The University of Texas at Tyler
Department of Electrical Engineering

<u>Course: EENG 4311 – Signals and Systems</u>

Syllabus

<u>Catalog Description:</u>

> Types of signals; types of systems; properties of systems; convolution; Fourier series, Fourier transforms; Laplace transforms; Difference equations; Z-transform; Discrete-time systems; applications and design concepts.

<u>Prerequisites:</u>   EENG 3305 Linear Circuits Analysis II, EENG 2101 Matlab for Engineers

<u>Credits:</u>   (3 hours lecture,   0 hours laboratory per week)

<u>Text(s):</u>   B. P. Lathi, Linear Systems and Signals, 2nd edition, Oxford, 2005

<u>Additional Material:</u>   Class Notes

<u>Course Coordinator:</u>   Ron Pieper, Assistant Professor, Electrical Engineering

<u>Topics Covered:</u> (paragraph of topics separated by semicolons)

> Signal and System Modeling; Time domain modeling of systems; Fourier Series; Fourier Transform and its applications; The Laplace Transform; Applications of the Laplace Transform; Z-Transform

<u>Evaluation Methods:</u> (only items in dark print apply):

1. **Examinations / Quizzes**
2. **Homework**
3. **Report**
4. **Computer Programming**
5. Project
6. Presentation
7. Course Participation
8. Peer Review

<u>Course Learning Outcomes[1]:</u> By the end of this course students will be able to:

1. Determine the circuit response to a periodic signal using the Fourier Series. (1)
2. Model linear time-invariant systems using convolution (1,2)
3. Describe how composite signals are used to determine the response of linear systems (1)
4. Utilize the Fourier Transform in the analysis of electronic circuits. (1)
5. Compute the signal energy using Parseval's Theorem (1)
6. Construct a proof for the frequency shifting theorem using the Fourier Transform (1)
7. Determine the stability of an LTI system through an analysis of the pole locations in the s-plane. (1)

8. Demonstrate what happens in the frequency domain when a continuous signal is sampled. (2)
9. Design an anti-alias filter for a sampled data system. (1)
10. Design an FIR filter using the frequency-sampling method (2,4)
11. Utilize the z-Transform to describe a discrete-time signal (1)
12. Report on a paper covering a contemporary issue related to signals and systems (3)
13. Design a discrete-time system using multipliers, adders, and delay elements (1)

[1]Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Program Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering; [3,6,11]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering; [2,8]
3. have the ability to analyze electrical circuits, devices, and systems; [1,4]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements; [9,13]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results; [10]
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods; [5,7]
7. have effective written, visual, and oral communication skills;
8. possess an educational background to understand the global context in which engineering is practiced, including:
    a. knowledge of contemporary issues related to science and engineering;
    b. the impact of engineering on society; [12]
    c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers;

[2]Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0	hours
Engineering Sciences and Design:	3	hours
General Education Component:	0	hours

Prepared By:	R. Hippenstiel	Date:	14 Jan 2007
Modified By:	Hector A. Ochoa	Date:	7 Jan 2008
	David Hoe		12 Jan 2014
	R Pieper		12 Jan 2017

The University of Texas at Tyler
Department of Electrical Engineering

EENG 4311: Signals and Systems
2020 Spring Semester

COURSE OUTLINE

Course Coordinator:	Dr. Ron J. Pieper, Electrical Engineering : E-mail rpieper@uttyler.edu

Class Location/Time:	RBN 2012 11:15 AM to 12:10 MWF
Office Hour	Tentative plan 8:30 to 10AM Tuesday (not first week) Will confirm via canvas and at lecture time when specifics determined -EE conference room - expected location
Text	Linear Systems and Signals, ,3rd B. P. Lathi Oxford **978-0-19_020017-6**
Prerequisites	EENG 3305 Linear Circuits Analysis II EENG 2101 Matlab for Engineers Communication Theory, Control Theory
Related subjects	

Tentative Grading Policy:

Exam 1 (55 min)	20%
Exam 2 (55 min)	20%
Matlab Computer problems-	10%
Quiz/HW- turn in problems/project	10%
Final Examination (120 min)	40%

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Tentative Semester Schedule:

Chapter B,	1 week	Complex Numbers and Partial Fraction Expansion
Chapter 1	1 week	Signals and systems (properties)
Chapter 2	1 week	Continuous time systems
Chapter 2	1 week	impulse response, convolution, system stability
Chapter 4	1 week	Laplace Transform
Chapter 4	1 week	Laplace Transform

		Applications
Chapter 6	1.0 week	Fourier Series
Midterm 1	**55 minutes**	**Material ChB Ch,1, 2,,4**
Chapter 7	1.0 week	Fourier Transform
	Spring Break	
Chapter 7	1.0 week	Frequency Response and Continuous time Fourier Transform Applications
Chapter 8A	1.0 week	Sampling Theorem
Midterm 2	**55 minutes**	**Material Ch 6,7,**
Chapter 8B	1.0 week	Discrete Fourier transform
Chapter 3	1 week	Time domain Analysis discrete time systems
Chapter 5	1 week	Z transform
Chapter 5	1 week	Frequency Response Discrete time Systems
Final Exam 120 minutes		Final exam 120 minutes Ch8A8B,Ch3, Ch5

Important dates (you are highly encouraged to double check dates if they are critical to decisions you need to make. based on academic calendar Spring 2020 found on internet)

- no class holiday   Monday Jan 20 (Martin Luther King Jr holiday)

- Census date (deadline for

   Schedule changes)   Jan 27
- Spring break,   Mar 9-14

- last day to withdraw from

   one or more classes,   Mar 30
- Final exam Study day   Monday April 20

- final exam week   April 28-May 2

- Final exam (EENG 4311)   Not yet posted

<u>ClassRoom Etiquette</u>
Please remember to turn off cell phones before coming to class. Working on class assignments or surfing the web while class is going on is not acceptable. If these activities are important for you on a particular day it would be better you did them outside the class environment. That being said attendance is important and will taken periodically during the semester. If you know you have an emergency schedule conflict that comes up please inform me (email OK). Although I do not plan to integrate attendance data in with student evaluation it can and will provide additional information if a student is experiencing problems keeping up.

<u>Background on grading and study habits</u>

Typical ranges for grades in this class run as follows, 91-100% A, 80-90% B, 65% to 79% C. The class examples and HW problems provide a basis for gauging you comfort level with the material. The amount of time a student should study can not always be easily quantified due to differences between students. If after reviewing notes, book and HWs if you are having trouble digesting the concept or procedure involved you are highly encouraged to come to an office hour or make an appointment with me.

Advance Information on notes, exams, quizzes
Not open book, limited equation reference allowed and provided. General policy is: you should get your questions answered before the day of exams. On exam day I will typically be involved with other activities including getting your exam ready. "needs of many outweigh needs of one " Materials placed in advance on Canvas for early printing. Department policy prevents me from duplicating notes for students on regular basis.

Homework, MATLAB and HW Policy:
Regular homework assignments will be handed out and posted on Canvas. Students will take quizzes at regular intervals corresponding to assignments. **Solutions to the homework assignments will be made available through Canvas. Students are encouraged to keep their own problem solving notebook and compare with the solutions after making as serious effort at solving the problem without review of the solution,** Homework assignment when requested for turn in should be written as per the guidelines provided. [*] this policy depends on if a grader is assigned for the class.

Academic Integrity:
Students should be aware that absolute academic integrity is expected of every student in all undertakings at The University of Texas at Tyler. Failure to comply can result in strong university-imposed penalties.

Disclaimer There are two primary channels for communication in the class. In class. One channel is thru class attendance and the second channel is Canvas. These channels are intended to be complementary and not redundant. Students should consider it a requirement to attend class and to review materials on canvas on as need basis on canvas. To avoid any misunderstanding or confusion on class requirements make sure you make use of both channels.

Note:
Students who have registered with the Office of Student Accessibility and Resources and deemed eligible for accommodated testing may take their exams in the Testing Center. https://www.uttyler.edu/disabilityservices/accommodatedtesting.php

Grade Replacement Policy: (students encouraged to double ckeck deadlines if appropriate)
If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grape point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35- your responsibility to check if details have changed)