Course code	Course title	L	T	P	J	C
SWE1010	Digital Image Processing	3	0	0	4	4
Pre-requisite	MAT1011	Syllabus version				
		v. 1.0				

Course Objectives:

- To introduce the principles of image processing.
- To develop student's knowledge from basic image processing techniques to advanced image processing and analysis systems.
- To understand the theory of image processing with emphasis on the areas of restoration, enhancement, segmentation, compression and their applications.

Expected Course Outcome:

At the end of the course students should able to

- Apply the knowledge of image processing to solve the real world problems.
- Design a component or a product by applying all the relevant standards and with realistic constraints
- Design an automated system to analyze and interpret data.

Student Learning Outcomes (SLO): 1,6,14

Module:1	DIGITAL IMAGE FUNDAMENTALS	6 hours	SLO:1

Introduction, Digital Image Fundamentals, image acquisition and display using digital devices - Human visual perception, properties -Image sampling and quantization-Basic relationship between pixels.

Module:2	IMAGE ENHANCEMENT	8 hours	SLO:6

Image enhancement in the spatial domain: basic grey level transformation, Histogram Processing-Enhancement using arithmetic/Logic operations-Spatial filtering: smoothing and sharpening. Image enhancement in the frequency domain: Introduction to two-dimensional transforms-Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet Transform - smoothing frequency domain filtering-sharpening frequency domain filtering

Module:3	IMAGE RESTORATION	5 hours	SLO:1

Noise Models-Restoration in the presence of Noise only-spatial filtering-periodic noise reduction by frequency domain filtering.

Module:4	IMAGE SEGMENTATION	8 hours	SLO:6

Detection of discontinuities, Edge Linking and Boundary Detection, Thresholding Methods, Region Oriented Methods.

Module:5	IMAGE COMPRESSION	5 hours	SLO:1

Lossless Image Compression- The Concept of entropy and Huffman coding; Run-length coding for grey images,Lossy Image Compression – Predictive coding, transform coding – JPEG compression standard, Wavelet-based image compression JPEG2000.

Module:6	**REPRESENTATION AND DESCRIPTION:**	**5 hours**	**SLO:14**
Chain codes, Polygonal approximation, Signature Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description, Relational Descriptors.			
Module:7	**MORPHOLOGICAL AND COLOR IMAGE PROCESSING**	**6 hours**	**SLO:14**
Dilation and Erosion-Opening and Closing-Hit or Miss Transformation-Basic morphological algorithms.Color Image processing: Light and color, color formation, Colour models, Histogram of a color Image, Color image filtering, Gamma correction and segmentation of color image.			
Module:8	**Contemporary issues:** Applications of Image Processing in industry	**2 hours**	**-**
	Total Lecture hours:	**45 hours**	

Text Book(s)

1.	R.C. Gonzalez & R.E. Woods,"Digital Image Processing" , Pearson Education, Third Edition,2013

Reference Books

1. S. Jayaraman, S. Esakirajan & T.Veerakumar " Digital Image Processing", Tata Mcgraw-Hill First Edition 2009.

2. A. K. Jain**,** "Fundamentals of Digital Image Processing," Pearson Education (Asia) Pte. Ltd./Prentice Hall of India, 2004.

3. Jhon C Ross, " The Image Processing Hand Book", CRC Press 5th Edition,2006

4. B. Chanda and D. Dutta Majumdar "Digital Image Processing and Analysis", PHI, 2011.

Recommended by Board of Studies		5-3-2016	
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