# EE 708: DIGITAL IMAGE PROCESSING (3-0-0: 3)

**IMAGE FUNDAMENTALS**

Background, Digital Image Representation, Fundamental steps in Image Processing, Geometric Transformation, Perspective Projection, Sampling & Quantization.

**MATHEMATICAL PRELIMINARIES AND TRANSFORMS**

Neighbour of pixels Connectivity, Distance Measures, Arithmetic/ Logic Operations. Introduction to fourier transform and DFT − Properties of 2D fourier transform − FFT − Separable image transforms − Walsh-Hadamard − Discrete cosine transform − Haar-Slant − Karhunen-Loeve transforms.

**IMAGE ENHANCEMENT TECHNIQUES**

Spatial domain methods − Basic grey level transformation − Histogram equalization − Image subtraction − Image averaging − Spatial filtering − Smoothing – Sharpening filters − Laplacian filters − Frequency domain filters − Homomorphic filtering

**IMAGE RESTORATION TECHNIQUES**

Model of image degradation/restoration process − Noise models − Inverse filtering − Least mean square filtering − Blind image restoration − Pseudo inverse − Singular value decomposition.

**IMAGE COMPRESSION**

Lossless compression − Variable length coding − LZW coding − Bit plane coding −Predictive coding − PCM − Lossy compression − Transform coding − Wavelet coding − Basics of image compression standards − JPEG − MPEG − Basics of vector quantization.

**IMAGE SEGMENTATION AND REPRESENTATION**

Edge detection − Thresholding − Region based segmentation – Boundary representation − Chair codes − Polygonal approximation − Boundary segments −Boundary descriptors − Simple descriptors − Fourier descriptors – Regional descriptors − Simple descriptors − Texture.

**References:**


1. Rafael C Gonzalez and Richard E Woods, Digital Image Processing, Pearson Education.
2. William K Pratt, Digital Image Processing, John Willey.
3. A. K. Jain, Fundamentals of Digital Image Processing, PHI, New Delhi.
4. Chanda Dutta Majundar, Digital Image Processing and Applications, PHI.