Course Description	
Course Code	YS 416
Course Name	COMPUTER VISION
Prerequisite Courses	
Language of the Course	The English
Course Coordinator	
Instructor(s)	
Course Assistants	
The aim of the course	Upon successful completion of this course of study a student: • Knows imaging models and how images are generated. • Understands how to model linear systems and knows how to implement linear and nonlinear filtering. • Knows how to design and implement edge detection algorithms. • Understands the basics of texture modeling and algorithms for texture classification. • Knows the basic principles of motion estimation and how to implement optical flow estimation algorithms. • Understands the fundamental problems and importance of segmentation and grouping and knows how to implement basic segmentation and grouping algorithms. • Understands the issues in object recognition from images and knows how to implement basic template matching and deformable template matching algorithms. • Has some experience with research in computer vision.
Course Content	Robotics and industrial control systems are becoming one of the fastest-growing fields in computer science. More and more companies are automating with computer-controlled robotic machinery. Automated manufacturing is leading the advanced technology revolution as companies vie for the competitive edge by utilizing productive, efficient, computer-controlled robots. This course is open to graduate students. The course aims at providing advanced techniques of Image Processing and Computer Vision. The techniques for image processing and feature extraction are covered in lectures; topics include: Geometric transforms, Discrete transforms, Noise, filter design, noise removal, Image restoration, Edge detection techniques, Object features extraction and analysis, Image analysis, Region, contour and motion-based image segmentation techniques

Weekly Course Content	
Week 1	Geometric transforms
Week 2	Discrete transforms
Week 3	Discrete transforms
Week 4	Noise, filter design, noise removing
Week 5	Image restoration
Week 6	Image restoration
Week 7	Edge detection techniques
Week 8	Midterm exam.
Week 9	Object features extraction and analysis
Week 10	Object features extraction and analysis
Week 11	Image analysis
Week12	Image analysis
Week 13	The region, contour and motion-based image segmentation techniques
Week 14	The region, contour and motion-based image segmentation techniques
Week 15	Final exam.

Course Learning Outcomes	
1	Apply math, science and engineering knowledge
2	Design a system, component or process to meet desired needs
3	Identify, formulate, and solve engineering problems
4	Image processing techniques
5	image sensing technologies
6	-

Contribution of the Course to Program Qualifications		Contribution Level
01	The student will have the ability to apply analytical approach, mathematics and science knowledge in software and engineering issues.	0
02	The student will have the ability to identify, define, formulate and solve a problem in software and computer systems.	0
03	The student will have gains scientific research skills in software and engineering problems, has the ability to design a system, part or process.	0
04	The student will have the ability to use the design capability, techniques and tools required for engineering applications.	0
05	The student will have the ability to design, implement and interpret experimental work and software projects by analyzing the results.	0
06	The student will have the ability to work between disciplines and teamwork.	0
07	The student will have the ability to work in international environments and adapt to different cultures.	0
08	The student will have verbal and written communication skills in Turkish and English.	0
09	The student will have the awareness of the necessity of lifelong learning and the ability to realize it.	3
10	The student will gain knowledge of legal issues with the awareness of professional and ethical responsibility.	0
11	The student will have managerial skills (leadership, organization, time and risk management, quality awareness, efficiency, etc.).	3
12	The student will have the ability to participate in social activities, to acquire regular sports habits and to use time in the best way.	0
13	The student will have the ability to find unusual ways and produce projects.	0
14	The student will have professional self-confidence, being an entrepreneur and taking initiative.	3
15	It is sensitive about the problems of the age and looks after the national interests.	0

ECTS WORKLOAD	Number	Duration (hours)	Number*Duration
Face to face education	14	2	28
Out-of-class study time (pre-study, reinforcement)	10	1	10
Homeworks	0	0	0
Presentation / Seminar preparation	0	0	0
Quizzes	0	0	0
Preparation for midterm exams	1	10	10
midterm exams	1	2	2
Project (Semester assignment)	0	0	0
Lab	0	0	0
field work	0	0	0
Preparation for the final exam	1	15	15
Semester final exam	1	2	2
Research	5	5	25

TOTAL WORKLOAD			**92**
ECTS			**3**

Evaluation		
SEMESTER EVALUATION	**Number**	**Contribution Percentage**
Midterm	1	40
Quiz	0	0
Homework	0	0
SEMESTER TOTAL		**40**
Contribution rate of mid-term evaluations to success		40
Contribution rate of the final exam to success		60
GRAND TOTAL		**100**

RESOURCES	
Textbook	• R. C. Gonzalez and R. E. Woods, Digital Image Processing, Addison-Wesley Pub. Co., New York, (2nd edition) 2002. • Sonka, M., Hlavac, V., and Boyle, R. Image Processing, Analysis and Machine Vision. Chapman & Hall Computing, 1993. • Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, 1989. • Low, A. Introductory Computer Vision and Image Processing. McGraw-hill, 1991
Helpful Resources	• Kenneth R. Castleman, Digital Image Processing, Prentice Hall, 1996. • A. Rosenfeld and A. Kak, Digital Image Processing, Volume 1, Academic Press, 1982. • Image Processing Fundamentals • Image Processing Home Page • Computer Vision Home Page