Signals and Systems (ELC 321)-Spring 2016

Department of Electrical and Computer Engineering

The College of New Jersey

Course Curriculum

Professor: Dr. Ambrose Adegbege

Course Details:

Credits: 1.0

Course Venue: Room AR-136

Class Hours†: 11:00-12:20PM MoTh (Class Section 1); 12:30-1:50PM MoTh (Class Section 2)

Prerequisite: Advanced Engineering Mathematics I (ENG272)

Instructor Information:

Office Location: Room AR-143A

Email Address: adegbega@tcnj.edu

Office Hours: 9:30-10:50AM MoTh. By appointment (Send email).

Description

This course provides a comprehensive introduction to signals and systems. It covers signal modeling and characterization in the time (continuous and discrete), frequency and transformed domains, and focuses almost exclusively on modeling and analysis of linear time-invariant systems using mathematical tools such as convolution integral and sums, differential and difference equations, continuous and discrete-time Fourier series and transforms, Laplace and z-transforms. Applications are drawn from several engineering fields but with particular bias towards electrical circuits and systems.

Learning Outcomes

Upon a satisfactory completion of this course students must be able to:

- Apply knowledge of mathematics, science and engineering concepts such as z-transforms, Fourier transforms and sampling [a, e,k]*.
- Identify, formulate and solve engineering problems such time-domain and frequency response and characterization of linear time invariant systems [a, e, k]*.
- Use the techniques, skills and modern engineering tools such as Matlab/Simulink, necessary for engineering practice [a, e, k]*.

Topical Outline

- Continuous-Time and Discrete-Time Signals
- Linear Time-Invariant Systems
- Fourier Series and Fourier Transforms
- Time and Frequency Characterization of Signals and Systems
- Sampling
- Laplace Transform.

Text: Signals, Systems and Transforms, Fifth Edition, by Philips C. L., Parr J. M., and Riskin, E. A., 2014.

Student Assessment

Student proficiency in this course is assessed through two mid-semester exams, Home-work, MATLAB exercises and a comprehensive final examination as follows:

Two Mid-semester Exams [A]**	30%
Homework [B]**	30%
Matlab Exercises [C]**	20%
Final Exam [A]**	20%

The grading scheme for this course is:

A	94%	-	100%	C	74%	-	<77%
A-	90%	-	<94%	C-	70%	-	<74%
B+	87%	-	<90%	D+	67%	-	<70%
B	84%	-	<87%	D	60%	-	<67%
B-	80%	-	<84%	F	0%	-	<60%
C+	77%	-	<80%				

College Level Policies:

Attendance Policy: http://academicaffairs.pages.tcnj.edu/college-governance/policies/attendance-policy/

Academic Integrity Policy: http://academicaffairs.pages.tcnj.edu/college-governance/policies/academic-integrity/

Americans with Disabilities Act (ADA) Policy: http://affirm.pages.tcnj.edu/policies/theadapolicy/

† **Fourth Hour Statement:** This class contains one intensive design or analytical experiences or other appropriate activity that require each student to significantly increase out-of-class learning.

***Lower case letters in brackets refer to the student outcomes of the ECE Program.**

****** **Capital letters in brackets refer to the evaluation methods used to assess student performances.**

Tentative Class Schedules-ELC 321

Date	Day	Topic/Activity	Reading
Week 1		**Signals: Representation and Characterization**	Chapter 2
25-Jan	Mon	Continuous-Time Signals	2.1-2.5
28-Jan	Thur	Common Continuous-time Signals	
Week 2		**Signals: Representation and Characterization**	Chapter 9
1-Feb	Mon	Discrete-Time Signals	9.1-9.4
4-Feb	Thur	Sampling of Periodic Signals	
Week 3		**Linear Time-Invariant (LTI) Systems**	Chapter 3
8-Feb	Mon	Continuous-Time LTI Systems	3.1-3.4
11-Feb	Thur	The Convolution Integral	
Week 4		**Linear Time-Invariant (LTI) Systems**	Chapter 3
15-Feb	Mon	Models of Continuous-time LTI Systems	3.5-3.7
18-Feb	Thur	System Response	
Week 5		**Linear Time-Invariant (LTI) Systems**	Chapter 10
22-Feb	Mon	Discrete-Time LTI Systems	10.1-10.3
25-Feb	Thur	Convolution Sums	
Week 6		**Linear Time-Invariant (LTI) Systems**	Chapter 10
29-Feb	Mon	Models of Discrete-Time LTI Systems	4.1-4.4
3-Mar	Thur	MID-Semester Exam I	
Week 7		**Fourier Series Representation of Signals**	Chapter 4
7-Mar	Mon	Fourier Series of Continuous-Time Periodic Signals	4.1-4.4
10-Mar	Thur	Properties and Transformations	
Week 8		**Spring Break**	
14-Mar	Mon	No Class	
17-Mar	Thur	No Class	
Week 9		**Fourier Series Representation of Signals**	Chapter 4
21-Mar	Mon	Fourier Series of Discrete-time Periodic Signals	4.5-4.6
24-Mar	Thur	Fourier Series and LTI-Systems	
Week 10		**The Fourier Transforms**	Chapter 5
28-Mar	Mon	Definition and Properties of Fourier Transform	5.1-5.2
31-Mar	Thur	Fourier Transforms of Periodic Functions	

Week 11		**The Fourier Transforms**	Chapter 12
4-Apr	Mon	Discrete-Time Fourier Transform (DTFT)	12.1-12.4
7-Apr	Thur	Discrete Fourier Transform (DFT)	
Week 12		**Applications of Fourier Transforms**	Chapter 12
11-Apr	Mon	Review	12.6
14-Apr	Thur	MID-Semester Exam II	
Week 13		**The Laplace Transforms**	Chapter 7
18-Apr	Mon	Definition and Properties	7.1-7.4
21-Apr	Thur	Transfer Functions	
Week 14		**Z-Transform**	Chapter 11
25-Apr	Mon	z-Transform and Regions of Convergence	11.1-11.6
28-Apr	Thur	z-Transform Theorems and Inverse z-Transform	
Week 15		**Revision and Reading Week**	
2-May	Mon	Revision Class/Student Feedback	
5-May	Thur	Revision Class/Student Feedback	
Week 16		**Final Examination**	
9-May	Mon	Final Examination	
12-May	Thur	Final Examination	