FACULTY OF COMPUTER SCIENCE
Master of Computer Application (Sem-II)
In Effect from Academic Year 2023-24

Branch Name:	MCA
Program Code:	CS201
Course Name:	Image Processing
Course Code:	3CS2010205T
Pre-requisite Course:	Basic knowledge of Computer Graphics is desirable

Course Objectives:

1. Understand basic concepts and methodologies for digital image processing
2. Develop a foundation that can be used as the basis for further study and research in this field
3. Provide understanding of the different types of image representations, enhancing Image characteristics, image filtering, and reducing the effects of noise and blurring

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory		Practical		
Lecture	Tutorial	Practical	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total
4	-		4	60	40	-	-	100

Course Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	**Introduction to Digital Image Processing and Fundamental** Introduction: What is Digital Image Processing, The origins of Digital Image Processing, Examples of Fields that use Digital Image Processing, Fundamental steps in Digital Image processing, Components of Image Processing system Fundamentals, Image Sensing and Acquisition, Image Sampling and Quantization, Image data Formats.	4	15
2	**Transformations, Histogram Processing and Spatial Filtering** Image Enhancement in the spatial domain: Background, Some basic gray level Transformation, Introduction of Histogram processing, Enhancement using Arithmetic/Logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.	10	25
3	**Image Restoration and Compression** Image Restoration and compression: A model of the Image Degradation/Restoration process, Noise Models, Restoration in the presence of noise only spatial filtering, , Image Compression: Fundamentals: Coding Redundancy, Spatial and Temporal Redundancy, Image Compression models, Error-free Compression: Huffman Coding, Arithmetic Coding, LZW coding, Bit plane coding, Run length coding, Introduction to JPEG.	8	20
4	**Color and Morphological Image Processing** Techniques of color image processing: Color image signal representation, color system Transformations, Morphology: Dilation, Erosion, Opening and Closing, Hit-and Miss transform, Morphological Algorithms: Boundary Extraction, Region filling, Extraction of connected components, Convex Hull.	8	20
5	**Image Segmentation and Object Recognition** Image Segmentation and object detection: Point, Line and Edge detection, Hough Transform for Detection, Thrasholding – Local and Global, Region Based Segmentation, Wavelet transform and application for Image Segmentation, Distance Transform and Watershed Segmentation. Object Recognition: Decision Theoretic Methods-Maximum Distance classifier, Correlation matching, Optimal Statistical Classifier and String Matching	8	20

Text Books:

1. Digital Image Processing, R.C. Gonzalez and R.E. Woods, Addition-Wesley (Pearson Education Asia), 3rd Edition.

2. Fundamentals of Digital Image Processing, Anil K. Jain, Prentice-Hall India, 2001.

Reference Books:

1 Digital Image Processing and Analysis, B. Chanda and D. Datta Majumder, Prentice-Hall India, 2001.
2. Digital Image Processing, Madhuri A. Joshi, PHI, 2006.

List of Open Source Software/learning website:

1. https://www.tutorialspoint.com/dip/index.htm
2. https://www.w3schools.com/css/css_image_sprites.asp

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom'sTaxonomyLevel
CLO1	To choose the appropriate data type and data structure for a given problem.	2 Understanding
CLO2	To choose the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.	1 Remembering 3 Applying,
CLO3	To create the algorithms and program of various operations on Queues, Stacks, Linked Lists, Trees, Graphs, Sorting, Searching, Hash tables etc.	2 Understanding, 3 Applying,
CLO4	To evaluate algorithms with respect to time and space complexity.	3 Applying, 2 Understanding
CLO3	Learns the fundamentals of image processing. Applies transformations on images.	1 Remembering 3 Applying,
CLO4	Explains image segmentation. Expresses image compression methods. Realizes image recognition process. Recognizes morphological image processing techniques.	4.Analyse 6.Creating

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes (POs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CLO1	**M**	**M**	**L**		M		**L**	M	L	M		**M**	**H**	**M**
CLO2	M	M	H			**M**	M			**H**	L	L	**H**	**M**
CLO3	H	M	H		**M**	**M**		**M**	L	M		H	**L**	**M**
CLO4	M		**H**	**M**	M	**L**	M	**L**	**M**		H	H	H	**M**
CLO5	M		**H**	**L**	M	**L**	M	**L**	**H**		H		H	**M**
CLO6	L		**H**	**M**	M	**L**	M	**L**	**M**		H	H	H	**L**

H:High, M:Medium, L:Low