

Digital Signal Processing Design and Applications
EHB372E (CRN: 20865)
Spring 2015- Course Syllabus

Instructors:

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Lecture hours and place: Tuesday, 13:30-17:30, 6307

Teaching Assistants:

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Office hours:

Assoc. Prof. İlker Bayram: Monday, 14-16, office: 1103

Assoc. Prof. Ender M. Ekşioğlu: Tuesday, 10-12, office: 2401

B.Sc. Ergin Aslan: Thursday, 10-12, office: 3207

B.Sc. Ulaş Taşkın: Wednesday, 14-16, office: 1115

M.Sc. Özden Bayır : Wednesday, 14-16, office: 3104

Prerequisite: Digital Signal Processing, EHB315(E).

Website: ninova, dropbox folder, make sure you follow announcements on ninova. All homeworks, reports etc. will be uploaded through ninova (possibly in addition to print-out submissions)

Textbook:

- *"Digital Signal Processing Using MATLAB"*, Vinay K. Ingle and John G. Proakis, 3rd Edition, Cengage Learning, 2011.

Some reference texts:

- *"Essentials of Digital Signal Processing Using MATLAB"*, Vinay K. Ingle and John G. Proakis, Adapted International Student Edition, 3rd Edition, Cengage Learning, 2012.
- *"Discrete-Time Signal Processing"*, Oppenheim and Schaffer, Prentice-Hall, 3rd edition, 2010.
- *"Digital Signal Processing"*, Schaum's Outlines, Monson H. Hayes.
- *"Digital Signal Processing : a computer-based approach"*, Sanjit Mitra, Mc Graw-Hill.
- *"Bilgisayar Uygulamalarıyla Sayısal İşaret İşleme"*, A.H. Kayran ve Ender M. Ekşioğlu, Birsen Yayınevi, 2010.

Homework: A due date will accompany each homework assignment. You will be neither excused from nor granted any extension for an assignment without prior approval from the instructor.

Academic Integrity: Homework and examinations are expected to be the sole effort of the student submitting the work.

VF grade: Attendance is required for at least 12 class sessions. Students who fail to attend 12 class sessions get a VF grade. Also students in groups who do not submit a project proposal or fail to finish the project (missing the presentation or not submitting the project report on time) will be graded with a VF.

Grading criteria:	Percent of final grade
Homework and Quizzes:	15%
In lab exercises	20%
Project	45%
Final exam	20%

Tentative Course Outline:

Topic	Tentative timetable
Overview of Digital Signal Processing. A brief introduction to MATLAB. Brief Overview of the book and course mechanics.	Week 1 (Chp.1)
Discrete-time Signals. Discrete Systems. Convolution. Difference Equations.	Week 2 (Chp.2)
The Discrete-time Fourier Transform (DTFT). Frequency Domain Representation of LTI Systems. Sampling and Reconstruction of Analog Signals.	Week 3 (Chp.3)
z-Transform. Important Properties of the z-Transform. System Representation in the z-Domain. Solutions of the Difference Equations.	Week 4 (Chp.4)
The Discrete Fourier Transform (DFT). Properties of DFT. Linear Convolution Using DFT. Fast Fourier transform (FFT).	Week 5 (Chp.5)
STFT and time-frequency representation of audio.	Week 6
Implementation of discrete-time filters. IIR Filter Structures. FIR Filter Structures.	Week 7 (Chp.6)
FIR filter design. Window Design Techniques. IIR filter design. Prototype Analog Filters. Analog-to-Digital Filter Transformations. Lowpass Filter Design Using MATLAB.	Week 8 (Chps. 7, 8)
Image processing using MATLAB	Week 9
Audio signal processing applications.	Week 10
Applications in adaptive filtering	Week 11 (Chp.11)
Advanced problems in signal processing (deconvolution, array signal processing, sampling rate conversion).	Week 12
Presentations	Week 13
Presentations	Week 14

Information about the Term Project

- ⊙ By 17 February 2015: Project groups up to maximum 3 members should be determined. The group should decide on a project topic and discuss the topic with the instructors about its suitability. The topic should be approved by the instructors.
- ⊙ By 24 February 2015: The project proposal should be submitted.
- ⊙ By 24 March 2015: The progress report should be submitted. In the progress report, you need to describe, in at least five pages, what you have done so far. A progress presentation session might be held.

- ⊙ The due date for the final report will be announced later. The final report is a more detailed report, which describes the problem in your words, the work you have done and the problems you encountered while implementing the method etc.
- ⊙ Project presentations will be done on the last two weeks of classes.
- ⊙ Proposal, progress report, presentations and final report will all affect your project grade.
- ⊙ **More details** about the project will be given in an additional document.