

COURSE INFORMATION					
Course Title	Code	Semester	L+P Hour	Credits	ECTS
SIGNALS&SYSTEMS	ES 224	4	2+2	3	5

Prerequisites	
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Language of Instruction	English
Course Level	Bachelor's Degree (First Cycle Programmes)
Course Type	
Course Coordinator	
Instructors	Asst. Prof. Uğur Yıldırım Asst. Prof. Soner Özgünel
Assistants	
Goals	The aim of this course is to understand mathematical properties of systems and signals in time and frequency domains
Content	Signals and their properties, Fourier series (for discrete-time and continuous-time signals), Fourier transform (for discrete-time and continuous-time signals), systems, properties of systems, linear time invariant systems and their response in time (convolution) and frequency domains, filters, sampling, and communication applications

Course Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
1) Ability to use mathematical techniques for signals in time domain	1	1,2	A,C
2) Ability to compute response of systems in time domain using convolution	2	1,2	A,C
3) Ability to compute Fourier Series and Fourier Transform of signals	1	1,2	A,C
4) Ability to perform frequency domain analysis of signals	2	1,2	A,C
5) Ability to apply their knowledge about frequency domain characterization of signals to concepts of sampling, modulation and filtering.	3	1,2	A,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study
Assessment Methods:	A: Testing, B: Experiment, C: Homework, D: Project

COURSE CONTENT		
Week	Topics	Study Materials
1	INTRODUCTION TO SIGNALS AND THEIR BASIC PROPERTIES	
2	BASIC OPERATIONS ON SIGNALS	
3	SINUSOIDAL AND COMPLEX EXPONENTIAL SIGNALS	
4-5	FOURIER SERIES OF CONTINUOUS-TIME SIGNALS	
6-7	FOURIER SERIES OF DISCRETE-TIME SIGNALS	
8-10	FOURIER TRANSFORM OF DISCRETE-TIME AND CONTINUOUS-TIME SIGNALS	
11	SYSTEMS AND THEIR PROPERTIES	
12	RESPONSE OF LTI SYSTEMS IN TIME DOMAIN AND CONVOLUTION	
13	RESPONSE OF LTI SYSTEMS IN FREQUENCY DOMAIN	
14	APPLICATIONS: SAMPLING, FILTERING, COMMUNICATION	

RECOMMENDED SOURCES	
Class Notes	
Additional Resources	<p>TEXTBOOKS:</p> <ul style="list-style-type: none"> • Oppenheim, Alan, V., Willsky, Alan, S. "Signals & Systems", Second Edition, Prentice Hall • Signal Processing First; J. H. McClelland, R. W. Schafer, M. A. Yoder; Prentice Hal

MATERIAL SHARING	
Documents	
Assignments	Homework questions on the following topics: basic concepts and operations on signals, Fourier Series and Fourier Transform, systems and their properties, convolution, frequency domain response of systems
Exams	Midterms, Final

ASSESSMENT			
	IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms		2	55

Homework	5	5
Total		60
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		100

COURSE CATEGORY	Expertise/Field Courses
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COURSE'S CONTRIBUTION TO PROGRAM						
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.					X
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.					X
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. (Realistic constraints and conditions may include factors such as economic and environmental issues, sustainability, manufacturability, ethics, health, safety issues, and social and political issues, according to the nature of the design.)			X		
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.					
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.					
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.					
7	Ability to communicate effectively both orally and in writing; knowledge of a minimum of one foreign language.					
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.					
9	Awareness of professional and ethical responsibility.					
10	Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development.					
11	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety; awareness of the legal consequences of engineering solutions.					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)

Course Duration (Including the exam weeks: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Midterms)	2	20	40
Hours for off-the-classroom study (Final)	1	20	20
Midterm examination	2	2	4
Homework	5	8	40
Final examination	1	3	3
Total Work Load			149
Total Work Load / 30 (h)			4,96
ECTS Credit of the Course			5