EET 3300
Applied Signal Processing

Course Description:

This course aims to familiarize students with basic concept of signal processing, Fourier series representation Fourier transform for sinal analysis, impulse response and frequency response of linear systems, data acquisition and sampling theorem, signal-to-noise ratio, convolution operation, signal filtering, A/D and D/A conversion, discrete Fourier Transform, digital filter design, and Z-transform for digital signal processing. Students are required to use computer software for signal processing in both continuous and discrete time domain.

Credit Hours: 3

Class Schedule: TBA

Instructor: Dr. Chih-Ping Yeh, yeh@wayne.edu, 313-577-0800

Prerequisites: None

Co requisites: EET3150 Network Analysis

Textbook and Other Required Materials:

Textbook: Signal Processing First
            James H. McClellan, Ronald W. Schafer, Mark A. Yoder
            Prentice Hall, ISBN 0-1-3-0909998

Reference: Signals & Systems, continuous and Discrete
            Rodger E. Ziemer William H.Tranter and D.Ronald Fannin
            Prentice Hall, ISBN 0-1 3-496456-X

Computer Software: MATLAB & Signal Processing Toolbox

Programming Language: C Programming

Topics Covered:

1. Periodic and aperiodic signals, phasor signals and spectra
2. Introduction of MATLAB - basic operation, graphics, symbolic math
3. Fourier series representation of periodic signals
4. Fourier transform and its mathematical properties
5. Frequency response of a linear system
6. Low-pass, high-pass and band-pass filters, Butterworth filters

7. Spectrum analysis - Bode plot, bandwidth and power spectra
8. Impulse response and convolution operation
9. Discrete Fourier transform and fast Fourier transform (fft)
10. Data acquisition and sampling rate
11. Discrete-time signals and systems - Analog-to-digital conversion
12. Z-transform
13. Digital signal processing and digital filters

Laboratory Experiments:

Computer exercises using MATLAB and Signal Processing Toolbox

Grading Policy:

Test 1	20%
Test 2	20%
Test 3	20%
Homework	15%
Literatural Research Assignment	10%
Computer Simulation Project	15%

Course Learning Objectives:

Upon completion of this course, the student should be able to:

1. Explain the meanings of impuse response, frequency response, Fourier transform, and converlution operation, and their applications in signal processing [a, b]
2. Determine frequency response and system output of low-pass, high-pass and band-pass Butterworth filters [a, b, d, E3]
3. Design low-pass, high-pass, band-pass, and band-stop filters using operational amplifiers [b, c, E1]
4. Apply Fast Fourier transform (fft) for frequency analysis of discrete time signals [a, E3]
5. Use computer simulation software (MATLAB or Pspice) for signal and system analysis [a, b, c, f, h]
6. Apply Z-transform techniques to desigh digital signal processing systems [b, E1, E3]
7. Write computer programs to implement digital signal processing [a, b, c, E1]
8. Communicate clearly, concisely and correctly in written, oral and visual forms (as proven in tests and labs), that effectively convey ideas and concepts to peers and faculty, using proper technical terminology. [g]
9. Conduct independent study and literature research to acquire knowledge and information for self-improvement [f, h]

Contributions to EET Program Outcomes:

BSET-EET Student Outcomes	
3	a. an ability to select and apply the knowledge, techniques, skills, and modern tools of their disciplines to broadly-defined engineering technology activities
3	b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies

2	c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes
1	d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives
	e.an ability to function effectively as a member or leader on a technical team.
1	f. an ability to identify, analyze, and solve broadly-defined engineering technology problems
1	g. an ability to communicate effectively regarding broadly-defined engineering technology activities
2	h. an understanding of the need for and an ability to engage in self-directed continuing professional development
	i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity.
	j. a knowledge of the impact of engineering technology solutions in a societal and global context
	k. a commitment to quality, timeliness, and continuous improvement
3	E1. the ability to analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems
	E2. the ability to apply project management techniques to electrical/electronic(s) systems
3	E3. the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of electrical/electronic(s) systems

Grading Scale:

A	**93-100**
A-	**90-92**
B+	**87-89**
B	**83-86**
B-	**80-82**
C+	**77-79**
C	**73-76**
C-	**70-72**
D+	**67-69**
D	**63-66**
D-	**60-62**
E	**Below 60**

Withdraw Policy:

Last day to drop with a tuition refund: End of 2nd Week of Semester
Last day to drop without a notation of W on the transcript: End of 4th Week
Final day to drop with W (ET Students): End of 8th Week

All drop/add activity during the first four weeks should be done by the student through

Pipeline. Withdrawal after the fourth week requires the instructor's permission and must be submitted on a Drop/Add form to the Registrar's Office. Withdrawal after the 'final drop' date will only be permitted under exceptional circumstances and requires the permission of the Chair of the ET Division. A failing grade is not an acceptable reason for withdrawal after the 'final drop' date.

Policy of Cheating:

Cheating is defined by the University as "intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information, or assistance in any academic exercise." This includes any group efforts on assignments or exams unless specifically approved by the professor for that assignment/exam. Evidence of fabrication or plagiarism, as defined by the University in its brochure *Academic Integrity*, will also result in downgrading for the course. Students who cheat on any assignment or during any examination will be assigned a failing grade for the course and may be subject to additional penalties.

University / Department Policies:

Academic Integrity
http://www.doso.wayne.edu/judicial/academic-integrity.htm

Code of Ethics for Engineers:

WSU library has a tutorial that talks about transmitting ideas, plagiarism, copyright, and citing sources. At the end, there is a quiz. You are encouraged to visit this site then take the quiz at the end.
http://www.lib.wayne.edu/services/instruction_tutorials/searchpath/mod6/contents.html

The following list gives additional sites:
http://onlineethics.org/codes/
http://www.iit.edu/departments/csep/codes/coe/abet-a.html

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