COMPUTER VISION

1	Course Title:	COMPUTER VISION
2	Course Code:	BM5113
3	Type of Course:	Optional
4	Level of Course:	Second Cycle
5	Year of Study:	1
6	Semester:	1
7	ECTS Credits Allocated:	6.00
8	Theoretical (hour/week):	3.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	None
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Dr. Ögr. Üyesi CEYDA NUR ÖZTÜRK
15	Course Lecturers:	
16	Contact information of the Course Coordinator:	ceydanur@uludag.edu.tr
17	Website:	
18	Objective of the Course:	To introduce matching, classification, detection, segmentation, registration, tracking, and reconstruction-like problems that should be solved to provide computers with ability to see and to examine necessary representations, techniques, and algorithms for solution of these problems.
19	Contribution of the Course to Professional Development:	Develops skills to use proper methods for understanding information that is asked for in various images and hence to manage the visual perception tasks of high-level intelligent systems.
20	Learning Outcomes:	

	1	Being able to describe the relationships between camera images and physical world
	2	Being able to extract image features and produce descriptors for them
	3	Being able to obtain foreground and flow information in moving images
	4	Being able to classify and segment objects of interest in images
	5	Being able to provide alignment between source and destination images
	6	Knowing the approaches of depth estimation from images
	7	Being able to use convolutional neural networks for some vision problems
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21	Course Content:	

Course Content:	

Week	Theoretical	Practice
1	Overview of computer vision problems, image formation	

#	Topic
2	Fundamental image processing: intensity transformations, noise types, linear and nonlinear filtering
3	Fundamental image processing: histograms, edge detection, morphological operations
4	Image features: edge, corner, line, and circle detection, template matching
5	Interest point detectors and descriptors: SIFT, SURF, ORB, HOG, LBP algorithms, spatiotemporal interest points
6	Transforms: Hough, Fourier, Haar and wavelet transforms
7	Alignment: geometric transformations, point matching, image warping, homography estimation and RANSAC algorithm
8	Moving image processing: background subtraction and optical flow
9	Camera parameters, perspective projection, camera calibration
10	Stereo vision and epipolar geometry, sparse and dense depth maps, 3-D reconstruction
11	Object detection and segmentation: texture and shape modelling, classification, clustering, and registration approaches
12	Object tracking in moving images: Lucas-Kanade, mean shift, MOSSE and KCF algorithms
14	Classification, detection, and segmentation of objects with convolutional neural networks

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preparation	14	3.00	42.00
Homeworks	3	18.00	54.00
Projects	1	20.00	20.00
Field Studies	0	0.00	0.00
Midterm exams	0	0.00	0.00
Others	0	0.00	0.00
Final Exams	1	18.00	18.00
Total Work Load			176.00
Total work load/ 30 hr			5.87
ECTS Credit of the Course			6.00

22 Textbooks, References and/or Other Materials:
1. Szeliski, R., 2010. Computer Vision: Algorithms and Applications. Springer Science & Business Media. ISBN: 1848829345.
2. Dadhich, A., 2018. Practical Computer Vision: Extract Insightful Information from Images Using TensorFlow. 1788297684.

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Quiz	0	0.00
Final Exam	1	40.00
Total	4	100.00

Contribution of Term (Year) Learning Activities to Success Grade	60.00
Contribution of Final Exam to Success Grade	40.00
Total	100.00
Measurement and Evaluation Techniques Used in the Course	Programming assignments, project, presentation, written exam

24	ECTS / WORK LOAD TABLE

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	3	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0
ÖK2	5	4	5	2	2	2	0	0	0	0	0	0	0	0	0	0
ÖK3	5	3	4	1	1	1	0	0	0	0	0	0	0	0	0	0
ÖK4	5	4	5	4	2	3	0	0	0	0	0	0	0	0	0	0
ÖK5	5	3	4	2	1	1	0	0	0	0	0	0	0	0	0	0
ÖK6	4	2	3	1	1	1	0	0	0	0	0	0	0	0	0	0
ÖK7	5	4	5	4	2	3	0	0	0	0	0	0	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	1 very low		2 low		3 Medium		4 High			5 Very High						