Faculty of Eng. & Natural Sci.

EE311-202101

Introduction to Signal Processing and Information Systems

Instructor(s)

Name	Email	Office	Phone	Web	Office Hours
Özgür Erçetin	oercetin@sabanciuniv.edu	FENS-1111	9608	http://people.sabanciuniv.edu/~oercetin/	

Course Content

Discrete-time Fourier transform. Discrete-time processing of continuous-time signals. Basic communication concepts, modulation, AM, FM, pulse amplitude modulation. Laplace transform, system response. Z-transform. Systems characterized by differential and difference equations. Control systems and feedback. Uncertainty and randomness in signals and systems.

Objectives

To provide a broad introduction to signal processing and information systems, following upon basic signals and systems knowledge. To provide exposure to basics and selected topics in communication, control, and random signals, with links to practical applications.

Recommend or Required Reading

Textbook

Signals, Systems and Inference, Oppenheim, Alan, and George Verghese, Pearson, 2017.
https://www.homerbooks.com/urun/signals-systems-and-inference

Assessment Methods and Criteria

	Percentage(%)	Number of assessment methods
Final	35	
Exam	50	2
Assignment	15	4

Course Outline

Overview of Signals and Systems basics.
Deterministic Signals
- Continuous-time Fourier Series
- Continuous-time Fourier Transform
- Laplace Transform
- Unified understanding of signal processing, communications and control
- Sampling and relationship between continuous- and discrete- transforms
Random Signals
- Review of Probability Theory
- Inference/ Estimation of continuous random signals
- Hypothesis Testing, Neyman Pearson criterion
- Wiener filter

Learning Outcomes

- discuss the fundamental concepts in signal processing and information systems,

- exhibit and express a unified view of problems in communication, control, and signal processing,
- describe the process of input-output characterization of linear time invariant systems,
- correctly perform calculations involving transforms including continuous and discrete-time Fourier transforms, as well as Laplace and z-transforms,
- perform computer simulations demonstrating main concepts in signal processing including sampling, transforms, and modulation.

Course Policies

We will have bi-weekly single question (with several parts) multiple choice exam. In total there will be 7 exams during lecture hours. The duration of the exam will be 15-30 minutes depending on the difficulty of exam question.

There will be 3-4 programming assignments. Although Python and R are coming as strong alternatives for mathematical analysis, neither TAs nor students are yet comfortable with these. Hence, we will continue using Matlab with its extensive help and tutorials. Brief (!) tutorial will be given at the beginning of semester, but your TA will always be available for your Matlab related questions. Computer assignments can be completed as a group.