Digital Image Processing

Course Information:

Code:	**ECE 6258**
Credit Hours:	3
Class:	MS-EE
Instructor:	Dr. M. Usman Akram
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	http://biomisa.org/usman/

Course Home Page:

http://biomisa.org/usman/digital-image-processing-fall16

Class Hours:

Friday (1800 - 2100)

Semester:

Fall 2016

Text:

- Digital Image Processing by Rafael C. Gonzalez, Richard E. Woods, Addison Wesley, 3rd Ed. 2008.

Reference

- Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab by Chris Solomon, Wiley-Blackwel, 2011
- Digital Image Processing Using Matlab by Rafael C. Gonzalez and Richard E. Woods, Pearson Education, 2009.
- Digital Image Processing by Kenneth R. Castleman, Prentice Hall International Edition, 1996.
- http://www.imageprocessingplace.com/

Prerequisites by Topic:

- Basic knowledge about linear algebra, matrices and complex variables
- Concepts related to signals and systems and digital signal processing
- Know how with MATLAB or any programming language

Course Objective:

1. To develop thorough understanding of digital image processing fundamentals
2. To explore the properties of discrete transforms and their importance with respect to image processing
3. To study various image enhancement techniques in spatial and frequency domains, fundamentals of image compression, introduction to color image processing, wavelets and morphological image processing

4. Combining the concepts of image processing with machine learning to design decision support systems for image processing based applications
5. Learning the use of MATLAB to implement basic image processing algorithms and to build and execute image processing based projects to solve real life problems

Grading:

Mid Exam :	20%
Quizzes (4-6):	10%
Computer and numerical assignments:	10%
Final Project:	20%
Final Exam:	40%

***Quizzes*:**

Ten-minute surprise quizzes will be given periodically

Computer Assignments & Project:

For computer assignments, sharing of programming tips and discussing general concepts is allowed. Collaborating on program writing is not. A mini project and term-project will be conducted in groups. One to three students can form a group. It is very important to have hands on image processing algorithms. Almost 25% marks are directly related to it inform of computer assignments and projects etc. The project will be monitored throughout the semester on periodic basis and marks will be assigned accordingly.

Topical Outline:

1. Introduction to Image processing
2. Image processing Fundamentals
3. Image Enhancement & Restoration (Spatial & Frequency Domain)
4. Color Image Processing
5. Morphological operations
6. Segmentation
7. Feature extraction (edges, corners, local binary patterns)
8. Texture analysis
9. Image Registration/Matching
10. Image Compression
11. Wavelets
12. Introduction to Machine Learning and basic types of classifiers, Performance parameters for evaluation