



# AMITY UNIVERSITY

UTTAR PRADESH

## FORMAT FOR COURSE CURRICULUM

**Course Title: IMAGE PROCESSING**

**Course Level: UG**

**Course Code: CSIT322**

**Credit Units:03**

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
3	-	-	-	3

### **Course Objectives:**

The objective of this course is to provide

1. Insight on of image processing along with its application areas.
2. Knowledge about different techniques for image processing
3. Knowledge of MATLAB image processing tool box.

**Pre-requisites: NIL**

### **Course Contents/Syllabus:**

	Weightage (%)
<b>Module I : Introduction</b>	25
Digital Image Processing Fundamentals; History of an Image Processing and its application areas, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.	
<b>Module II: Image Enhancement</b>	25
Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothing and Sharpening Spatial Filters, Combining Spatial Enhancement Methods. Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.	
<b>Module III : Image Restoration</b>	25
A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position- Invariant Degradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric	

Mean Filter, Geometric Transformations.	
<b>Module IV : Image Compression and Segmentations</b>	<b>25</b>
Image Compression: Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation	

### Student Learning Outcomes:

After finishing this course student will be able to:

- 1) Describe fundamentals of digital image processing: hardware and software, digitization, enhancement and restoration, encoding, segmentation, feature detection.
- 2) Explore the algorithms and techniques involved in Digital Image Processing using computational tools.
- 3) Apply image processing techniques in both the spatial and frequency (Fourier) domains
- 4) Apply image processing programs in a high-level language such as Java, MATLAB.

### Pedagogy for Course Delivery:

Course will be taught both in theory and practical mode. Class room teaching will be incorporated with PowerPoint slides and video tutorial. Labs will provide hands on experience on MATLAB digital image processing toolbox.

### Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total (%)
<b>100</b>	-	<b>100</b>

### Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Mid Term	Assignment	Viva	Attendance	
<b>Weightage (%)</b>	10	10	5	5	70

## **Text & References:**

### **Text books:**

- Rafael C. Gonzalez & Richard E. Woods, “Digital Image Processing”, 2nd edition, Pearson Education, 2001.
- A.K. Jain, “Fundamental of Digital Image Processing”, PHI publications, 2003.

### **References Books:**

- RosefieldKak, “Digital Picture Processing”, 1999
- W.K. Pratt, “Digital Image Processing”, 2000

### **Any other Study Material:**

- <http://lit.fe.uni-lj.si/showpdf.php?lang=slo&type=doc&doc=dip&format=0>
- <http://freevideolectures.com/Course/2316/Digital-Image-Processing-IIT-Kharagpur>
- [http://www.imageprocessingplace.com/root\\_files\\_V3/tutorials.htm](http://www.imageprocessingplace.com/root_files_V3/tutorials.htm)