III- Year I- Semester	Name of the Course	L	T	P	C
PC3101L	**Image Processing Using Python**	3	0	0	3

Course Objectives:

1. Familiarize with basic concepts of digital image processing.
2. Learn various image processing techniques like image enhancement both in spatial and frequency domain
3. Familiarize with basic restoration techniques
4. Understand segmentation and morphological techniques applicable to various tasks
5. Understand the need for compression and familiarize few compression methods

Syllabus:

Unit I: FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS

Introduction, Fundamental steps in image processing, Image sampling, Quantization, Resolution, Elements of image processing system, Applications of Digital image processing. Color fundamentals, Color image formats and conversion.

Unit II: IMAGE ENHANCEMENT

Spatial domain methods: Point & Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

Unit III: IMAGE RESTORATION AND RECONSTRUCTION

A model of the image degradation and Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering.

Unit IV: IMAGE SEGMENTATION

Fundamentals, point, line, edge detection, thresholding, and region –based segmentation.

MORPHOLOGICAL IMAGE PROCESSINGs

Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning.

Unit V:IMAGE COMPRESSION

Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding.

Text books:

1. Digital Image Processing – Gonzalez and Woods, 2nd Ed., Pearson.
2. S. Jayaraman, S. Esakkirajan and T. VeeraKumar, “Digital Image processing, Tata McGraw Hill publishers, 2009

Reference books:

1. Anil K. Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
2. J. T. Tou, R. C. Gonzalez, “Pattern Recognition Principles”, Addison-Wesley, 1974.
3. B. Chanda, D. Dutta Majumder, “Digital Image Processing and Analysis”, PHI, 2009.