Faculty of Eng. & Natural Sci.

EE311-202201

Introduction to Signal Processing and Information Systems

Instructor(s)

Name	Email	Office	Phone	Web	Office Hours
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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 are 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 essential signals and systems knowledge. To give 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

Readings

Introduction to Stochastic Signal Processing by I.Young and R. Ligteringen (online)

WEB: https://sites.google.com/socraticsoftware.org/socraticsoftware/
Apple: https://apps.apple.com/tr/app/stochastic-signal-processing/id1450268179
Android:
https://play.google.com/store/apps/details?id=org.SocraticSoftware.iSSP&gl=NL

Assessment Methods and Criteria

	Percentage(%)	Number of assessment methods
Final	30	
Exam	50	5
Written Report	10	1
Homework	10	5

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 (a systems perspective)
- Sampling and relationship between continuous- and discrete- transforms
Random Signals
- Review of Probability Theory and Statistics
- 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

Proficiency in MATH203 is expected. The second half of the course deals with random variables and processes.

We will have bi-weekly exams. In total, there will be five exams administered during recitation hours. The exam duration will be 15-30 minutes, depending on the difficulty of the exam questions. The week before the exam, there will be a homework assignment. The exam questions will be related to the assignment. A final comprehensive exam will be given at the end of the semester.

There will be one programming assignment which will be completed in multiple phases. Although Python and R are coming as strong alternatives for mathematical analysis, we will continue using Matlab due to its extensive online help and tutorials. TA will give a brief tutorial at the beginning of the semester and will always be available for your Matlab-related questions. You will prepare a final report of your findings in this programming assignment.