EE 4637/5637 Digital Signal Processing
Syllabus

University of Colorado Denver
College of Engineering and Applied Science

Term: Fall 2011   Professor: David R. Ohm, PhD
Course days/times: Sat - 09:00AM to 011:30AM   Office location: North 3210
Course location: North 3210
Office Hours: Sat - 11:30AM to 12:30PM   email address: david.ohm@ucdenver.edu

Prerequisites: EE 3316 and ability to use Matlab.

Description:
This is an introductory course on Digital Signal Processing (DSP) which provides an overview of relevant topics in the analysis and design of systems for processing discrete-time (DT) signals. Among the topics that will be covered: fundamental properties of DT and linear-time-invariant (LTI) systems, frequency domain analysis of DT signals, the Discrete-Time Fourier Transform (DTFT), the Discrete Fourier Transform (DFT), and the z-Transform, frequency response and transfer function of DT- LTI systems, signal sampling and reconstruction, digital processing of continuous-time signals, FIR and IIR digital filter design and structures, Hilbert transforms, and multirate processing. This course will be very important for students planning careers in areas such as audio processing, multimedia processing, RADAR, SONAR, satellite communications, wireless communications, sensor array processing, digital image processing, etc.

Requirements:
Required Text:
S.K. Mitra, *Digital Signal Processing* -- A Computer-Based Approach, 4th Edition, McGraw-Hill, 2005

Recommended References:
R.G. Lyons, *Understanding Digital Signal Processing*, 2nd Edition, Prentice Hall, 2004
A.V. Oppenhiem and R.W. Schafer, *Discrete-Time Signal Processing*, Prentice-Hall

Additional, Materials, Equipment:
Assignments and projects require the use of MATLAB; access to MATLAB is required, and familiarity with MATLAB is highly recommended.

Assignments and Examinations:
- 10 Homework assignments: Homework is due at the beginning of the specified class. No late homework will be accepted.
- 2 Projects: There will be two assigned projects.
- Midterm Exam: This will be a take-home midterm exam.
- Final Exam (comprehensive): The exam time will be 2 hours. Scheduled by AHEC administration during the final week.

Assessment Design:
Grades:

Homework:	20%
Projects:	30%
Midterm:	20%
Final:	30%
Total:	100%

Course Policies:
Verbatim or plagiarized solutions from posted sources will receive a grade of zero. Assignments are to be submitted *only* at beginning of class on the due date. Late homework will not be graded. Extensions will only be made for extenuating circumstances and only if agreed upon before the work is due.

Course Schedule:

Class Schedule

Date	Topic	Required Reading	Assignments
08/27/11	Review and Introduction, discrete-time signals, sampling, LTI systems, Convolution	Ch. 1 – 2.8 Course Notes	HW 1
09/03/11	Correlation, Fourier Transform, Discrete-time Fourier Transform	Ch. 2.9, 3.1-3.6 Course Notes	HW 2
09/10/11	DFT, Math Methods for DSP	Ch. 3.7-3.9, 5.2 Course Notes	HW 3
09/17/11	Continuous-time signal processing	Ch. 4.1-4.6 Course Notes	HW 4
09/24/11	Transform domain processing I Application: Signal Averaging	Ch. 4.7-4.10 Course Notes	HW 5
10/01/11	Fourier Domain Filtering Application: Spectral Analysis	Ch. 5.8 Course Notes	Project 1
10/08/11	Z-transform	Ch. 6.1-6.5 Course Notes	
10/15/11	Introduction to digital filters Application: Filtering Signals	Ch. 7.4, 8.1-8.5 Course Notes	HW 6
10/22/11 10/29/11	Filter design, IIR, FIR	Ch. 9.1-9.6, 10.1-10.5 Course Notes	Midterm Exam
11/05/11	Digital filter structures and effects of finite wordlengths	Ch. 12.1-12.6, 12.12 Course Notes	HW 7
11/12/11	Fast Fourier Transform (FFT) Application: Time-Frequency Analysis	Ch 11.4-11.10 Course Notes	HW 8
11/19/11	Quadrature Signals, Hilbert transforms Application: Digital Communications	Course Notes	Project 2
	Fall Break		
12/03/11	Sample rate conversion, averaging Application: A/D and D/A converters	Ch. 13.1-13.6 Course Notes	HW9
12/10/11	Multirate Signal Processing Application: TBD	Ch. 14.1-14.5 Course Notes	HW10
12/12/11	FINAL TEST WEEK		Final Exam

Course Communication
- Office hours: Sat. 11:45-12:45 PM, contact the instructor by e-mail to schedule a meeting at a different time.
- E-mail: david.ohm@ucdenver.edu

Students called for military duty
- If you are in the military with the potential of being called to military service and /or training during the course of the semester, you are encouraged to contact Paul Rakowski.