



ECTS COURSE INFORMATION FORM

Faculty	Faculty of Engineering	
Program	B.Sc. in Civil Engineering	Elective
	B.Sc. in Computer Engineering	Elective
	B.Sc. in Electrical-Electronics Engineering	Elective
	B.Sc. in Industrial Engineering	Elective
	B.Sc. in Mechanical Engineering	Elective

Course Code	COMP 482			
Course Title in English	Computer Vision			
Course Title in Turkish	Bilgisayarla Görü			
Language of Instruction	English			
Type of Course	Flipped Classroom			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	10	30	60	0
Semester Offered	Fall			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab: -	Other: -
Estimated Student Workload	161 hours			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	COMP 201			
Expected Prior Knowledge	Object Oriented Programming, Data Structures			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To become familiar with the fundamental concepts of Computer Vision, such as image formation, camera parameters, preprocessing, convolution, segmentation, edge and corner detection, line and ellipse fitting, image understanding and object recognition.			
Course Description	This course provides a comprehensive introduction to some fundamental aspects of Computer Vision. The following topics are covered: Introduction, Image formation, camera parameters, preprocessing, convolution, SIFT, Parameter estimation, RANSAC, image stitching, binocular stereo, image understanding and object recognition, Deep Learning.			
Course Description in Turkish	Bu derste; bilgisayarla görünün temel kavramları şu konu başlıklar altında kapsamlı bir şekilde incelenmektedir: Giriş, görüntü oluşumu, kamera parametreleri, ön işleme, evriştirme, bölütleme, kenar, köşe bulma, SIFT, parametre kestirimi, RANSAC, panoramik görüntü elde etme, stereo algoritmaları, görüntü anlama, nesne tanıma ve derin öğrenme.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: <ol style="list-style-type: none">1. understand image formation process, camera parameters and projections;2. apply convolution for filtering and preprocessing;3. apply probability and statistics to solve problems in computer vision4. develop feature extractors such as edge, corner, line extractors;5. develop solutions using image stitching and stereo images;6. develop image understanding and objects recognition solutions;7. communicate effectively by means of reports and presentations;8. analyze and interpret data, and use engineering judgment to draw conclusions;9. acquire and apply new knowledge as needed.			

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	H	1,2,3	Exam, HW, Project
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	H	4,5,6	Exam, HW, Project
(3) an ability to communicate effectively with a range of audiences	S	7	Project report
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	S	8	Exam, HW, Project
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	S	9	Exam, HW, Project
Prepared by and Date	Prof. Dr. Muhittin Gökmen / December 2019		
Semester	Spring 2019-2020		
Name of Instructor	Prof. Dr. Muhittin Gökmen		
Course Contents	Week	Topic	
	1.	Introduction	
	2.	Image formation	
	3.	Camera parameters	
	4.	Preprocessing: Histogram modifications	
	5.	Convolution and noise reduction	
	6.	Edge and corner detection	
	7.	Line, circle and ellipse fitting	
	8.	RANSAC and Homography	
	9.	Binocular Stereo	
	10.	Image Understanding	
	11.	Object Recognition-PCA	
	12.	Object Recognition-Neural Networks	
	13.	Object Recognition-Deep Learning	
	14.	Project presentations	
	15.	Final Exam/Project/Presentation Period	
	16.	Final Exam/Project/Presentation Period	
Required/Recommended Readings	Computer Vision: Algorithms and Applications, Richard Szeliski, Springer Science & Business Media, 2010 Introductory Techniques for 3-D Computer Vision, by Emanuele Trucco, Alessandro Verri, Prentice-Hall, 1998		
Teaching Methods	Lecturing and exercises in the classroom with computers. In-class exercises and 3 Projects will be carried out by students		

Homework and Projects	In-class exercises, 2 Projects, 2 Midterm exams, Term project
Laboratory Work	Programming exercises
Computer Use	For Programming
Other Activities	
Assessment Methods	Quiz (3):10%; Project (2): 20%; Midterm (2): 40%; Term Project: 30%
Course Administration	<p>Instructor's office and phone number, office hours, email address: To be announced -Office: 5th Floor, #18; Phone number: 0 212 395 36 26; Email: gokmenm@mef.edu.tr</p> <p>Rules for attendance: Minimum of 70% attendance required.</p> <p>Missing a quiz: Provided that proper documents of excuse are presented, each missed quiz by the student will be given a grade which is equal to the average of all of the other quizzes. No make-up will be given.</p> <p>Missing a midterm: Provided that proper documents of excuse are presented, each missed midterm by the student will be given the grade of the final exam. No make-up will be given.</p> <p>Missing a final: Faculty regulations.</p> <p>A reminder of proper classroom behavior, code of student conduct: YÖK Regulations</p> <p>Statement on plagiarism: YÖK Regulations http://3fcampus.mef.edu.tr/uploads/cms/webadmin.mef.edu.tr/4833_2.pdf</p>

ECTS Student Workload Estimation	Activity	No/Weeks	Hours			Calculation	Explanation
		No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
	Lecture	14	1	3	1	70	A*(B+C+D)
	Quizzes	3	4	1		15	
	Midterms	2	15	2		34	A*(B+C+D)
	Projects	2	8	2		20	
	Term Project	1	19	3		22	A*(B+C+D)
	Total Workload					161	
	Total Workload/25					6.44	
	ECTS					6	