

**COURSE INFORMATION FORM**

School/Faculty/Institute	Faculty of Engineering		
Program	B.Sc. in Electrical-Electronics Engineering	Elective	
	B.Sc. in Industrial Engineering	Elective	
	B.Sc. in Computer Engineering	Elective	
	B.Sc. in Mechanical Engineering	Elective	
	B.Sc. in Civil Engineering	Elective	
Semester	Fall 2016-2017		

Course Code	COMP480			
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
	0	10	80	10
Semester	Fall			
Contact Hours per Week	Lecture: 2	Recitation: -	Lab: 2	Other: -
Estimated Student Workload	161 hours per semester.			
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 introduce fundamental concepts of Computer Vision. Problems and their solution methods related with developing machines with seeing ability will be introduced. The students will be familiar with 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, segmentation, edge and corner detection, line and ellipse fitting, Object Tracking, 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, önışleme, evriřtirme, bölütleme, kenar ve köşe bulma, doğru ve elips uydurma, görüntü analizi, nesne tanıma ve derin öğrenme.			
Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to be able to: <ol style="list-style-type: none">1. Understand image formation process, camera parameters and projections2. Apply convolution for filtering and preprocessing3. Gain experience in edge and corner detection, curve fitting4. Gain experience in image understanding and objects recognition.			
Relation to Program Outcomes and Competences:	N=None S=Supportive H=Highly Related			

Program Outcomes and Competences		Level	Assessed by
		N/S/H	Exam, Project, HW, Lab, Presentation, etc.
(a) an ability to apply knowledge of mathematics, science, and engineering		N	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data		N	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability		H	Quiz, Project, Midterm, Final
(d) an ability to function on multidisciplinary teams		N	
(e) an ability to identify, formulate, and solve computer engineering problems		H	Quiz, Project, Midterm, Final
(f) an understanding of professional and ethical responsibility		N	
(g) an ability to communicate effectively		N	
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context		N	
(i) a recognition of the need for, and an ability to engage in life-long learning		N	
(j) a knowledge of contemporary issues		N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for computer engineering practice.		S	Quiz, Project, Midterm, Final
Prepared by and Date	Prof. Dr. Muhittin Gökmen/ September 2016		
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.	Optical Flow and Tracking	
	11.	Image Understanding	
	12.	Object Recognition-PCA	
	13.	Object Recognition-Deep Learning	
	14.	Project presentations	
	15.	Final Examination Period.	
	16.	Final Examination Period.	
Required/Recommended Readings	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, 3 Projects		
Laboratory Work	Programming exercises		
Computer Use	For Programming		
Other Activities			
Assessment Methods	Quiz (5): %10 Project (3): %20 Midterm: % 30		

Course Administration	Final: %40
	<p>Instructor's office and phone number, office hours, email address: To be announced</p> <p>-Office: 5th Floor, #18</p> <p>-Phone number: 0 212 395 36 26</p> <p>- Email address: 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</p> <p>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)
	Lab etc.					0	
	Midterm(s)	1	3	1		4	A*(B+C+D)
	Assingment, Project, Presentation	8	5	3	2	80	A*(B+C+D)
	Final Examination	1	5	2		7	A*(B+C+D)
	Total Workload					161	
	Total Workload/25					6,44	
	ECTS					6	

PROGRAM CRITERIA

Computer Engineering Program Criteria

A1. Breadth in computer engineering practice, analysis and design with **18** required course, and depth in one or more fields with **4** electives.

A2. Knowledge of mathematics, including differential and integral calculus, basic sciences, computer science, and engineering sciences that is necessary for analysis and design of complex electrical and electronic devices, software, and systems containing hardware and software components.

A3. Knowledge of probability and statistics, including application to computer engineering; knowledge of advanced mathematics, including differential equations, linear algebra, complex variables, and discrete mathematics.