Course Specification

(Bachelor)

Course Title : Computer Vision	
Course Code: CS460	
Program: Computer Science	
Department: Computer Science	
College: Colleague of Computer and Information Sciences	
Institution: Majmaah University	
Version: Fall'23	
Last Revision Date: 11 September 2023	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3(2,2,0)					
2. Course type					
A.	☐University	☐College	☐Department	☒ Track	☐Others
B.	☐Required		☐Elective		
3. Level/year at which this course is offered: (Level 9/10 year)					
4. Course general Description:					
This course provides an introduction to computer vision, including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification, scene understanding, and deep learning with neural networks. Implementation of various algorithms will be done in python language.					
5. Pre-requirements for this course (if any)**:**					
CS 210					
6. Pre-requirements for this course (if any)**:**					
Nil					
7. Course Main Objective(s):					
Course Main Objectives **1. To introduce to the theoretical and practical aspects of computing with images** **2. To cover the techniques of image formation, measurement, and analysis** **3. To expose to the common methods for robust image matching and alignment** **4. Highlight the geometric relationships between 2D images and the 3D world** **5. Giving exposure to object and scene recognition and categorization from images**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**60**	**100%**
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**45**
2.	**Laboratory/Studio**	15
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1				
1.2				
...				
2.0	**Skills**			
2.1	CLO1: Students understand the foundation of image formation, measurement, and analysis	S2	Classroom Teaching & Lab	Lab Exercise Test, Mid Exam, Final Exam,
2.2	CLO2: Sstudent's Be familiar with both the theoretical and practical aspects of computing with images	S2	Classroom Teaching	Exercise Test, Mid Exam, Final Exam,
2.3	CLO3: Students understand how to track, identify and recognize objects from images	S4	Classroom Teaching Lab	Lab Exercise Test, Mid Exam, Final Exam,
2.4	CLO4: Students Understand how deep learning models have evolved from a generalization of traditional computer methods	S4	Classroom Teaching	Exercise Test, Mid Exam, Final Exam,
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	CLO5: Giving exposure to object and scene recognition and categorization from images	V1	Classroom Teaching & Lab	Final Exam,
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Image formation and perception, image representation	4
2.	Image geometric transformations	4
3	image registration	4
4	Edge detection, image segmentation	4
5	Linear filters, Binary image analysis,	4
6	Background subtraction	4
7	Object recognition, template matching, classification	4
8	Object detection and tracking	4
9	Mid Review & Mid	4
10	Camera models, stereo vision	4
11	Supervised classification algorithms	4
12	Visual attributes, Dimensionality reduction	4
13	Deep learning	4
14	Presentation on Mini Projects	4
15	Review	4
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Tests	Week 5	10%
2.	Mid Term Exam	Week 9	20%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
3.	Exercise	Every Week	10%
4.	Lab Based Assignments/ Mini Project Presentation	week 14	20%
5.	Final Exam	Week 16	40%
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Computer Vision: Algorithms and Applications by Richard Szeliski, Springer,2011, ISBN 978-1-84882-934-3
Supportive References	Computer Vision, A Modern Approach, Forsyth and Ponce, 2nd ed., 2011
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (projector, smart board, software)	PC or Laptop with Windows/Linux, Smart Board, Projector
Other equipment (depending on the nature of the specialty)	Internet Connection

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Classroom	Classroom
Effectiveness of Students assessment	Course instructor	Direct
Quality of learning resources	Students	Indirect
The extent to which CLOs have been achieved	Students	Indirect
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	