National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	**M.Tech /Ph.D**		Year of Regulation	**2021**
Department	**Electronics and Communication Engineering**		Semester	**I**

Course Code	Course Name		Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
EC 533	**Medical Image Analysis**		**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	To understand the importance of medical image analysis	Course Outcomes	CO1	Ability to understand the various medical images and their difference.
	To examine the skill acquired on practical problem solving using various algorithm in the field of medical Images.		CO2	Ability to learn different image enhancement techniques used for medical images.
			CO3	Ability to learn various medical image segmentation techniques.
			CO4	Ability to study the various feature extraction techniques.
			CO5	Ability to learn different classifier models used in medical images.
			CO6	

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	2	2	2	0	2	0	0	0	3	2	2
2	CO2	3	2	3	2	2	2	2	0	2	0	0	0	3	2	3
3	CO3	3	2	3	2	2	2	2	0	2	0	0	0	3	2	2
4	CO4	3	2	3	2	2	2	2	0	2	0	0	0	3	2	2
5	CO5	3	2	3	2	2	2	2	0	2	0	0	0	3	2	2
6	CO6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SYLLABUS

No.	Content	Hours	COs
I	**Introduction to Medical Imaging** Various Medical images : X-ray and Computed Tomography (CT) imaging, Magnetic Resonance Imaging (MRI) Ultrasonic Imaging, Microscopic Imaging, Objectives of biomedical image analysis, Difficulties in biomedical image acquisition and analysis.	6	CO1
II	**Image Enhancement** Gray scale thresholding, Contrast manipulation, histogram equalization, Laplacian derivatives, rank operators –textural analysis, Homomorphic filtering	10	CO2
III	**Detection of Region of Interest** Edge Detection, Optimal thresholding, Region based segmentation (splitting and merging), K-means clustering based segmentation, Fuzzy based segmentation	10	CO3
IV	**Analysis of shape and texture** Representation of shapes and countours, shape factors, Fourier Descriptors, texture in biomedical images, statistical analysis of texture, fractal analysis, Fourier domain analysis of texture, Gabor filters.	6	CO4
V	**Pattern Classification and Diagnosis detection** Supervised pattern classification (SVM, Naive Bayes, k-NN, Decision trees), Neural Networks, Unsupervised pattern classification (k-Means and FCM).	6	CO5
	Total Hours	38	

Essential Readings

1. Rangaraj M. Rangayyan, "Biomedical Image Analysis", CRC Press, 2000.

2. Qiang Wu, Fatima A. Merchant, Kenneth R. Castleman, "Microscope Image Processing", Elsevier Publication, ISBN: 978-0-12-372578-3.

3. Gonzalez R. C. and Woods R. E, "Digital Image Processing", Pearson Prentice Hall.

4. A K Jain, "Fundamental of Digital Image Processing", Prentice Hall, 2002

Supplementary Readings

1. Forsyth D. and Ponce J., "Computer Vision - A Modern Approach", Prentice-Hall.

2. Mark Nixon, "Feature Extraction and Image Processing for Computer Vision", Elsevier Publication, 3rd Edition, 2012.

3. Richard O. Duda, Peter E. Hart, David G. Stork. Pattern classification, Wiley, New York, 2001.