ESE 305: Deterministic Signals and Systems

Summer 2018

Catalog Description:

Introduction to signals and systems. Manipulation of simple analog and digital signals. Relationship between frequencies of analog signals and their sampled sequences. Sampling theorem. Concepts of linearity, time-invariance, causality in systems. Convolution integral and summation; FIR and IIR digital filters. Differential and difference equations. Laplace transform, Z-transform, Fourier series and Fourier transform. Stability, frequency response and filtering. Provides general background for subsequent courses in control, communication, electronics, and digital signal processing.

Course Designation: Required Course

Text Books: "Signals and Systems," Chi-Tsong Chen. Third Edition, 2004. Oxford University Press. ISBN: 978-0-19-515661-4

Prerequisites: Pre- or Corequisite: ESE 271

Coordinator: **Sangjin Hong**

Goals: Introduce basic concepts in signals and systems and associated mathematical and computational tools

Course Learning Outcomes:

- ability to apply knowledge of mathematics, science and engineering
- an ability to identify, formulate, and solve engineering problems
- an ability to use techniques, skills, and modern engineering tools necessary for engineering practice

Topics Covered:

Week 1.	Overview; signals and properties; signal transformations; Periodic signals; Impulses; Systems; System properties
Week 2.	DT and CT LTI Systems and Convolution; Intro to Frequency Domain and Fourier Series
Week 3.	Fourier Series in CT and DT; Fourier Series properties; Frequency representation of systems

Week 4.	Filtering; Introduction to Fourier Transform; Fourier Transform and LTI Systems
Week 5.	Discrete-Time Fourier Transform; Sampling; Intro to communications systems
Week 6.	Laplace Transform; Laplace Transform; Final review

Class/laboratory Schedule: 6 lecture hours per week

Student Outcomes	**% contribution***
❑ (a) an ability to apply knowledge of mathematics, science and engineering	40
❑ (b1) an ability to design and conduct experiments	
❑ (b2) an ability to analyze and interpret data	
❑ (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
❑ (d) an ability to function on multi-disciplinary teams	
❑ (e) an ability to identify, formulate, and solve engineering problems	30
❑ (f) an understanding of professional and ethical responsibility	
❑ (g) an ability to communicate effectively	
❑ (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
❑ (i) a recognition of the need for, and an ability to engage in life-long learning	
❑ (j) a knowledge of contemporary issues	
❑ (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	30
❑ Any other outcomes and assessments?	

* Assume that the total contribution of any course will be 100%. Use the right hand column to indicate the approximate percent that the left hand columns contribute to the overall course.

Document Prepared by: Sangjin Hong
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