Course Code	PCS21E03J	Course Name	IMAGE PROCESSING USING MATLAB	Course Category	D	Discipline Elective Course	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO 1	PSO 2	PSO 3
CLR-1 :	*To provide deep understanding of basic concept of digital image acquisition*																		
CLR-2 :	*To provide deep Understanding of various digital image enhancement techniques*																		
CLR-3 :	*To Understand image restoration and segmentation methods*																		
CLR-4 :	*To provide understanding and implementation of image compression techniques*																		
CLR-5 :	*To provide understanding and knowledge of image recognition methods*																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	*Understand basics of digital images and tools for image processing*	3	80	70	L	H	-	H	L	-	-	-					-	-	-
CLO-2 :	*Learn and implement image Enhancement techniques*	3	85	75	M	H	L	M	L	-	-	-					-	-	-
CLO-3 :	*Understand and Learn image Restoration and Segmentation Methods*	3	75	70	M	H	M	H	L	-	-	-					-	-	-
CLO-4 :	*Understand and implement Image Compression techniques*	3	85	80	M	H	M	H	L	-	-	-					-	-	-
CLO-5 :	*Learn and Implement Image Recognition methods*	3	85	75	H	H	M	H	L	-	-	-					-	-	-

Duration (Hour)		15	15	15	15	15
S-1	SLO-1	*Introduction of Digital Image Processing*	*Introduction to Spatial Domain*	*Point detection*	*Fundamentals of Compression*	*Boundary representation- Chain codes*
	SLO-2	*Origin-Steps in Digital Image Processing*	*Smoothing frequency*	*Line Detection*	*Image Compression methods*	*Polygonal approximation*
S-2	SLO-1	*Fundamental steps in Digital Image Processing*	*Domain filters*	*Edge Detection*	*Error Free*	*Signature*
	SLO-2	*Image Sensing and Acquisition*	*Sharpening frequency domain filters*	*Local & Regional processing*	*Compression*	*Patterns and Pattern classes*
S-3	SLO-1	*Image Sampling*	*The 2-D Discrete Fourier Transform*	*Region based segmentation*	*Variable Length Coding*	*Boundary description–Shape number*
	SLO-2	*Quantization*	*Noise models*	*Morphological processing*	*Arithmetic coding*	*Regional Descriptors*
S4-5	SLO-1	*Laboratory 1: Image Sensing and Acquisition, Image Sampling and Quantization*	*Laboratory4: Smoothing and Sharpening Spatial Filtering, Frequency Domain: Basics of filtering*	*Laboratory 7:Marr-Hildreth & Canny edge detector*	*Laboratory 10: Compression Standards-Huffman, Arithmetic coding, LZW coding*	*Laboratory 13: Regional Descriptors, Topological -Texture –Patterns and Pattern classes*
	SLO-2					
S-6	SLO-1	*Components*	*Computing and Visualizing the 2-D DFT in MATLAB*	*Watershed segmentation algorithm*	*Lossy Compression*	*Fourier Descriptor*
	SLO-2	*Elements of Visual Perception*	*Filtering in the Frequency Domain*	*Boundary detection*	*Lossy Predictive Coding*	*Topologica*
S-7	SLO-1	*The MATLAB Working Environment*	*Properties of 2D Fourier Transform*	*Spatial Filters.*	*Block Transform coding, JPEG standard*	*Recognition based on matching*
	SLO-2	*Exploring functions*	*Mean Filters orders*	*Image Enhancement in Frequency domain*	*Huffman coding*	*Texture*

Duration (Hour)		15	15	15	15	15
S-8	SLO-1	*Relationships between pixels*	*Statistics*	*Image Enhancement in Frequency domain*	*MATLAB code for image compression: Arithmetic coding*	*MATLAB code for image representation*
	SLO-2	*Background on MATLAB*	*Adaptive filters*	*Filtering in the frequency domain*	*Run Length Encoding*	*Image recognition*
S9-10	SLO-1	*Laboratory 2: Introduction to Image processing toolbox in MATLAB*	*Laboratory 5: MATLAB code for histogram, equalization*	*Laboratory 8: Edge Linking and Boundary detection*	*Laboratory 11: Run Length Encoding Compression Standards Huffman,*	*Laboratory 14: MATLAB code for image recognition, MATLAB Practice exercises*
	SLO-2					
S-11	SLO-1	*Image Processing Toolbox*	*Band reject Filters*	*Smoothing*	*Bit plane Coding*	*Region based Segmentation*
	SLO-2	*Gray level transformations*	*Band pass Filters*	*Sharpening*	*Compression Standards Huffman*	*Compression*
S-12	SLO-1	*Histogram processing*	*Inverse Filtering*	*Edge detection operators*	*Predictive coding*	*Edge Detection*
	SLO-2	*Smoothing and Sharpening Spatial Filtering*	*Wiener filtering*	*Degradation using adaptive and wiener filter*	*boundary segments*	*Transformations*
S-13	SLO-1	*Frequency Domain: Basics of filtering*	*Segmentation*	*Wavelets–Sub band coding*	*Wavelet coding*	*Thresholding*
	SLO-2	*Basics of Spatial Filtering*	*frequency domain filters*	*Multi resolution expansions*	*MPEG standards*	*Boundary Segments*
S 14-15	SLO-1	*Laboratory3: Toolbox practice*	*Laboratory6: MATLAB code for spatial and frequency domain filters.*	*Laboratory 9: MATLAB code for restoring an image after Degradation using adaptive and wiener filter, Edge detection operators*	*Laboratory12: MATLAB code for image compression: Huffman coding, Arithmetic coding,*	*Laboratory 15:Case study using MATLAB*
	SLO-2					

Learning Resources	1.Digital Image Processing Using MATLAB, Ralph Gonzalez, Richard Woods, Steven Eddins, Second Edition,2017, Kindle 2. A Practical Approach for Image Processing & Computer Vision In MATLAB, Prof. Neeraj Bhargava, Dr. Ritu Bhargava, Abhishek Pandey, CreateSpace Independent Publishing Platform ,2016.

Learning Assessment

Bloom's Level of Thinking		Continous Learning Assessment(50% Weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4# (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
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		Dr.Sabeen