HASAN KALYONCU UNIVERSITY
Faculty of Engineering
Course Description Form

COURSE: Image Processing and Analysis				
CODE: CENG473	**SEMESTER:** FALL OR SPRING			
LANGUAGE: ENGLISH	**TYPE:** ELECTIVE			
PRE-REQUISITES: CENG112, MATH251 **CO-REQUISITES:**	**THEORY**	**PRACTICAL**	**CREDIT**	**ECTS**
WEEKLY HOURS:	3	0	3	5

CONTENT OF THE COURSE:
This course introduces basic mathematical concepts, algorithms, and other building blocks in image processing and analysis. The course contents include: image sensing and acquisition, image enhancement and restoration in both spatial and frequency domains like noise removal and deblurring; color image processing; various image compression techniques; morphological Image processing, Image edge detection, region segmentation, watersheds; image representation and description; and finally object recognition.

OBJECTIVE OF THE COURSE:
1. To teach basic mathematical and algorithmic concepts of image processing and analysis.
2. To emphasize general principles of image processing as 2D signal processing and system design for a range of applications.
3. To provide an understanding and hands on the wide range of processing components domain applications involved in image analysis systems.

WEEKLY SCHEDULE	
Week	**Topics**
1	Introduction to the course and image processing
2	Digital Image Processing Fundamentals
3	Image Enhancement in the Spatial Domain
4	Image Enhancement in the Frequency Domain
5	Image Restoration
6	Color Image Processing
7	Midterm I
8	Lossless Image Compression, Lossy image Compression
9	Binary Image Processing and Morphological Operations
10	Edge based Image Segmentation
11	Region based Image Segmentation
12	Image Representation and Description
13	Object Recognition
14	Term Project presentations

TEXTBOOK: Gonzalez, R. C., and Woods, R. E., 2008.Digital Image Processing, Prentice Hall, (3rd Edition).

REFERENCE BOOKS:

Gonzalez, R. C., and Woods, R. E., Eddins, S., 2004. Digital Image Processing using MATLAB. Pearson, Prentice Hall. [4] Sonka, M., Hlavac, V., Boyle, R.,2007.
Image Processing: Analysis and Machine Vision, Chapman & Hall Computing, 3rd edition.

EVALUATION SYSTEM:		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE (%)**
Midterm Exam	1	20
Homework	5	15
Project work	1	15
Quiz	3	5
Final Exam	1	45
TOTAL	**11**	**100**
CONTRIBUTION OF INTERM STUDIES TO OVERALL GRADE	10	55
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE	1	45
TOTAL	**11**	**100**

COURSE CATEGORY:	**PERCENTAGE (%)**
Mathematics and Basic Sciences	40
Engineering	30
Engineering Design	30
Social Sciences	0

TABLE OF ECTS / WORKLOAD:			
Activities	**QUANTITY**	**Duration (Hour)**	**Total Workload**
Course Duration	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	14	4	56
Laboratory works			
Mid-term	2	2	4
Final examination	1	2	2
Homework	3	5	15
Quiz	3	3	9
Project work	1	20	20
Total Work Load			**140**
Total Work Load / 30			**4.67**
ECTS Credit of the Course			**5**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
LO1	3	2	1	1	1	1	0	1	0	0	0
LO2	3	3	3	3	1	1	1	1	0	1	0
LO3	3	3	2	2	1	1	2	3	2	0	2
LO4	3	2	3	3	3	3	2	3	2	1	1
	PO: Program Outcomes | LO: Learning Outcomes Values: 0: None | 1: Low | 2: Medium | 3: High										

INSTRUCTOR(S):	Asst. Prof. Dr. Abdul Hafiz ABDULHAFIZ
FORM PREPARATION DATE:	22/05/2019

LEARNING OUTCOMES OF THE COURSE:	**PROGRAM OUTCOMES:**
LO1: learning of mathematical basis of the digital image processing and analysis. **LO2:** Understanding of the various algorithmic, software, and hardwar computing component consituting the image processing and analysis systems. **LO3:** Learning to develop basic, advance, and invoative image related solutions to problems through homework, quizzes and projects. **LO4:** Gaining a comprehensive knowledge on a some selected advance topics through the term project.	**PO1:** Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. **PO2:** Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. **PO3:** Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. **PO4:** Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. **PO5:** Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions. **PO6:** Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually. **PO7:** Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions. **PO8:** Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself. **PO9:** Consciousness to behave according to ethical principles and professional and ethical responsibility;

	knowledge on standards used in engineering practice. **PO10:** Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development. **PO11:** Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.