ECE 6342 Digital Signal Processing, Fall 2016

Course Website: http://www.uh.edu/~hebert. Check this site regularly.

Time/Place: 8:30 am – 9:50 am TTh (29 class meetings) AH 110

1st class meeting: Tues Aug 23. (29 class meetings).

Drop Policy: You can drop the course on-line through enrollment services without receiving a grade until 5pm Wed, September 7. You can drop the course with a "W" from 5 pm Sept 10 through 5pm Fri, Oct 28 (unless you have reached the 6 total "W" limit). You can submit an add-drop form available in the ECE Office (N308D).

Semester holiday: Thurs Nov 24 (Thanksgiving).

Last class meeting: Thurs Dec 1.

Class Meeting Make-up Day: Mon Dec 5.

ECE 6342 Pre-req: Graduate ECE standing, undergrad signal processing DSP course.

Instructor: Dr. Tom Hebert, N316, (office) 713-743-4448, (fax) 713-743-4444, (e-mail) thebert@uh.edu ,

Office hrs: TuTh 10 am – 11 am, TuTh 2:30 pm - 3:30 pm, TuTh 7-7:30 pm, or E-mail for meeting.

Course Text: Discrete-Time Signal Processing - Oppenheim, Schafer, 3ed.

Homework: weekly, about 12 in all. Will include some Matlab programs.

Midterm: Thurs, Oct 13, Closed book, handouts provided. No make-up exam.

Final: Mon Dec 5 or Thurs Dec 8 (TBD), 8 am-10:50 am, Closed book, handouts provided.

Grades: The following grade ranges will determine your course grade.
(A-,A: 90-100) (B-,B,B+: 78-90) (C-,C,C+: 66-78)
(D-,D,D+: 54-66) (F: < 54.00)

Grade weightings: HWs: 3%; projects: 3%; midterm: 45%; final: 49%.

Academic Honesty Policy:

Students in this course are expected to follow the Academic Honesty Policy of the University of Houston. It is your responsibility to know and follow this policy.

Religious Holy Days:

Students whose religious beliefs prohibit class attendance or completion of specific assignments on designated dates may request an excused absence. To do this, submit a written request for the excused absence to Dr. Hebert no later than 5 pm of the 12th class-day, Wed Sept 7. For more information, see the Student Handbook.

Students with Disabilities:

Students with disabilities will be provided reasonable accommodations, appropriate to this specific course. You must submit a Student Accommodation Form from the Center for Students With Disabilities to Dr. Hebert no later than 5 pm of the 12th class-day, Wed Sept 7. For more information, see the Student Handbook.

ECE 6342 Course Topics:

1. Discrete-Time Signals and Systems.

Discrete-time Signals: Sequences. Discrete-time Systems. Linear Time-Invariant Systems. Linear Constant-Coefficient Difference Equations. Frequency-Domain Representation of Discrete-Time Signals and Systems. Representation of Sequence by Fourier Transforms. Symmetry Properties of the Fourier Transform. Fourier Transform Theorems.

2. The z-Transform.

The z-Transform. Properties of the Region of Convergence for the z-Transform. The Inverse z-Transform. z-Transform Properties.

3. Sampling of Continuous-Time Signals.

Periodic Sampling. Frequency-Domain Representation of Sampling. Reconstruction of a Bandlimited Signal from samples. Continuous-Time Processing of Discrete-Time Signals. Changing the Sampling Rate. Oversampling.

4. Transform Analysis of Linear Time-Invariant Systems.

The Frequency Response of LTI Systems. System Functions for Systems Characterized by Linea. Frequency Response for Rational System Functions. Relationship Between Magnitude and Phase. All-Pass Systems. Minimum-Phase Systems.

5. Structures for Discrete-Time Systems.

Block Diagram Representation of Linear Constant-Coefficient Difference Equations. Basic Structures for IIR Systems. Basic Structures for FIR Systems. Overview of Finite-Precision Numerical Effects. Effects of Roundoff Noise in Digital Filters.

6. Filter Design Techniques.

Design of Discrete-Time IIR Filters from Continuous-Time Filters. Design of FIR Filters by Windowing. Examples of FIR Filter Design by the Kaiser Window Method. Optimum Approximations of FIR Filters.

7. The Discrete Fourier Transform.

The Discrete Fourier Series. Properties of the DFS. The Fourier Transform of Periodic Signals. Sampling the Fourier Transform. Fourier Representation of Finite-Duration Sequences: The Discrete-Fourier Transform. Properties of the Discrete Fourier Transform. Linear Convolution Using the Discrete Fourier Transform.

8. Computation of the Discrete Fourier Transform.

Efficient Computation of the Discrete Fourier Transform. The Goertzel Algorithm Decimation-in-Time FFT Algorithms. Decimation-in-Frequency FFT Algorithms. Practical Considerations Implementation of the DFT Using Convolution.

9. Fourier Analysis of Signals Using the Discrete Fourier Transform.

Fourier Analysis of Signals Using the DFT. DFT Analysis of Sinusoidal Signals. The Time-Dependent Fourier Transform.

Expected Learning Outcomes:

In this course you will learn about digital signal processing. This course focuses on both analysis and design, both theory and applications.

Evaluation of learning outcomes: Homework **,** Exams**, short** Projects