Course Specifications

Course Title:	Computer Vision
Course Code:	**AI 423**
Program:	**Information and Computer Science**
Department:	**Computer Science and Information**
College:	**Science in AL Zulfi**
Institution:	**Majmaah University**

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: 8th Level
4. Pre-requisites for this course (if any)**:** **Artificial Intelligent AI 314**
5. Co-requisites for this course (if any)**:** NA

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	48	80 %
2	**Blended**	6	10 %
3	**E-learning**	6	10 %
4	**Correspondence**		
5	**Other**		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	**Lecture**	30
2	**Laboratory/Studio**	20
3	**Tutorial**	10
4	**Others** (Presentations & group discussions)	
	Total	60
Other Learning Hours*		
1	**Study**	20
2	**Assignments**	15
3	**Library**	10
4	**Projects/Research Essays/Theses**	5
5	**Others** (seminars)	
	Total	50

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces computer vision including the fundamentals of image types, image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification and scene understanding

2. Course Main Objective

1 **Introduction:** an introduction to computer vision including the fundamentals of image types, classification and scene understanding.

2 **Image Formation:** image formation, camera imaging geometry, feature detection and matching, stereo.

3 image classification and scene understanding

4 .Image Processing for Feature Detection and Image **Synthesis:** image stabilization, automated alignment, tracking, boundary detection, and recognition

5 **Stereo**: Introduction to Stereo Vision, Applications

6 **Motion Analysis:** Motion detection and optical flow Structure from motion

7 **Object Recognition:** Model-based methods, Appearance-based methods and Invariants

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge:**	
1.1	Acquire knowledge of the history and evolution of Course Teaching Strategies computer graphics both hardware and software.	K1
1.2	Understand the fundamentals of image types, classification and scene understanding.	K2
1.3	Understand the c image formation, camera imaging geometry, feature detection and matching, stereo.	
	Have knowledge about the applications and the Stereo Vision	K3-AI
2	**Skills :**	
2.1	Implement Motion estimation techniques. Some of the block based techniques can be introduced. Motion detection and optical flow Structure from motion.	S3-AI
3	**Competence:**	
3.1	Object Recognition: Model-based methods, Appearance-based methods and Invariants	C3-AI

C. Course Content

No	List of Topics	Contact Hours
1	fundamentals of image types, classification and scene understanding	4
2	image formation, camera imaging geometry, feature detection and matching, stereo.	4
3	image classification and scene understanding	8
4	image stabilization, automated alignment, tracking, boundary detection, and recognition	8
5	Stereo: Introduction to Stereo Vision, Applications	8
6	Motion Analysis: Motion detection and optical flow Structure from motion	8
7	Some motion estimation techniques	12
8	Model-based methods, Appearance-based methods and Invariants	4
9	Model-based methods, Appearance-based methods and Invariants. Cont. …	4
Total		60

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**		
1.1	Acquire knowledge of the history and evolution of Course Teaching Strategies computer graphics both hardware and software.	Lectures, Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Class & lab Activities Quizzes
1.2	Understand the fundamentals of image types, classification and scene understanding.		
1.3	Understand the c image formation, camera imaging geometry, feature detection and matching, stereo.		
2.0	**Skills**		
2.1	Implement Motion estimation techniques. Some of the block based techniques can be introduced. Motion detection and optical flow Structure from motion	Group discussions, Lab demonstrations, Brainstorming Presentations	Home works and assignments
3.0	**Competence**		
3.1	Object Recognition: Model-based methods, Appearance-based methods and Invariants	Group discussions, Case Studies, Brainstorming Presentations	Written Exam Homework assignments Class & lab Activities Quizzes

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First written mid-term exam	6	10%
2	Second written mid-term exam	12	10%
3	Presentation, class activities, and group discussion	Every week	10%
4	Homework assignments	After Every chapter	10%
5	Practical exam	15	20%
6	Final exam	16	40%
	Total		100%

***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 :
Office hours: Sun: 1-3, Mon. 12-1, Wed. 12-1 Office call: Sun. 12-1 and Wed 9-10 Email: y.qawqzeh@mu.edu.sa

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	**1-** Klette, R., Concise Computer Vision, Springer-2014. 2. Computer Vision: Algorithms and Applications. Richard Szeliski (2010). Springer. ISBN 978-1-84882-935-0
Essential References Materials	Computer Vision: A Modern Approach (2nd Edition). David A. Forsyth and Jean Ponce (2011). ISBN-13: 978-0136085928
Electronic Materials	http://szeliski.org/Book/
Other Learning Materials	Video and presentations that available with the instructor

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms and Laboratories are available at the college of science at Al-Zulfi.
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart Boards, software, data shows and AV technological resources are available.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N/A

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Analysis of students' results.	Teaching Staff	Direct
Observation during work	Teaching Staff	Indirect
Students' evaluations.	Teaching Staff	Direct
Colleagues' evaluations.	Peer Reviewer	Indirect
Evaluation questionnaire filled by the students.	Students	Indirect
Interview a sample of students enrolled in the	The head of department	Indirect

Evaluation Areas/Issues	Evaluators	Evaluation Methods
course to take their opinions.		

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	
Reference No.	
Date	