Course Specification

(Postgraduate Programs)

Course Title:	**Image Analysis and Media Understanding**
Course Code:	**MSCS 623**
Program:	**Master Programme in Computer Science**
Department:	**Computer Science**
College:	**Computer Science and Information Technology**
Institution:	**King Faisal University**
Version:	*Course Specification Version Number*
Last Revision Date:	*Pick Revision Date.*

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A. General information about the course:

1. Course Identification:

1. Credit hours: 3 (3-0-6)				
2. Course type				
A.	☐University	☒ College	☐Department	☐Track
B.	☐ Required		☒ Elective	
3. Level/year at which this course is offered: : Level 2 , 3 or 4				
4. Course General Description:				
This course introduces digital image formation and representation, basic algorithms for image manipulation, image enhancement techniques, edges & corner detections, segmentation, features extraction and matching, image understanding, multiresolution analysis, treatment of color images, template matching techniques, image tracking, stereo imaging and image classifications using Bayessian and neural networks. The course allows students to explore a range of practical techniques by developing their own simple processing functions either in a language such as Java and/or by using library facilities and tools such as MatLab/OpenCV/Python				
5. Pre-requirements for this course (if any)**:**				
NA				
6. Pre-requirements for this course (if any)**:**				
NA				
7. Course Main Objective(s):				
The objective of this course is to provide an introduction to basic and advanced concepts and methodologies for digital image processing, and to develop a strong foundation that can be used as the basis for further study and research in the fields of computer vision and machine learning..				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom		
2	E-learning		
3	Hybrid • Traditional classroom • E-learning	45	100%
4	Distance learning		

3. Contact Hours: (based on the academic semester)

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

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

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Know basic concepts of digital image processing	K1	Lectures	- Quizzes - Exams - Assignments
1.2	Understand image process techniques, e.g., sampling, quantization, enhancement	K1	Lectures	- Quizzes - Exams - Assignments
1.3	Know histogram modification, image restoration, features detection and noise reduction	K1	Lectures	- Quizzes - Exams - Assignments
2.0	**Skills**			
2.1	Expose the current technologies and issues specific to image processing techniques	S1	- Lectures	- Quizzes - Exams - Assignments
2.2	Develop hands-on experience in using computers to process images	S2	- Lectures	- Quizzes - Exams - Assignments

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
2.3	Familiarize with Image Processing Toolboxes in Matlab, Python, OpenCV etc	S2	- Lectures	- Quizzes - Exams - Assignments
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate team work by applying Image Processing skills in projects using cutting edge techniques, technologies and recent research.	V1	- Lectures - Case studies -Research assignment	Project Report and Presentation
...				

C. Course Content:

No	List of Topics	Contact Hours
1. 1	Introduction of Digital Image Processing and its Applications. Introduction to Software and Tools (Matlab, OpenCV, Python, R)	3
2. 2	Image Resolution, Quantization and Enhancement in Spatial Domain)	3
3	Image Segmentation (Edge detections, Thrresholding, region Segmentation, etc)	6
4	Image Morphology	3
5	Color Image Processing	3
6	Image Features Extraction (Harris Corner Detector, SIFT, SURF)	6
7	Object detection and Tracking (Background Image subtraction)	3
8	PCA (Multi-Resolution Image Analysis)	3
9	Image Classification using Bayessian and NN	3
10	Stereo Imaging (Panoramic Image Creation)	6
11	Biometrics: Finger print, IRIS and Face Recognitions	6
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	Continuous	10%
2.	Quiz	Continuous	10%
3.	Mid Term	8^{th}- 9^{th}	20%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
4	Capstone Project	15th	20%
5	Final Exam	16th- 17th	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:

Required Textbook	1. Digital Image Processing by Woods and Gonzales, 3rd Ed, Prentice-Hall, 2008 2. Digital Image Processing using MATLAB by Woods and Gonzales,Prentice-Hall, 2008 3. Computer Vision Algorithms and Applications by Richard Szeliski, 2013. .
Essential References	1. Learning OpenCV: Computer Vision with the OpenCV Library, by Gary Bradski and Adrian Kaehler, O'Reilly, 2008. 2. Digital Image Processing by Rafael C. Gonzalez, Richard E. Woods, Pearson, 4th Edition, 2017, ISBN-10: 0133356728, ISBN-13: 978-0133356724
Supportive References	
Electronic Materials	• IEEE journals, • www.opencv.org
Other Learning Materials	• Python • Matlab • OpenCV

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Sufficient seats (typically 20) as per student registration required in the lecture
Technology equipment (Projector, smart board, software)	Sufficient computer terminals with required setup having the necessary software installed and configured for the students to complete assignments and projects. Data show is needed to demonstrate in the class
Other equipment (Depending on the nature of the specialty)	Not Required

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect Assessment through Teaching Evaluation
Effectiveness of students' assessment	Faculty	Indirect assessment through Course Evaluation Survey
Quality of learning resources	Students	Indirect Assessment through Learning Resources Survey
The extent to which CLOs have been achieved	**Faculty**	Direct assessment through Rubrics analyses
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	