اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Computer Vision
Course Code:	501574-3
Program:	Bachelor in Computer Science
Department:	Department of Computer Science
College:	College of Computers and Information Technologies
Institution:	TU

Table of Contents

A. Course Identification

1. Credit hours:3	

2. Course type

a. University ☐ College ☐ Department ☒ Others ☐
b. Required ☐ Elective ☒

3. Level/year at which this course is offered: 15th Level/5

4. Pre-requisites for this course (if any)**: 202262-3 (Linear Algebra)**
                                               501324-3 (Data Structures)

5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	80%
2	Blended		
3	E-learning	1	20%
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	50
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces the basic concepts of computer vision, its applications and techniques. Topics treated in the course include low level image processing, segmentation, boundary detection, fitting, stereo correspondence, 3-Dreconstruction, recognition and detection.

2. Course Main Objective

- Introduce typical application domains where computer vision techniques are used.
- Introduce methods and tools for developing computer vision applications.
- Develop techniques to emulate human vision capabilities.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Explain the fundamental concepts in digital image processing and computer vision.	K1
1.2	Describe emerging topics in computer vision.	K1
1.3		
1...		
2	**Skills :**	
2.1	Apply image preprocessing algorithms and computer vision techniques for detection.	S1
2.2	Analyze a computer vision problem and suggest solutions that meet its constraints.	S1
2.3	Develop computer vision applications using appropriate tools.	S1
3	**Values:**	
3.1		
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to computer vision, image processing, basic image processing operations	3
2	Image Filtering (Spatial and Frequency Domain) and Fourier Transform	5
3	Image pyramids and Applications	3
4	Edge detection (Canny Edge Detector) and line fitting	5
5	Robust fitting (RANSAC)	4
6	Machine Learning (overview, Clustering and Classification)	12
7	Interest points: corners (Harris-Laplacian)	6
8	Feature description SIFT	6
9	Recognition: (PCA and EigenFaces)	6
	Total	**50**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Explain the fundamental concepts in digital image processing and computer vision.	Lectures	**Direct** Quizzes / Project Exams **Indirect** Course Exit Survey
1.2	Describe emerging topics in computer vision.	Lectures	**Direct** Quizzes / Project Exams

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			Indirect Course Exit Survey
2.0	**Skills**		
2.1	Apply image preprocessing algorithms and computer vision techniques for detection.	Lectures Project	**Direct** Quizzes / Homework Exams **Indirect** Course Exit Survey
2.2	Analyze a computer vision problem and suggest solutions that meet its constraints.	Lectures Project	**Direct** Quizzes / Homework Exams **Indirect** Course Exit Survey
2.3	Develop computer vision applications using appropriate tools.	Lectures Project	**Direct** Quizzes / Homework Exams **Indirect** Course Exit Survey
3.0	**Values**		
3.1			
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	HomeWorks /Student Participation-Attendance	Week 4, Week 8	10%
2	Quizzes	Week 3 and 7, 10	10%
3	Project	From Week 6	20%
4	Mid-Term	Week 6	20%
5	Final Examination	Week 12	40%
6			
7			
8			

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
- 6 hours per week in pre-determined office hours
- Consultation by appointment (as needed)
- Through emails

Through BlackBoard Learn

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	• Computer Vision: Algorithms and Applications by Szeliski, R, Publisher Prentice Hall 1st Edition, Springer; 2011, ISBN-10: 1848829345
Essential References Materials	• Digital Image Processing Using Matlab by Gonzalez,R.C, Woods,R.E and Eddin,S.L, Publisher: Gatesmark Publishing, 2nd Edition 2009, ISBN-10: 0982085400
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classroom with 20 seats.
Technology Resources (AV, data show, Smart Board, software, etc.)	• Video projector / data show, Python, OpenCV, Scikit-Learn, TensorFlow Smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching	• Students	• Course survey
Effectiveness of assessment	• Students	• Course survey
Extent of course learning outcomes	• Faculty members	• Direct Method CLOs assessment
Quality of learning resources	• Students • Faculty members	• Course survey • Feedback from Faculty members

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	CS council
Reference No.	Meeting #12
Date	23-10-1443