EE 373
Signals and Systems

Prerequisites: MATH 202, EE 201
Textbook: A. V. Oppenheim, A. S. Willsky, with S. H. Nawab, *Signals and Systems*, Prentice-Hall, 2nd Edition, 1997.
Instructor: Burak Acar (acarbu@boun.edu.tr)
Teaching Assistant: Öykü Deniz Köse
Webpage: www.vavlab.ee.boun.edu.tr -> Courses -> EE373
Hours: Monday 15:00-16:00 (PS) TESLA
Tuesday 11:00-13:00 TESLA
Thursday 11:00-13:00 TESLA
Grading:
Assignments : Not graded
Pop quizzes: 15 %
2 midterms (in-class) : 25 % each
Midterm 1: 17.10.19
Midterm 2: 03.12.19
Final Exam (in-class) : 35 %
You are required to earn **minimum 20 pnts** from the midterms and the quizzes **to qualify for the final exam**. Exam date will be announced by the registrar's office

The course is designed to familiarize students with the techniques for analyzing and synthesizing continuous-time as well as discrete-time systems. Time domain and frequency domain signal analysis tools will be studied, and the subjects of filtering and modulation will be introduced as signal processing techniques both in continuous-time and discrete-time.

Program:
1. Signals and Systems (Ch 1) : 2 days (19,24.9)
- a) Continuous-time and discrete-time signals
- b) Special signals
- c) Continuous-time and discrete-time systems
- d) Basic system properties

2. Linear time-invariant (LTI) systems (Ch 2): 2 days (26.9; 1.10)
- a) Discrete-time LTI signals: The convolution sum
- b) Continuous-time LTI signals: The convolution integral
- c) Properties of LTI systems
- d) Systems described by differential and difference equations

3. Fourier Series rep. of CT and DT periodic signals (Ch 3): 4 days (3, 8,10,15.10)
- a) Response of LTI systems to complex exponentials
- b) Fourier Series representation of continuous-time periodic signals
- c) Properties & Convergence of continuous-time Fourier Series
- d) Fourier Series representation of discrete-time periodic signals
- e) Properties & Convergence of discrete-time Fourier Series

f) Filtering concepts

→ MIDTERM 1 on 17.10.19 at class time

4. The cont. time Fourier transform – CTFT (Ch 4): 3 days (22, 24,31.10)

a) Representation of aperiodic signals

b) Fourier transform for periodic signals

c) Properties of continuous-time Fourier Transform

5. The discrete-time Fourier transform – DTFT (Ch 5) : 3 days (5, 12,14.11)

a) Representation of aperiodic signals: the discrete-time Fourier transform

b) The Fourier transform of periodic signals

c) Properties of the discrete-time Fourier transform

6. Sampling (Ch 7): 4 days (19, 21,26,28.11)

a) The Sampling Theorem

b) Reconstruction of continuous time signals from its samples and aliasing: Interpolation formula

c) Discrete-time processing of continuous-time signals

d) Sampling of discrete-time signals: Interpolation and decimation

→ MIDTERM 2 on 03.12.2019 at class time

7. The Laplace Transform (Ch 9): 2 days (5, 10.12)

8. The z-transform (Ch 10): 2 days (12,17.12)

a) The z-transform and its properties

b) Region of convergence

c) Inverse z-transform

d) Analysis of discrete-time systems using z-transform

9. Extra course day in case needed: (19.12)

Cheating and Plagiarism

Cheating and plagiarism will be treated without tolerance whenever found. Students may discuss assignments/projects with each other but, for grading, must hand in their individual version which means that each student writes down *his/her version with his/her own expressions*.