

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
MULTIMEDIA PROCESSING and COMMUNICATIONS	COE4167990	Fall Semester	3+0	3	6
Prerequisites Courses	PROGRAMLAMAYA GİRİŞ				
Recommended Elective Courses	Probability; Signals and systems; MATLAB or Python programming				
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Prof.Dr. Bahadır Kürşat GÜNTÜRK				
Name of Lecturer(s)	Prof.Dr. Bahadır Kürşat GÜNTÜRK				
Assistant(s)					
Aim	Representation, compression, storage, transmission and processing of multimedia. Signal representation of data and audio, speech, image, graphics, video signals. Multimedia compression techniques and standards. Content-based image and video indexing and retrieval. Fundamental technologies for multimedia communications and networking. Streaming audio and video over Internet and wireless/mobile networks. Error resilient communications. Internet multimedia content distribution.				
Course Content	This course contains; Introduction to multimedia systems, Multimedia data / information representation and processing (Graphics and image data formats), Fundamental concepts in video / Basics of digital audio, Multimedia data compression (Lossless and lossy compression) , Text and image compression / Video compression techniques and standards, Audio/speech compression techniques/standards , Multimedia network communications and applications, Midterm, Multimedia over IP and quality of service (QoS) , Wireless/Mobile networks, Multimedia content distribution (Content delivery networks), Overlay and peer-to-peer networks, Multimedia information sharing and retrieval, Advanced Topics: Current state of technology in multimedia processing and communications.				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
Know the basics of sampling theory, quantization, and coding			1, 15, 4	A, C, E	
Apply transformations/mappings and compute transform coefficients			1, 15, 4	A, C, E	
Compute entropy, bitrate, and PSNR			1, 15, 4	A, C, E	
Recognize multimedia data formats and their application areas			1, 15, 4	A, C	
Know the current trends and needs in multimedia coding and communication			1, 15, 2	C	
Apply entropy coding techniques to various types of data			1, 15, 4	A, C, E	
Integrate different coding tools and design compression algorithms			1, 15, 4	A, C	
Design error detection methods for reliable communication			1, 15, 4	A, C, E	
Recognize multimedia communication protocols in internet and wireless/mobile networks			1, 15, 4	A, C	
Analyze alternative approaches for multimedia content distribution			1, 15, 4	A, C	
Implement multimedia processing, transformation, coding and transmission algorithms in MATLAB/Python			1, 14, 15, 4	C, E	
Teaching Methods	1: Lecture, 14: Self-Study, 15: Problem solving, 2: Question - Answer, 4: Exercise, Practice				
Assessment Methods	A: Written Exam, C: Homework, E: Quiz				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	Introduction to multimedia systems				
2	Multimedia data / information representation and processing (Graphics and image data formats)				
3	Fundamental concepts in video / Basics of digital audio				
4	Multimedia data compression (Lossless and lossy compression)				
5	Text and image compression / Video compression techniques and standards				
6	Audio/speech compression techniques/standards				
7	Multimedia network communications and applications				
8	Midterm				
9	Multimedia over IP and quality of service (QoS)				
10	Wireless/Mobile networks				
11	Multimedia content distribution (Content delivery networks)				
12	Overlay and peer-to-peer networks				
13	Multimedia information sharing and retrieval				
14	Advanced Topics: Current state of technology in multimedia processing and communications				
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources
Ze-Nian Li, Mark S Drew, J. Liu, Fundamentals of Multimedia, 2nd ed., Springer, 2014. Fred Halsall, Multimedia Communications: Applications, Networks, Protocols and Standards, Addison-Wesley, 2001. Multimedia over IP and Wireless Networks: Compression, networking, and Systems, by Mihaela van der Schaar. And Philip Chou, Academic Press, 2007.