

UNIVERSITY OF ST THOMAS

ENGR 340 -- Signals & Systems

- Fall 2009 4 Credit Course meeting Monday, Wednesday & Friday 9:35 – 10:40 AM in OSS LL10.
- Instructor Dr. Christopher S. Greene
E-Mail: csgreene@stthomas.edu
Phone: (651) 962-5768
Office Hours: By appointment. (Almost anytime that I am not in class.)
- Required Text
1. Signal Processing First James McClellan, Ronald Schafer and Mark Yoder, Prentice Hall, 2003, ISBN 0-13-090999-8.
 2. Almost any Math/Engineering Reference work.
- Optional Material
1. Signals and Systems Made Ridiculously Simple, Zoher Karu, (ZiZi Press, ISBN 0-9643752-1-4)
 2. Matlab® Student Edition (Software package)
(Matlab and some toolboxes are also installed on most of the computers that students can use in the engineering department.)
 3. USB Flash Drive (at least 256K for this class)
- Prerequisite ENGR 240 – Circuit Analysis or consent of instructor.

- Disability Accommodation Students with disabilities who may need accommodations in this class are encouraged to contact the Enhancement Program - Disability Services at 651-962-6315 as soon as possible. See <http://www.stthomas.edu/enhancementprog/> for more information.
- Academic Integrity All students are expected to understand and follow the University of St.Thomas policies on Academic Integrity. These are described at: http://www.stthomas.edu/policies/student_policy_book/Academic_rights_and_procedures.asp.
- Attendance Students are expected to attend all class sessions. All absences require that the instructor be informed in advance. Circumstances that prevent attendance will be honored up to two instances. Absences in excess of two times may result in an incomplete grade for the course. Contact the instructor when a special situation arises.
- Flu Because of the possibility of a flu pandemic, I will be particularly understanding of absences due to the flu. Student's responsibilities are:
- 1) If you have flu symptoms (fever and sore throat) stay home and self-isolate. Notify all your professors ASAP.
 - 2) Stay isolated until you have been fever-free for at last 24 hours.
 - 3) You are still responsible for the material. If I know you have the flu, I will work hard to put the notes on Blackboard. Keep up using Blackboard and use email to ask any questions. See me when you have recovered. If you have notified me in a timely manner and have been diligent about keeping up, I will be understanding of needing more time for assignments, including exams.
 - 4) Don't attend lab until you have recovered. You can make up the work later. If necessary, this can be during J-term.
 - 5) If I get sick, I will use Blackboard to communicate with you our plan for continuing the course. Come to class as usual unless I email/blackboard you otherwise.
- Please don't abuse this. Getting the flu twice is unlikely and if everyone gets the flu the morning of an exam.... I will treat you as professionals as long as you act as professionals.
- Homework and exam answers. Show your work and convince me that you know and understand the problem being solved.
1. Identify and list applicable data needed for the problem.
 2. Solve the problem in a logical, clearly written and well thought-out manner. This enables me to follow your work, understand your thought processes and award as much partial credit as possible. Anything that detracts from this will cost points.
 3. The problem solution should use only one side of each page. If multiple pages are needed, number the pages. I can't easily follow your work when flipping pages back and forth.
 4. Box the final answer and make sure units are noted.

Course Description for ENGR 340

To develop an understanding of the analysis of systems using Laplace, and Fourier Transforms, and an understanding of frequency domain characteristics, state space concepts and modulation.

Learning Outcomes

Upon successful completion of the course, the student will:

1. Understand the uses and properties of step, ramp, impulse, pulse and sinusoidal signals as demonstrated in homework problems and tests. (a, e)
2. Understand the uses and solutions of difference and differential equations to describe the behavior of systems as demonstrated in homework problems and tests. (a, e, ee)
3. Understand the use and properties of linear filtering in both CT and DT domains. (a, e, ee)
4. Analyze the response of linear systems to periodic and non-periodic signals as demonstrated in homework problems and tests. (a, e, ee)
5. Be able to use the convolution representation of systems as demonstrated in homework problems and tests. (a, e, ee)
6. Use complex numbers to represent amplitude and phase of periodic and non-periodic signals as demonstrated in homework problems and tests. (a, ee)
7. Understand the use of frequency response and Bode plots to characterize linear systems as demonstrated in homework problems and tests, (a, e, ee)
8. Utilize the four Fourier representations and z-Transforms to analyze linear systems as demonstrated in homework problems and tests. (a, e, ee)
9. Be able to analyze systems using analog modulation to transmit signals as demonstrated in homework problems and tests. (a, e, ee)
10. Be able to apply those principles to the design and analysis of systems for data acquisition, processing and control as demonstrated in homework problems and tests. (a, e, c, ee)
11. Be able to use Matlab to analyze discrete and continuous time signals and systems as demonstrated in homework problems and tests. (a,)
12. Understand various disciplines within Electrical Engineering and how they relate to signals and systems as demonstrated in homework and tests. (j)

Attitudes

During the course, the student must at all times exhibit:

1. Efficient use of time and resources, (f)
2. Courtesy to classmates, faculty and staff, (f)
3. Personal integrity, (f)
4. Desire for clear communication (g).

Course Methodology

Lectures and computer exercises with homework supplemented by exercises in Matlab.

Grading

Grading will be based on how well the student demonstrates that they have met the learning outcomes (including the attitudinal ones) of the class. Opportunities to demonstrate these include quizzes and exams. Some of the attitudinal outcomes may come from class participation, homework, etc.

For an individual piece of evidence such as an exam problem, or report

Good: Demonstrates an accomplishment of the learning objective with a sufficient mastery to be able to solve typical problems encountered by engineers.

Good But...: Demonstrates an accomplishment of the learning objective with some mastery but short of that needed to solve typical problems encountered by engineers.

Acceptable: Demonstrates through tangible evidence an accomplishment of all learning objectives at a minimal level that shows they might work in the field under appropriate supervision, but did not demonstrate sufficient mastery of the subject for the instructor to be confident of the student's ability to solve problems independently.

Not Acceptable: Does not demonstrate accomplishment of the learning objective.

Course Grade

A	Consistent good work in all objectives
A-	Consistent good work in most objectives, occasional good work in all
B+	Consistent good work in some objectives, occasional good work in all
B	Occasional good work in all objectives
B-	Occasional good work in most objectives, acceptable work in all
C+	Occasional good work in some objectives, acceptable in all
C	Acceptable work in all objectives
C-	Unacceptable work in some objectives, with strong evidence of improvement
D+	Unacceptable work in some objectives, with evidence of improvement
D	Unacceptable work in some objective
D-	Unacceptable work in many objectives
F	Unacceptable work in most objectives

Class Web Site

See Blackboard. (<http://blackboard.stthomas.edu>)

Tentative Schedule (August 1, 2009)

	Date	Topics	McClellan	Homework
1	Wednesday, September 9	Orientation & Intro	1,2	Math test
2	Friday, September 11	Pre-test	-	
3	Monday, September 14	Spectrum Representation	3	
4	Wednesday, September 16	Fourier Series	3	
5	Friday, September 18	Spectrograms	3	
6	Monday, September 21	Sampling & Aliasing	4	
7	Wednesday, September 23	D to A Conversion	4	
8	Friday, September 25	Sampling Theorem	4	
9	Monday, September 28	FIR Filtering	5	
10	Wednesday, September 30	LTI Systems	5	
11	Friday, October 2	Convolution Sum	5	
12	Monday, October 5	Cascaded LTI Systems	5	
13	Wednesday, October 7	Frequency Response of FIR Filters	6	
14	Friday, October 9	Properties of the Frequency Response	6	Exam 1
15	Monday, October 12	Cascaded LTI systems	6	
16	Wednesday, October 14	Filtering Sampled CT signals	6	
17	Friday, October 16	z-Transforms	7	
18	Monday, October 19	More z-Transforms	7	
19	Wednesday, October 21	Poles, Zeros and useful filters	7	
20	Friday, October 23	Practical Bandpass Filters	7	
21	Monday, October 26	IIR Filtering	8	
22	Wednesday, October 28	Frequency Response of IIR Filters	8	
	Friday, October 30	Midterm Break		
23	Monday, November 2	More IIR filtering	8	
24	Wednesday, November 4			
25	Friday, November 6	CT Signals		
26	Monday, November 9	CT Systems CT Convolution – The Convolution	9	
27	Wednesday, November 11	Integral	9	
28	Friday, November 13	Properties of LTI systems	9	
29	Monday, November 16	Frequency Response for CT Systems	10	Exam 2
30	Wednesday, November 18	Ideal Filtering	10	
31	Friday, November 20	Applications of Ideal Filtering	10	
32	Monday, November 23	CTFT	11	
33	Wednesday, November 25	Examples of CTFT Pairs	11	
	Friday, November 27	Thanksgiving Holiday		
34	Monday, Nov 30	CTFT Properties, System configurations & combinations		
35	Wednesday, December 2	Sine wave Amplitude Modulation		
36	Friday December 4	DT filtering of CT signals	12	
47	Monday, December 7	Computing the Spectrum of a signal	13	
38	Wednesday, December 9	More Computing the Spectrum	13	
39	Friday, December 11	Review		Final Exam
	Tuesday, December 15	Final Exam 10:30-12:30 AM		