sufficient.

MATLAB Problems (-10 or more if violated)

1. Write the equations to be solved

2. Describe the solution method (flowchart, description, etc)

3. Comment the MATLAB code

4. Turn in the code and the results (Plots, etc.)

Be Neat - if I cannot read the solution - no credit!!