



MARMARA UNIVERSITY - FACULTY OF ENGINEERING

2017-2018 Fall

CSE4084 Multimedia Systems

COURSE DESCRIPTION FORM

Offering Department	Department of Computer Engineering		Technical Elective					
Course Code	CSE4084							
Course Name	Multimedia Systems							
Language of Instruction	English							
ECTS	5							
Contact Hours	Theoretical (T): 3		Practice (P):		Laboratory (L):			
Pre-requisites	-							
Instructor	Name	Çiğdem Eroğlu Erdem						
	E-mail	cigdem.erdem@marmara.edu.tr						
Course Materials	Mandatory	Lecture notes and announcements are shared via the class web page.						
	Recommended	<p>Fundamentals of Multimedia (2nd Edition), Ze-Nian Li, Mark S Drew, Prentice Hall, 2014. Digital Image Processing (3rd edition), Rafael C. Gonzalez and Richard E. Woods, Prentice Hall, 2016. Practical Image and Video Processing Using Matlab, Oge Marques, Wiley 2011, ISBN: 978111093467. Video Processing and Communications, by Yao Wang, Joern Ostermann, and Ya-Qin Zhang, Prentice Hall, 2002, ISBN 0-13-017547-1. Digital Video Processing, by M. Tekalp, Prentice Hall, Second Edition, 2015. Digital Media Primer, Yue-Ling Wong, Pearson Education, 2009, ISBN The Science of Digital Media, Jennifer Burg, Pearson Education, 2009 Multimedia Fundamentals, Volume 1: Media Coding and Content Processing, 2/E, Ralf Steinmetz, Klara Nahrstedt, Prentice Hall, 2002, ISBN-10: 0130313998 Multimedia: Making it Work, Tay Vaughan, McGraw Hill, 2007, Digital Multimedia, Nigel Chapman and Jenny Chapman, Wiley, 2004, ISBN: 0470858907</p>						
Course Objectives	Introduce te student basic image, video and audio processing methods and provide them hands on experience. Introduce basic image and video compression methods and maket them apply the basic steps.							
Course Content	Introduction to multimedia; 2D signals and systems; 2D sampling; motion estimation in video; image and video enhancement; image and video restoration; edge detection; segmentation; lossless and lossy compression methods; image and video compression standards; basics of speech processing and compression.							
Learning Outcomes	LO1	Apply basic digital image processing operations such as sampling and filtering.						
	LO2	Explain basic image enhancement, restoration, edge detection and segmentation methods.						
	LO3	Apply basic motion estimation methods.						
	LO4	Apply basic methods of image and video compression.						
	LO5	Explain basic speech processing and compression methods.						
Program Outcomes		LO1	LO2	LO3	LO4	LO5		
PO4	Ability to devise (a), select, and use (b) modern techniques and tools needed for engineering practice (1); ability to employ information technologies effectively (2).	1.b	1.b	1.b				
PO13	Knowledge of mathematics, basic sciences (a), computer science (b) and engineering sciences (c) required for the design and analysis of complex electrical and electronic devices, software and systems including hardware and software.	c	c	c	c	c		
Subjects (Knowledge, Skills and Behaviours), Contributions of Subjects to Learning Outcomes, Assessment Methods	No	Week	Subjects	LO1	LO2	LO3	LO4	LO5
	S1	1	Introduction to multimedia; review of linear signals and systems, probability, and linear algebra.					
	S2	2-4	Basics of digital image processing: image capture, EM spectrum, 2D signals and systems, 2D Fourier transform and sampling, color images.	MF, H				
	S3	5	Motion estimation in video: phase correlation, block matching, optical flow			MF, H		
	S4	6-7	Image and video enhancement, restoration		MF, H			
	S5	8-9	Edge detection, image segmentation		MF			
	S6	10	Lossless and lossy image compression methods				MF	

	S7	11	Image compression (JPEG)				MF, H																
	S8	12	Video compression (standards, MPEG 1,2; MPEG 4,7)				MF																
	S9	13	Basics of speech processing and compression					MF															
	S10	14	Project presentations																				
Assessment Methods and Weights	No	Type	Weight	Implementation Rule			Make-up Rule																
	MF	Midterm, Final	80%	There will be two midterm exams and a final exam. Exams will be closed books and notes. Simple calculators are allowed.			Marmara University regulations will be followed for make-up exams.																
	H	Homeworks	10%	There will be four assignments that require MATLAB programming. Late submissions are penalized.																			
	P	Project	10%	Course project can be an implementation or paper presentation. A project plan, midterm report and a final report and presentation is expected.																			
	TOTAL		100%																				
Determining Letter Grades	<ul style="list-style-type: none"> The letter grades will be determined based on the midterm and final exams, project and homeworks. In order to determine the letter grade, a curve or catalog based method will be followed based on the total average scores of the students. The final exam score and the total average score of the student must be at least 35 to pass the course. According to Marmara University Undergraduate regulations, the weight of the final exam must be at least 40 out of 100. 																						
	<table border="1"> <tr> <td>Assessment</td> <td>Midterm 1</td> <td>Midterm 2</td> <td>Homeworks</td> <td>Project</td> <td>Final</td> <td colspan="2">TOTAL</td> </tr> <tr> <td>Weight</td> <td>20</td> <td>20</td> <td>10</td> <td>10</td> <td>40</td> <td colspan="2">100</td> </tr> </table>								Assessment	Midterm 1	Midterm 2	Homeworks	Project	Final	TOTAL		Weight	20	20	10	10	40	100
Assessment	Midterm 1	Midterm 2	Homeworks	Project	Final	TOTAL																	
Weight	20	20	10	10	40	100																	
Teaching Method, Student Work Load	Time Applied by the Instructor																						
	No	Method	Explanation					Hours															
	1	Lectures	Lectures are given in class using the board or via presentations. Example questions are solved to enhance the concepts.					14x3=42															
	2	Problem Session/ Practice	Problems related to the course topics are solved on the board.																				
	3	Laboratory	Experiments are done in the laboratory or theoretical concepts covered during the lectures are practiced using computer exercises.																				
	4	Interactive Courses	Questions are asked to students during lectures and they are encouraged to guess the answers (peer learning is also in this category)																				
	5	Field Work	Students attend activities outside the campus.																				
	6	Midterm	Midterm exam is given during the midterm week.					2x2 = 4															
	7	Final	Final exam is given during the final exam week.					2															
	Estimated Time to be Allocated by a Student																						
	8	Project	The students carry out research about the problem given in the project, design and implement their solution and prepare a report.					20															
	9	Homeworks	The students solve the problems given as homework.					4x5=20															
	10	Pre-class learning of Course Material	The students study and learn the new subjects from course materials.																				
11	Review of Course Material	Students review the course subjects from course materials to prepare for the exams and homeworks.					35																
12	Office Hour	Students ask questions to the instructor or the assistant during office hours.					2																
Total							125																
Academic Honesty	Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students.																						
	In case academic dishonesty is observed, the first authority is the instructor of the course. The instructor may decide to give the student zero for the homework(s)/lab(s)/exam(s), give the letter grade FF, or may take disciplinary action.																						