AGU Graduate School of Engineering and Science ……
Program

COURSE RECORD

Code	**ECE 535**
Name	**Digital Signal Processing**
Hour per week	3+0 (Theory + Practice)
Credit	3
ECTS	10
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	LO1 Determine the filter specifications by analyzing the real world digital signal processing problems, and design the filter accordingly LO2 Analyze and model digital signals LO3 Implement discrete-time systems LO4 Alter the sampling rate of a signal using decimation and interpolation LO5 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. Schafer, 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: 10 (Work Load/25-30)

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6
LO1	5	5	5	2	1	4
LO2	5	5	3	1	2	3
LO3	5	5	4	2	1	2
LO4	3	2	2	2	1	2
LO5	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	LO1, LO2
	Activity: Lecture, Web Search	
2	Discrete time systems	LO3
	Activity: Lecture, Group Work	
3	Discrete time systems	LO3
	Activity: Lecture, Group Work	
4	Z transform	LO1, LO5
	Activity: Lecture, Group Work	
5	Discrete time Fourier transform	LO3, LO4, LO5
	Activity: Presentation	
6	Midterm exam	
	Activity:	
7	FIR filter design	LO1, LO3, LO5
	Activity: Lecture, Group Work	
8	IIR filter design	LO1, LO3, LO5
	Activity: Lecture, Group Work	
9	Spectral estimation: background	LO2, LO5
	Activity: Lecture, Group Work	
10	Spectral estimation: parametric methods	LO2, LO5
	Activity: Lecture, Group Work	
11	Spectral estimation: non-parametric methods	LO2, LO5

	Activity: Lecture, Group Work	
12	Adaptive signal processing	LO1, LO2, LO3,
	Activity: Lecture, Group Work	LO5
13	Adaptive signal processing	LO1, LO2, LO3,
	Activity: Lecture, Group Work	LO5
14	Presentation of term project to class	LO1, LO2, LO3,
	Activity: Group Work, Presentation	LO4, LO5

Prof. Bülent YILMAZ
April 25, 2018