



BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus

Instruction Division
First Semester, 2016-2017
Course Handout (Part II)

Date: 02.08.2016

In addition to Part I (General Handout for all courses appended to the Time Table), this portion gives further specific details regarding the course.

Course No : EEE C435
Course Title : **Digital Image Processing**
Instructor-in-charge : **KARUNESH K GUPTA**

1. Course Description: This is a first course on digital image processing. It begins with an introduction to the fundamentals of digital images and discusses the various discrete transforms, which are extensively used in image processing. It then goes on to discuss the different image processing techniques such as image enhancement, automatic image classification and recognition.

2. Text Books:

Gonzalez, R. C. & R. E. Woods, Digital Image Processing, Pearson Education, 3rd ed., 2009.

Reference Books:

1. Gonzalez, Digital Image Processing using MATLAB, Woods & Eddins, Pearson, 2007.
2. Jain, Anil K, Fundamental of Digital Image Processing-- Englewood Cliffs, Prentice Hall, 1989.
3. Milan Sonka, Vaclav Hlavac, and Roger Boyle, Image Processing, Analysis, and Machine Vision, Thomson, 2008.
4. William K. Pratt, Introduction to Digital Image Processing, CRC Press, 2014.

3. Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Reference to Text Book
1	To introduce fundamental of Imagery system	Study different spectrum band imaging systems - Gamma-ray, X-ray, ultraviolet, microwave.	Ch. 1
2-4	To introduce fundamental concepts and terms associated with digital images.	Digital image fundamentals- image formation, image sampling, quantization, and interpolation	Ch. 2



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5-6	To study concept of image enhancement by gray level transformations	Some basic gray level transformations	Ch. 3
7-9	To study Histogram processing of an image	Histogram processing	Ch. 3
10-11	To learn image enhancement by filtering in the spatial domain	Spatial filtering	Ch. 3
12-14	To study image Transforms	Convolution, correlation, FFT, DCT, WHT, KL, DHT	Ch. 4
15	To learn image enhancement by filtering in the frequency domain	Filtering in the frequency domain	Ch. 4
16-17	To study image degradation	Image degradation model, estimation, inverse filtering	Ch. 5
18-19	To introduce fundamental of image compression	Fundamental of image compression	Ch. 8
20-21	To introduce basics of coding theory	Entropy, data compression, Kraft's inequality, Huffman code	Ch. 8
22-26	To study basic compression algorithms	Huffman, Arithmetic, LNW, RLC, DCT, DWT, JPEG	Ch. 8
27	Morphological Image Processing	Erosion, dilation, Opening closing, Hit-or-miss transformation, some basic morphological algorithms	Ch. 9
28-34	Image Segmentation	Point, line and edge detection, thresholding	Ch. 10
35-37	Representation and description	Boundary following, chain codes, signatures, boundary descriptors, regional descriptors, principal components analysis (PCA)	Ch. 11
38-40	Object Recognition	Patterns and pattern classes, decision-theoretic methods	Ch. 12





41	To learn where the image processing technique applied	OCR, Biomedical, Remote sensing	Notes
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4. Evaluation Scheme:

Evaluation Component	Duration	Weightage	Date, Time	Remarks
Mid-semester Test	90 Minutes	25%		CB
Lab Assignment / Project *		40%	To be announced in class	OB
Comprehensive Examination	3 Hours	35%		Partly open book

* Individual project on the topic of your choosing, subject to approval of the instructor.

5. Chamber Consultation Hour: To be announced in the class.

6. Notices: Notices concerning the course will be put up on the EEE notice board only.

Make-up Policy: Make-up for the tests will be granted only on genuine grounds of sickness (**to be supported by medical certificate and not prescription**) or urgency for going out of town. There will not be any make-up for the on-line test.

**Instructor-in-Charge
EEE G612**

