

COURSE RECORD

Code	ECE 535
Name	Digital Signal Processing
Hour per week	3+0 (Theory + Practice)
Credit	3
ECTS	7,5
Level/Year	Undergraduate/Graduate
Semester	Fall
Type	Elective
Location	Classroom
Prerequisites	Undergraduate course in signals and systems. Ability to program is essential to complete the computer-based projects. The projects can be done using MATLAB.
Special Conditions	-
Coordinator(s)	Prof. Bülent Yılmaz
Webpage	-
Content	Discrete-time signals and systems, linear and shift-invariant system properties, convolution integral and sum, sampling theorem, z-transform, discrete-time Fourier transform, fast Fourier transform, discrete Fourier transform, digital filters, adaptive signal processing fundamentals, spectral estimation
Objectives	(1) to introduce signals, systems, their time- and frequency-domain representations and the associated mathematical tools that are fundamental to all DSP techniques; (2) to provide a working knowledge of the design, implementation and analysis of digital filters; (3) to provide a working knowledge of modeling and analysis of signals based on spectral estimation techniques. (4) to provide the student with the necessary background for taking advanced level courses in signal processing.
Learning Outcomes	L01 Determine the filter specifications by analyzing the real world digital signal processing problems, and design the filter accordingly L02 Analyze and model digital signals L03 Implement discrete-time systems L04 Alter the sampling rate of a signal using decimation and interpolation L05 Implement digital signal processing methods in MATLAB (or an equivalent programming language) based on a given algorithmic description or theory
Requirements	Alan V. Oppenheim, Ronald W. Schaffer, Discrete-Time Signal Processing, 3rd Edition, Prentice Hall
Reading List	J.G. Proakis and D.G. Manolakis, Digital Signal Processing: Principles, Algorithms, and Applications, Prentice-Hall, NJ, Fourth Edition, 2007
Ethical Rules and Course Policy	University Ethics (Academic Honesty) Rules

LEARNING ACTIVITIES

Activities	Number	Weight (%)
Lecture	13	40%
Group Works	3	40%
Presentations	2	15%
Web search	2	5%
	Total	100

ASSESSMENT

Evaluation Criteria	Weight (%)
Quizzes	15%

Weekly Assignments	10%
Group Project Assignments & Presentations	35%
Attendance/Participation	05%
Midterm Exam	15%
Final Exam	20%
Total	100%

COURSE LOAD

Activity	Duration (hour)	Quantity	Work Load (hour)
In class activities	3	14	42
Group work	10	6	60
Research (web, library)	2	5	10
Required Readings	2	5	10
Pre-work for Presentation	3	4	12
Quiz	5	4	20
Studying for Midterm Exam	20	1	20
Studying for Final Exam	20	1	20
Term Project	30	2	60
General Sum			254

ECTS: 7,5 (Work Load/25-30)

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6
L01	5	5	5	2	1	4
L02	5	5	3	1	2	3
L03	5	5	4	2	1	2
L04	3	2	2	2	1	2
L05	3	4	4	2	2	2

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

WEEKLY SCHEDULE

W	Topic	Outcomes
1	Introduction to digital signal processing Activity: Lecture, Web Search	L01, L02
2	Discrete time systems Activity: Lecture, Group Work	L03
3	Discrete time systems Activity: Lecture, Group Work	L03
4	Z transform Activity: Lecture, Group Work	L01, L05
5	Discrete time Fourier transform Activity: Presentation	L03, L04, L05
6	Midterm exam Activity:	
7	FIR filter design Activity: Lecture, Group Work	L01, L03, L05
8	IIR filter design Activity: Lecture, Group Work	L01, L03, L05
9	Spectral estimation: background Activity: Lecture, Group Work	L02, L05
10	Spectral estimation: parametric methods Activity: Lecture, Group Work	L02, L05
11	Spectral estimation: non-parametric methods	L02, L05

	Activity: Lecture, Group Work	
12	Adaptive signal processing	L01, L02, L03, L05
	Activity: Lecture, Group Work	
13	Adaptive signal processing	L01, L02, L03, L05
	Activity: Lecture, Group Work	
14	Presentation of term project to class	L01, L02, L03, L04, L05
	Activity: Group Work, Presentation	

Prof. Bülent YILMAZ