	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Bachelor of Technology in Electrical and Electronics Engineering**	Academic Year of Regulation	**2018-19**
Department	**Electrical Engineering**	Semester	**VIII**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EE422	**Advanced Signal & Image Processing**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To learn the selection of enhancement techniques in image processing		CO1	**Able to acquire knowledge about image enhancement in spatial domain**
	To develop ability and skill to apply filtering methods in image processing		CO2	**Able to acquire knowledge about image enhancement in frequency domain**
	To learn color and morphological analysis image processing		CO3	**Able to apply functions and filtering techniques for image restoration**
	To learn segmentation methods in image processing		CO4	**Able to understand color and morphological processing**
			CO5	**Able to employ design, detection and segmentation techniques**

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**3**	**3**	**3**	**2**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**2**	**1**	**3**
2	CO2	**3**	**3**	**3**	**2**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**2**	**1**	**3**
3	CO3	**3**	**3**	**2**	**2**	**2**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**2**	**1**	**3**
4	CO4	**3**	**3**	**3**	**2**	**2**	**1**	**0**	**0**	**2**	**0**	**0**	**1**	**2**	**1**	**2**
5	CO5	**3**	**3**	**2**	**2**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**2**	**1**	**3**

SYLLABUS

No.	Content	Hours	COs
I	**IMAGE ENHANCEMENT IN SPATIAL DOMAIN:** Gray-level transformations, histogram equalization, spatial filters averaging, order statistics; Edge detection - first and second derivative filters, Sobel, Canny, Laplacian and Laplacian-of Gaussion masks	**08**	**CO1**
II	**IMAGE FILTERING IN FREQUENCY DOMAIN:** One and two-dimensional DFT, properties of 2-D DFT, periodicity properties, convolution and correlation theorems, Fast Fourier Transforms, Smoothing and sharpening filtering in frequency domain, Butterworth filters and homomorphic filtering	**08**	**CO2**
III	**IMAGE RESTORATION:** Degradation/restoration process, noise models, restoration in presence of noise-only spatial filtering, linear position-invariant degradations, estimating the degradation function, inverse filtering, Wiener filtering, constrained least squares filtering, geometric transformations	**08**	**CO3**
IV	**COLOR AND MORPHOLOGICAL IMAGE PROCESSING:** Color image - processing, transformation, segmentation, noise in color images; dilation, erosion, opening, closing, Hit-Miss transformations; Basic morphological algorithms - boundary extraction, region filling, connected components, convex hull, thinning, thickening, skeletons, pruning, and extensions to gray-scale morphology	**07**	**CO4**
V	**IMAGE SEGMENTATION:** Boundary detection; Hough transforms, graph-theoretic techniques, thresholding; Segmentation - region based, morphological watersheds and motion based segmentations	**05**	**CO5**
	Total Hours	**36**	

Essential Readings

1. Rafael C Gonzalez and Richard E Woods, “Digital Image Processing”, Pearson Education, 2nd edition 2003
2. A. K. Jain, “Fundamentals of Digital Image Processing”, PHI, New Delhi, 1st edition 1989
3. Chanda Dutta Magundar, “Digital Image Processing and Applications”, PHI, 2nd edition 2000
4. William K Pratt, “Digital Image Processing”, John Willey, 2nd edition 2006

Supplementary Readings

1. C. Phillips, “Image Processing in C”, BPB Publication, 1st edition 1995
2. B. Chanda, D. Dutta Majumdar, “Digital Image processing and Analysis”, PHI, 2nd edition 2011