

Digital Image Processing

Course Information:

Code: EC-433
Credit Hours: 3 (2 + 1)
Instructor: Dr. M. Usman Akram
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<http://biomisa.org/usman/>

Course Home Page:

<http://biomisa.org/usman/digital-image-processing-2>

Class Hours:

Monday (0800-0945)	DE-33 CE (A)	CRC-11
Monday (1055-1240)	DE-33 CE (B)	CRC-13

Lab Hours:

Tuesday (0800-1040)	DE-33 CE (A)	Embedded Lab
Friday (0800-1040)	DE-33 CE (B)	Computing Lab

Office Hours:

Tuesday (0900-1100)
Wednesday (0900-1100)

Semester:

Spring 2014

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, segmentation and morphological image processing
4. To have a basic understanding of some topics of machine learning to combine these ideas with image processing techniques to produce good projects

Grading:

Sessional Exams:	25%
Quizzes (4-6):	10%
Computer and numerical assignments:	07%
Lab	10%
Final Project:	08%
Final Exam:	40%

Quizzes:

Ten-minute surprise quizzes will be given periodically

Lab, Computer Assignments & Project:

For Lab and computer assignments, sharing of programming tips and discussing general concepts is allowed. Collaborating on program writing is not. The 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 Lab tasks, 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)
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