



Future Academy
Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:

Course Code:	CSC461
Course Title:	Digital Image processing
Year/level	4 th
Academic Programs	Computer Science Program (B.Sc.)
Contact hours/ week	(Theoretical = 2, Practical = 2, Total = 4)

2- Course aims:

Image processing is an area of active interest for research as well as academic purpose. The aim of this course is to familiarize students with basics of Digital Image Processing. Topics examined include: Imaging sensors and their principles; Techniques for noise reduction. Image enhancement including contrast manipulation, histogram equalization, edge highlighting; Filtering and transform techniques for image processing including two dimensional Fourier transforms, Spatial transformations and image segmentation. This course also focuses on MATLAB implementation of various ideas related to Image Processing.

3- Intended learning outcomes of the course (ILOs):

a- Knowledge and understanding:

On successful completion of this course, the student should be able to:

- a-1 Understand major concepts and techniques used for acquiring, processing and extracting useful information from digital images.
- a-2 Understand and use methods and tools of digital image processing (DIP) to solve image sampling and quantization, image enhancement and restoration.
- a-3 Demonstrate understanding of image processing knowledge by designing and implementing algorithms to solve practical problems.
- a-4 Describe the fundamental of mathematics required to solve problems in image processing.

b- Intellectual skills:

On completing this course, the student should be able to:

- b1- Identify image processing problems and employ or propose effective solutions.
- b2- Illustrate a set of alternative solutions for a given problem associated with their results for image processing problems.

- b3- Classify different methods, techniques and algorithms used for enhancement.
b4- Analyze images in practical settings using simple methods.

c- Professional and practical skills:

At the end of this course, the student will be able to:

- c1- Apply methods of processing to image data related to image filtering, image enhancement, segmentation, and representation.
c2- Implement solutions for solving issues related to processing of digital Images.
c3- Deploy effective supporting tool to adapt programming language with different image processing applications.

d- General and transferable skills:

On successful completion of this course, the student should be able to:

- d1- Displays student skills in making researches.
d2- Demonstrate abilities of student in making projects using Matlab.
d3- Work effectively as individual and within a team.
d4- Respect working in a team as a member or a leader

4- Course contents

Week No.	Topics/units	Number of hours		ILO's
		Lecture hours	Practical hours	
1	Introduction and Digital Image Fundamentals Image sensing	2	2	a1, b1,d1
2	Image sampling and quantization	2	2	a1,b1,c1,c3,d2
3	Color, point operations, intensity transformations for image enhancement.	2	2	a2,a3,a4, b2, c1,c3,d2
4	Histogram processing, Neighborhood operations. + Quiz1	2	2	a1,a4,b2,c1 ,c2,d1,d2
5	Basic Gray Level Transformations	2	2	a1,a4,b2,c1, c3,d1,d2
6	Spatial filtering, Correlation and convolution	2	2	a1,a2,a3,c3,d2,d3,d4
7	MidTerm Exam			
8	Point processing and effect on histogram: brightness, Gamma, contrast stretching.	2	2	a2,a3,a4,b2,c3,d2
9	Smoothing filters	2	2	a4,b1,c3,d2
10	Sharpening filters: First and second derivatives.	2	2	a2,a3,a4,b1,c3,d2
11	Frequency domain linear and nonlinear image filtering	2	2	a3,a4,c3,d2,d3,d4
12	Image Segmentation - Edge detection	2	2	a3,b2,c3,d1,d2
13	Image Restoration	2	2	a1,a4,b2,c1 ,c2,d1,d2
14	Final Revision			

4- Teaching and learning methods

Methods	ILO's																			
	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4	d5
Lectures	√	√	√	√		√	√	√	√		√	√	√			√	√	√	√	
Practical sections		√		√		√	√		√		√	√	√				√	√	√	
Self-learning																√				
Assays and reviews																				
Discussion groups																				
Brainstorming																				
Blended- learning																				
E- learning	√	√	√	√													√	√		

5- Teaching and learning methods for Low-achieving students

- Extra teaching hours for those who need help
- More quizzes to assess their ability for understanding the course
- Encourage the team work for those students with other advanced ones to increase their participation and understanding

6- Student assessment

Assessment method	Time	Grade weight (%)	Week	ILOs
Course Work (Tutorial Exercise and Assignments)	Through the semester	10	Every Week	a3, a4, a5, a6, a7, b2, b3, b4, c1, c2, c3, c4, d1
Quiz 1	Through the lecture	5	Week#4	a1, a2,c1
Mid-term exam	1 hours	10	Week#7	a3, a5, c1, c2, c3
Quiz 2	Through the lecture	5	Week#11	a3, a4 a5, a6, b3, c4
Practical exam	2 hours	10	Week#14	b2, c1, c2, c3, a7
Final Written exam	2 hours	60	Week# 15-16	a1, a2, a3, a4, a5, a6, a7, c1, c2, c3

7-List of references

8.1. Student notebooks:

- Comprehensive instructor notes ("PowerPoint slides") are available on the course web page ("Google Classroom")

8.2. Essential textbooks:

Gonzalez, Rafael C. *Digital image processing*. Pearson education india, 2009.

8.3. Recommended textbooks:

8.4. Journals, Periodical and Reportsetc.

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8.5. Websites

- <https://www.youtube.com/watch?v=rSGMXktsYI&list=PL2mBI0yFsKk-p73KQ4iPdsi10hQC4Zd-0>

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