	National Institute of Technology Meghalaya An Institute of National Importance	**CURRICULUM**

Programme	**Bachelor of Technology in Electronics and Communication Engineering**	Year of Regulation	**2018-19**
Department	**Electronics and Communication Engineering**	Semester	**VII**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 413	**Biomedical Image Processing**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	To study the fundamentals of digital image processing.	Course Outcomes	CO1	Ability to understand the various medical images and their difference.
	To study the various pre-processing techniques used in Biomedical image processing.		CO2	Ability to learn different image enhancement techniques used for medical images.
	To study the various segmentation techniques used in Biomedical field.		CO3	Ability to learn various medical image segmentation techniques.
	To develop the skill for practical problems solving using various algorithm in the field of medical Images.		CO4	Ability to study the various feature extraction techniques and classifier models for biomedical images.

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	PSO4
1	CO1	**3**	**1**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**1**	**-**
2	CO2	**3**	**3**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**-**
3	CO3	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**-**
4	CO4	**3**	**3**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**1**	**-**

SYLLABUS

No.	Content	Hours	COs
I	Fundamentals of Image processing and Image Transforms, Basic steps of Image processing system, Sampling and Quantization of an Image, Basic relationship between Pixels, Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform (DCT), Discrete Wavelet transforms, Various Medical images : X-ray and Computed Tomography (CT) imaging, Magnetic Resonance Imaging (MRI), Ultrasonic Imaging, Microscopic Imaging.	**10**	**CO1**
II	Image Enhancement: Gray scale thresholding, Contrast manipulation, histogram equalization, Laplacian derivatives, rank operators – textural analysis, Homomorphic filtering.	**6**	**CO2**
III	Segmentation: Edge Detection, Optimal thresholding, Region based segmentation (splitting and merging), K-means clustering based segmentation, Fuzzy based segmentation	**10**	**CO3**
IV	Representation of shapes and countours, shape factors, Fourier Descriptors, Difficulties in biomedical image acquisition and analysis and various classifier models for medical applications: SVM, ANN, Naïve Bayes, k-NN	**12**	**CO4**
	Total Hours	**38**	

Essential Readings

1. Gonzalez R. C. and Woods R. E, "Digital Image Processing", Pearson Prentice Hall, 2nd edition, 2002.
2. Rangaraj M. Rangayyan, “Biomedical Image Analysis”, CRC Press, 2000.
3. Qiang Wu, Fatima A. Merchant, Kenneth R. Castleman, “Microscope Image Processing”, Elsevier Publication, ISBN: 978-0-12-372578-3.

Supplementary Readings

1. Gonzalez R. C, Woods R. E and Eddins S. L "Digital Image Processing using MATLAB", McGraw Hill Education, 2nd edition, 2017.
2. Richard O. Duda, Peter E. Hart, David G. Stork. Pattern classification, Wiley, New York, 2001.