جامعة المجمعة
Majmaah University

Course Specifications

Institution:	**College of Science at Az Zulfi**
Academic Department :	**Computer Science and Information**
Programme :	**Computer Science and Information**
Course :	**Digital Image Processing**
Course Coordinator :	**Dr. Wael Khedr**
Programme Coordinator :	**Ass. Prof. Dr. Yosry Azzam**
Course Specification Approved Date :	22/ 12 / 1435 H

This form compatible with NCAAA 2013 Edition

A. Course Identification and General Information

1 - Course title : Digital Image Processing		Course Code: CSI 414	
2. Credit hours : **(3) (2 Lec. + 2 Lab)**			
3 - Program(s) in which the course is offered: Computer science and information			
4 – Course Language : English			
5 - Name of faculty member responsible for the course: **Dr. Wael Khedr**			
6 - Level/year at which this course is offered : : **Elective(7^{th} -10^{th})levels**			
7 - Pre-requisites for this course (if any) : **Linear Algebra & Differential Equations (Math310).**			
8 - Co-requisites for this course (if any) : •			
9 - Location if not on main campus : (.....)			
10 - Mode of Instruction (mark all that apply)			
A - Traditional classroom	√	What percentage?	**80 %**
B - Blended (traditional and online)	√	What percentage?	**10 %**
D - e-learning	√	What percentage?	**10 %**
E - Correspondence		What percentage?	**……. %**
F - Other		What percentage?	**……. %**
Comments :			

B Objectives

What is the main purpose for this course?

The purpose of image processing is divided into 5 groups. They are:

1. Visualization - Observe the objects that are not visible.
2. Image sharpening and restoration - To create a better image.
3. Image retrieval - Seek for the image of interest.
4. Measurement of pattern – Measures various objects in an image.
5. Image Recognition – Distinguish the objects in an image

Briefly describe any plans for developing and improving the course that are being implemented :

1. Using group discussions through the internet with course attending students.
2. Updating the materials of the course to cover the new topics of the field.
3. Increasing the ability of the students to implement Matlab programming in image processing that are presented in the course.

C. Course Description

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
1. **Introduction And Digital Image Fundamentals** • Image Sampling and Quantization, • Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels • Translation, Scaling, Rotation and Perspective Projection of image	3	12
2. **Digital image Representation** • Image Reading • Image Displaying • Writing Images using MATLAB , Data Classes, and • Image Types using MATLAB	2	8
3. **Image Enhancement in the Spatial Domain** • Some basic Gray Level Transformations • Histogram Processing • Smoothening and Sharpening Spatial Filters, and • Intensity Transformation Function	2	8
4. **Image Enhancement in the Frequency Domain:** • Introduction to Fourier Transform and the frequency Domain • Computing and Visualizing the 2D DFT (MATLAB • Smoothing Frequency Domain Filters • Sharpening Frequency Domain Filters • Homomorphic Filtering	3	12
5. **Image Restoration** • A model of Image Degradation / Restoration Process • Noise Models • Restoration in the presence of Noise Only Spatial Filtering • Periodic Noise Reduction by Frequency Domain Filtering	2	8
6. **Image Compression** • Coding • Interpixel and Psychovisual Redundancy • Image Compression models • Compression standards	2	8
7. **Graduate Project In Digital Image Processing by MatLab**	1	4

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	**30**	.....	.....	**30**	.....	60
Credit	**30**	.....	.....	**15**	.....	45

3. Additional private study/learning hours expected for students per week.

5

Total Hours = 60+ 75 = 135 hour s

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images.	Lectures Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Lab assignments Class Activities Quizzes
1.2	Have a good understanding of the mathematical foundations for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing, compression and analysis.		
1.3	.		
1.4	Learn and understand the Image Enhancement in the Spatial Domain and Frequency Domain		
2.0	**Cognitive Skills**		
2.1	Be able to use different digital image processing algorithms.	Lectures	Written Exam

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
2.2	Be able to design, code and test digital image processing applications using MATLAB language.	Lab demonstrations Case studies Individual presentations Brainstorming	Homework assignments Lab assignments Class Activities Quizzes
2.3	Be able to use the documentation for, and make use of, MATLAB library and MATLAB Digital Image Processing Toolbox (IPT).		
2.4	Be able to write programs using Matlab language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.		
2.5			
3.0	**Interpersonal Skills & Responsibility**		
3.1	Analyze a wide range of problems and provide solutions related to the design of image processing systems through suitable algorithms, structures, diagrams, and other appropriate methods.	Small group discussion Whole group discussion Brainstorming Presentation	Written Exam Homework assignments Lab assignments Class Activities Quizzes
3.2	Be able to solve image problems using Matlab Toobox.		
4.0	**Communication, Information Technology, Numerical**		
4.1	Be able to use the documentation for, and make use of, MATLAB library and MATLAB Digital Image Processing Toolbox (IPT).	Small group discussion Whole group discussion Brainstorming Presentation	Written Exam Homework assignments Lab assignments Class Activities Quizzes
4.2			
5.0	**Psychomotor**		
	NAN		

5. Schedule of Assessment Tasks for Students During the Semester:

	Assessment task	Week Due	Proportion of Total Assessment
1	**First written mid-term exam**	6	15%
2	**Second written mid-term exam**	12	15%
3	**Presentation, class activities, and group discussion**	Every week	10%
4	**Homework assignments**	After Every chapter	10%
5	**Implementation of presented concepts**	Every two weeks	10%
6	**Final written exam**	16	40%

D. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

Office hours: Sun: 8-12, Mon. 10-12, Wed. 8-10
Office call: Sun. 12-1 and Wed 12-1

Email: w.slem@mu.edu.sa

E. Learning Resources

1. List Required Textbooks :

- Maria Petrou, Fundamental : Digital Image Processing, John Wiley and Sons, **2010.**

2. List Essential References Materials :

Wilhelm Burger, Mark Burge Principles of digital image processing: fundamental techniques , Springer, 2009.

3. List Recommended Textbooks and Reference Material :

- **Journal of Digital Image Processing .**

4. List Electronic Materials :

- http://www.engineersgarage.com/articles/image-processing-tutorial-applications
- http://www.tutorialspoint.com/dip/image_processing_introduction.htm

5. Other learning material :

- **Video and presentation are available with me**

F. Facilities Required

1. Accommodation

Classroom and Lab, as those that are available at college of science at AzZulfi.

2. Computing resources

- **Smart Board**

3. Other resources

- **N/A**

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching:

- Questionnaires (course evaluation) filled by the students and electronically organized by the university.
- Student-faculty management meetings.

2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor :

- Discussion within the staff members teaching the course
- Departmental internal review of the course.

3 Processes for Improvement of Teaching : • Periodical departmental revision of methods of teaching. • Monitoring of teaching activities by senior faculty members. • Training courses.
4. Processes for Verifying Standards of Student Achievement • Evaluation matrix
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement : • Course evaluation • Exam evaluation • Improvement plan

Course Specification Approved
Department Official Meeting No (6) Date 22 / 12 / 1435 *H*

Course's Coordinator

Name : Dr. Wael Khedr
Signature : .....
Date : 17/ 12 / 1435 *H*

Department Head

Name : Dr. Yosry Azzam
Signature : .....
Date : 22/ 12 / 1435 H