# Birla Institute of Technology & Science, Hyderabad Campus
## Instruction Division
## First Semester, 2016-2017
## Course Handout (Part II)

Date:

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 F435 / ECE F435

**Course Title**: Digital Image Processing

**Instructor – in - Charge:** Sumit K Chatterjee
**Instructors:** Sumit K Chatterjee and R. Venkateswaran

**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.

**Scope & Objective**: The course introduces the students to the fundamentals of digital images and various processing techniques that are applied to them so as to improve their quality. These techniques are image enhancement, automatic image classification and recognition.

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

**Reference Books:**

1. Digital Image Processing using MATLAB, Gonzalez, Woods & Eddins, Pearson, 2007

**Course Plan:**

| Lecture No. | Learning Objectives | Topics to be covered | Reference to Text Book |
|---|---|---|---|
| 1 | To introduce fundamental concepts and terms associated with digital images. | Introduction and digital image fundamentals. | Chap 2 |
| 2-3 | To study image enhancement by gray level transformations | Some basic gray level transformations | Sec. 3.1, 3.2 |
| 4-6 | To study Histogram processing of an image | Histogram processing | Sec 3.3 |
| 7-9 | To learn image enhancement by filtering in the spatial domain | Spatial filtering | Sec. 3.4-3.7 |
| 10-11 | Review of Fourier domain techniques | Fourier Transforms, DFT, Convolution | 4.1-4.6 |

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|---|---|---|---|
| 12-13 | Filtering in the Fourier domain | Image smoothing and sharpening using Frequency domain filters | 4.7-4.10 |
| 14-16 | Image Restoration and Reconstruction | Noise Models, Inverse filtering | 5.1-5.7 |
| 17-19 | Image Compression | Basic Compression Methods (DCT) | 8.1-8.2 |
| 20-23 | Morphological Image Processing | Erosion, dilation, Opening closing, Hit-or-miss transformation, some basic morphological algorithms | 9.1-9.4, 9.5.1-9.5.7 |
| 24-28 | Image Segmentation | Point, line and edge detection, thresholding | 10.1-10.3 |
| 29-32 | Representation and description | Boundary following, chain codes, signatures, boundary descriptors, regional descriptors, principal components analysis (PCA) | 11.1.1-11.1.2, 11.1.5, 11.2, 11.3.3,11.3.4, 11.4 |
| 33–36 | Introduction to Medical Imaging and Advances in Medical Image Processing | Image Registration | Class Notes |
| 37 – 42 | Object Recognition | Patterns and pattern classes, decision-theoretic methods | 12.1-12.2 |

**Evaluation Scheme:**

| Evaluation Component | Duration | Weightage | Date & Time | Nature of Component |
|---|---|---|---|---|
| Test I | 60 Minutes | 30% | 13/09 & 2:30-3:30 PM | Open Book |
| Test II | 60 Minutes | 30% | 21/10 & 2:30-3:30 PM | Closed Book |
| Comprehensive Examination | 3 Hours | 40% | 13/12 AN | Closed Book |

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

**Notices:** Notices concerning the course will be put up on the CMS website.

**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.

**Instructor-in-Charge**

EEE F435 / ECE F435