

Birla Institute of Technology & Science, Hyderabad Campus

First Semester, 2020-2021

Course Handout (Part II)

17-08-2020

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

Course Title: Digital Image Processing

Instructor – in - Charge: R. Venkateswaran

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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
1-3	To introduce fundamental concepts and terms associated with digital images.	Introduction and digital image fundamentals.	Chap 2
4-6	To study image enhancement by gray level transformations	Some basic gray level transformations	Sec. 3.1, 3.2
7-9	To study Histogram processing of an image	Histogram processing	Sec 3.3
10-14	To learn image enhancement by filtering in the spatial domain	Spatial filtering	Sec. 3.4-3.7
15-16	Review of Fourier domain techniques	Fourier Transforms, DFT,	Sec 4.1-4.6
17-20	Filtering in the Fourier domain	Image smoothing and sharpening using Frequency domain filters	Sec 4.7-4.10
21-24	Image Restoration and Reconstruction	Noise Models, Inverse filtering	Sec 5.1-5.7

25-29	Image Compression	Information Theory, Huffman coding, Basic Compression Methods	Sec 8.1-8.2
30-33	Morphological Image Processing	Erosion, dilation, Opening closing, some basic morphological algorithms	Sec 9.1-9.4, 9.5.1-9.5.7
34-37	Image Segmentation	Point, line and edge detection, thresholding	Sec 10.1-10.3
38-41	Representation and description	Boundary following, chain codes, signatures, boundary descriptors, regional descriptors, principal components analysis (PCA)	Sec 11.1.1-11.1.2, 11.1.5, 11.2, 11.3.3,11.3.4, 11.4
42	Introduction to Medical Imaging and Advances in Medical Image Processing	Different medical imaging modalities	Class notes and Sec 5.11 and 2.65

Evaluation Scheme:

Components	Duration	Weightage	Marks	Date & Time	Nature of Component
Test-1	30 min	15%	15	September 10 – September 20 (During scheduled class hour)	Open Book
Test-2	30 min	15%	15	October 09 –October 20 (During scheduled class hour)	
Test-3	30 min	15%	15	November 10 – November 20 (During scheduled class hour)	
Assignment/Term Paper/project/quiz	-	25%	25	Take Home	
Comprehensive	120 min	30%	30	TBA	
Total		100%	100		

Chamber Consultation Hour: To be announced in the class.

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

Make-up Examination: Make-up will be given on extremely genuine grounds only for those receiving prior approval. No make-up for Assignment/Term Paper/project/Quiz

Academic Honesty and Integrity Policy: As per AUGSD guidelines academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-Charge