



**Indian Institute of Information Technology, Allahabad**

**Department of Information Technology**

**Syllabus**

1. Name of the Course: Image and Video Processing
2. LTP structure of the course: 211
3. Objective of the course:
  - To provide the basic understanding of the digital image formation and visualization.
  - To provide the visualization of relationships between spatial and frequency.
  - To provide the understanding of mapping the signal processing techniques to the digital image.
  - To provide an idea of multimedia data (image, video).
  - To provide an exposure to various image and video compression standards.
4. Outcome of the course:
  - The students shall be able to apply the knowledge gained during the course to solve various real time problems.
  - The students shall be able to develop new state of the art image and video processing method.
5. Course Plan: As per the below format only

Component	Unit	Topics for Coverage
Component 1	Unit 1	Digital Image Fundamentals- Simple image model, digital image formation, sampling, quantization, resolutions and representation, relationship among pixels, types of digital images. Color Image Processing: Color Representation, Chromaticity Diagram and Color Spaces, types of digital imaging and application areas. Enhancement-Point Processing: Contrast Stretching, Power-law and Gamma Transformation. Histogram Processing: Histogram Equalization and Matching.
	Unit 2	Filtering and Restoration- Degradation function and Noise Models, Spatial Domain Filtering: Correlation and Convolution, Smoothing Linear and Nonlinear Filters: Mean and Median Filters, Adaptive Filtering, Sharpening Linear and Nonlinear Filters: Derivative, Laplacian, Unsharp Masking, High-boost Filtering. Frequency Domain Filtering: Filtering: Low-pass (Smoothing) & High-Pass (Sharpening)

		Ideal, Butterworth and Gaussian Filtering, Unsharp Masking and High-Boost Filtering, Homomorphic Filtering, Periodic Noise Reduction and Inverse Filtering & Wiener Filtering.
Component 2	Unit 3	Edges, Lines and Boundary Detection- First and Second Order Edge Operators, Multi-scale Edge Detection, Canny Edge Detection Algorithm, Hough Transform: Line and Edge Detection, Morphological Operations and Application: Boundary, Skelton, Convex-Hull, Thinning, Pruning etc. Segmentation & Feature Extraction: Model-based and probabilistic methods and Image Classification Optimal and Multilevel Thresholding, Gray Image Segmentation, Watershed Algorithm.
	Unit 4	Compression: Lossy and Lossless compression techniques, JPEG JPEG2000 and Variants, Introduction to video processing, Compression standards and formats (MPEG & H.XXX), Video Streaming.

6. Text Book: Digital Image Processing (3rd Edition) by Willam K. Pratt, John Willey & Sons

7. Reference: