Course Profile

Course Name:-	**Image Processing**
Course Code:-	**CEN446**
Academic Year:-	**2014**
Semester:-	**2nd**

Course Overview

This course is introducing the following topics Digital Image Fundamental: Elements Of Digital Image Processing Systems, Elements Of Visual Perception, Image Sampling And Quantization, Matrix And Singular Value Representation Of Discrete Images. Image Transforms: 1d Dft, 2d Dft, Cosine, Sine Hadamard, Hear, Slant, Kl, Svd Transform And Their Properties. Image Enhancement: Histogram – Modification And Specification Techniques, Image Smoothing, Image Sharpening, Generation Of Spatial Masks From Frequency Domain Specification, Nonlinear Filters, Homomorphic Filtering, False Colour, Pseudo colour And Colour Image Processing. Image Restoration And Recognition : Image Degradation Models, Unconstrained And Constrained Restoration, Inverse Filtering, Least Mean Square Filter, Pattern Classes, Optimal Statistical Classifiers, Using Of Neural Networks In Image Processing. Image Compression :Run length, Huffman Coding, Shift Codes, Arithmetic Coding, Transform Coding, Jpeg Standard, Wavelet Transform, Predictive Techniques, Block Truncation Coding Schemes, Facet Modelling.

Course Details	
Level:-	**10**
Credit:-	**2(1-1-2)**
Pre-Requisites:-	**NA**
Co- Requisites:-	**NA**

Learning Outcomes of Course

After successful completion of this course, student will be able to-

1. Students learn the techniques to manage images.
2. Gain knowledge about Image Transforms.
3. Gain knowledge of Modification and specification techniques Image smoothing, Image sharpening.
4. Familiar with Image Restoration And Recognition technique.

5. Have knowledge of various algorithms for image compression and image controlling.

Course Assessment

Name of Assessment Task	Weight of Assessment	Week Due
1. Midterm Exam-1	15%	Week 6
2. Midterm Exam-2	15%	Week 10
3. Quizzes/ Assignments/Report/Seminar	10%	Week 11
4. Lab	20%	Week 15
5. Final Exam	40%	Week 15

Assessment Task and Learning Outcomes Alignment

Assessment Task Name	Course Learning Outcomes					
	1	2	3	4	5	6
1. Midterm Exam-1	√	√	√	√		
2. Midterm Exam-2	√	√	√	√		
3. Quizzes/ Assignments/Report/Seminar	√	√	√	√	√	
4. Lab	√	√	√	√	√	
5. Final Exam	√	√	√	√	√	

Teaching Contact Details

Name of Course Coordinator:-	**Dr. Ahmad Raza Khan**
Email of Course Coordinator:-	**ar.khan@mu.edu.sa**
Lab/Tutorial Instructor:-	**Dr. Ahmad Raza Khan**
Email of Lab/Tutorial Instructor:-	**ar.khan@mu.edu.sa**
Office Hours:-	**8:00am to 2:30pm**
Office Number:-	**024-1-19-1**
Office Phone Number:-	**01640425-2536**

Details of Required Text Book

Book Name	Authors Name	Publisher	Year	Edition
1. Digital Image Processing	Gonzalez R.C.	Pearson Education	2008	3rd Edition

Details of Required Reference Books

Book Name	Authors Name	Publisher	Year	Edition
1. Digital Image Processing	William K. Pratt	John Wiley & Sons Inc	2001	3rd Edition
2. Introduction to Digital Image Processing	McAndrew	Cengage Learning	2004	
3. Digital Image Processing and Computer Vision	Sonka, Hlavac, Boyle	Cengage learning	2008	
4. Digital Picture Processing Vol.I & II Acad	Rosenfeld A. Kak AC	Acad, Press	1982	2nd Edition

IT Resources

The following IT Resources will require to access-

1. MU University Student Email
2. Internet
3. Course Website
4. Computer System with Matlab Software lab

Course Schedule

Course Topics	Book's Chapter	Event Name	Week Due
Digital Image Fundamental: Elements Of Digital Image Processing Systems	Chapter 1, 2		Week-1
Elements Of Visual Perception, Image Sampling And Quantization	Chapter 1, 2	Assignment on sampling	Week-2
Matrix And Singular Value Representation Of Discrete Images	Chapter 1, 2	Assignment on quantization	Week-3
Image Transforms: 1d Dft, 2d Dft,	Chapter 4	Assignment on	Week-4

Cosine, Sine Hadamard, Hear, Slant, Kl, Svd Transform And Their Properties	**Chapter 4**	**Transformation**	
Image Enhancement: Histogram – Modification And Specification Techniques, Image Smoothing, Image Sharpening, Generation Of Spatial Masks From Frequency Domain Specification, Nonlinear Filters,	**Chapter 4,5**	**Assignment on histogram**	Week-5
Homomorphic Filtering, False Color, Pseudocolor And Color Image Processing	**Chapter 6**	**Assignment on color image processing**	Week-6
Image Restoration And Recognition	**Chapter 6**		Week-7
Image Degradation Models, Unconstrained And Constrained Restoration,	**Chapter 6**	**Assignment on restoration**	Week-8
Inverse Filtering, Least Mean Square Filter, Pattern Classes	**Chapter 7**		Week-9
Optimal Statistical Classifiers, Using Of Neural Networks In Image Processing	**Chapter 7**	**Assignment on filtering**	Week-10
Image Compression: Run length, Huffman Coding, Shift Codes, Arithmetic Coding	**Chapter 7**		Week-11
Transform Coding, Jpeg Standard, Wavelet Transform	**Chapter 8**	**Assignment on image compression**	Week-12
Predictive Techniques, Block Truncation	**Chapter 8**	**Assignment on Transform**	Week-13
Coding Schemes	**Chapter 8**	**Assignment on predictive techniques**	Week-14
Facet Modelling.	**Chapter 8**		Week-15
			Exam Week

Referencing Style

The **American Psychological Association (APA)** referencing style must be use for all submissions of this course.

Course Assessment Task

Assessment Name:-	Midterm Exam-1
Description of Task Assessment:-	This assignment is aligned to learning outcomes 1, 2, 3 and 4. In that regard, the assignment contains questions that assess: 1) Students' thorough

	understanding of the techniques to manage images; 2) Students' understanding about Image Transformation. 3) Students' learn Image smoothening, Sharpening.
Task Assessment Due Week/Date:-	**Week 6**
Return Week/Date to Students:-	**Week 8**
Weight of Task Assessment:-	**15%**
List of Learning Outcomes Assessed:-	**1.** Students learn the techniques to manage images. **2.** Gain knowledge about Image Transforms. **3.** Gain knowledge of Modification and specification techniques Image smoothening, Image sharpening.

Assessment Name:-	Midterm Exam-2
Description of Task Assessment:-	This assignment is aligned to learning outcomes 1, 2, 3 and 4. In that regard, the assignment contains questions that assess: 1) Students' thorough understanding of the techniques to manage images; 2) Students' understanding about Image Transformation. 3) Students' learn Image smoothening, Sharpening 4) Students understand the Image restoration.
Task Assessment Due Week/Date:-	**Week 10**
Return Week/Date to Students:-	**Week 11**
Weight of Task Assessment:-	**15%**
List of Learning Outcomes Assessed:-	**1.** Students learn the techniques to manage images. **2.** Gain knowledge about Image Transforms. **3.** Gain knowledge of Modification and specification techniques Image smoothening, Image sharpening. **4.** Familiar with Image Restoration And Recognition technique

Assessment Name:-	Online Quizzes/ Assignments/Report/Seminar
Description of Task Assessment:-	This assignment is aligned to learning outcomes 1, 2, 3 and 4. In that regard, the assignment contains questions that assess: 1) Students' thorough understanding of the techniques to manage images; 2) Students' understanding about Image Transformation. 3) Students' learn Image smoothening, Sharpening 4) Students understand the Image restoration. 5) Students will understand image compression and image controlling.
Task Assessment Due Week/Date:-	**Week 11**
Return Week/Date to Students:-	**Week 11**
Weight of Task Assessment:-	**10%**
List of Learning Outcomes Assessed:-	**1.** Students learn the techniques to manage

	images. **2.** Gain knowledge about Image Transforms. **3.** Gain knowledge of Modification and specification techniques Image smoothening, Image sharpening. **4.** Familiar with Image Restoration And Recognition technique. **5.** Have knowledge of various algorithms for image compression and image controlling.

Assessment Name:-	Lab
Description of Task Assessment:-	This assignment is aligned to learning outcomes 1, 2, 3, 4 and 5All students have to submit their Lab assignments and homework in time.
Task Assessment Due Week/Date:-	**Week 03,04,05,06,07,08,09,10,11,12,13,14**
Return Week/Date to Students:-	**Week 03,04,05,06,08,09,10,11,12,13,14,15**
Weight of Task Assessment:-	**20%**
List of Learning Outcomes Assessed:-	**1.** Students learn the techniques to manage images. **2.** Gain knowledge about Image Transforms. **3.** Gain knowledge of Modification and specification techniques Image smoothening, Image sharpening. **4.** Familiar with Image Restoration And Recognition technique. **5.** Have knowledge of various algorithms for image compression and image controlling.

Assessment Name:-	Final Exam
Weight of Task Assessment:-	**40%**
Duration:-	**3Hrs**
Warning:-	
List of Learning Outcomes Assessed:-	**1.** Students learn the techniques to manage images. **2.** Gain knowledge about Image Transforms. **3.** Gain knowledge of Modification and specification techniques Image smoothening, Image sharpening. **4.** Familiar with Image Restoration And Recognition technique. **5.** Have knowledge of various algorithms for image compression and image controlling.