

School of Engineering and Natural Sciences / Computer Engineering (English)

2022 - 2023 Academic Year

COMMUNICATION SYSTEMS

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
COMMUNICATION SYSTEMS	COE3234090	Spring Semester	3+2	4	8
Prerequisites Courses	SİNYALLER VE SİSTEMLER; OLASILIK VE RASSAL DEĞİŞKENLER				
Recommended Elective Courses	1. Probability Theory 2. Signals and Systems				
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Prof.Dr. Mehmet Kemal ÖZDEMİR				
Name of Lecturer(s)	Prof.Dr. Mehmet Kemal ÖZDEMİR				
Assistant(s)					
Aim	This is a third-year undergraduate course on the fundamentals of communication systems theory. The course will introduce the fundamentals of analog and digital communications systems, while highlighting critical applications, system design aspects, and practical implementation considerations. The course content includes signals and systems concept, continuous modulation (Amplitude and frequency), modulation and demodulation, signal transmission and the effect of noise on its performance, sampling, digital modulation approaches, baseband modulation schemes, matched filtering, random process and bit error rate calculations.				
Course Content	This course contains; Introduction to communication systems and signals, Representations of Signals and Systems, Fourier Transform, Amplitude Modulation (AM), Angle Modulation, Probability, Random Process, Random Processes passing through systems, Analog to Digital Conversion, PCM Systems, Baseband Digital Transmission, Digital communication technologies, Digital Modulations : PSK, BFSK and ASK, Overview of Modern Communication Systems.				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
1. Understand the application of signals and systems into communication systems.			1, 13, 9	A, C, D, E	
2. Understand the concept of Fourier Transform and demonstrate its usage in communication systems.			1, 13, 9	A, D, E	
3. Understand main types of analog modulation techniques : AM and FM.			1, 13, 9	A, C, D, E	
4. Understand the transition from analog to digital domain and vice versa. Demonstrate the transformation from both domains through voice signals.			1, 13, 9	A, C, D, E	
5. Grasp the basics of random process, its modelling, and its application to digital communication systems.			1, 13, 9	A, C, D, E	
6. Understand digital baseband and passband transmission techniques and challenges encountered.			1, 13, 9	A, C, D, E	
Teaching Methods	1: Lecture, 13: Experiment / Laboratory, 9: Simulation				
Assessment Methods	A: Written Exam, C: Homework, D: Project / Design, E: Quiz				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Introduction to communication systems and signals	Chapters 1 and 2 of the textbook.			
2	Representations of Signals and Systems	Chapter 2 of the textbook.			
3	Fourier Transform	Chapter 2 of the textbook.			
4	Amplitude Modulation (AM)	Chapter 3 of the textbook.			
5	Angle Modulation	Chapter 4 of the textbook.			
6	Probability	Chapter 5 of the textbook.			
7	Random Process	Chapter 5 of the textbook.			
8	Random Processes passing through systems	Chapter 5 of the textbook.			
9	Analog to Digital Conversion	Chapter 7 of the textbook.			
10	PCM Systems	Chapter 7 of the textbook.			
11	Baseband Digital Transmission	Chapter 8 of the textbook.			
12	Digital communication technologies	Chapter 8 of the textbook.			
13	Digital Modulations : PSK, BFSK and ASK	Chapter 9 of the textbook.			
14	Overview of Modern Communication Systems	Notes and survey papers of communication systems.			
Evaluation Methods			Weight(%)		
Midterm Exam			30		
General Exam			70		

Resources	
1. Communication Systems 5th Edition by Simon Haykin and Michael Moher	
2. Introduction to Communication Systems by Upamanyu Madhow, University of California, Santa Barbara http://www.ece.ucsb.edu/wcsl/Publications/intro_comm_systems_madhow_jan2014b.pdf	