

COURSE CODE	COURSE TITLE	L	T	P	C
1152IT115	DIGITAL IMAGE PROCESSING	3	0	0	3

**Course Category:**

~~Foundation (0) / Program Core (1) / Program Elective (2) / Allied Elective (3) / University Elective (4) / Value Education Elective (5) / Independent Learning (6) / Industry Higher Learning Institute Interaction (7).~~

**a.Preamble :**

This course provides an introduction regarding the various image processing techniques

**b.Prerequisite Courses:**

Introduction to digital images, digital processing techniques

**c.Related Courses:**

- Digital signal processing
- Digital programming concepts

**d.Course Educational Objectives :**

Students undergoing this course are expected:

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

**e.Course Outcomes :**

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Mathematical transforms necessary for image processing.	K1
CO2	Image enhancement techniques	K2
CO3	Image restoration procedures.	K2
CO4	Image compression procedures	K2
CO5	Image segmentation and representation techniques.	K2

**f.Correlation of COs with POs :**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		L		L							
CO2	M		L		M							
CO3	M		M		M							

CO4	M				M							
CO5	M				M							

H- High; M-Medium; L-Low

**g.Course Content:**

**UNIT I**

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals

**UNIT II IMAGE ENHANCEMENT**

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

**UNIT III IMAGE RESTORATION**

Image Restoration degradation model, Unconstrained restoration Lagrange multiplier and Constrained restoration, Inverse filtering removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations.

**UNIT IV IMAGE SEGMENTATION**

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation Region growing Region splitting and Merging Segmentation by morphological Watersheds basic concepts – Dam construction

**UNIT V IMAGE COMPRESSION**

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

**Total 45 periods**

**h.Learning Resources**

**i) TEXTBOOK**

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Second Edition, 2004.
2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson 2002.

**ii) REFERENCE BOOKS**

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

3. D.E. Dudgeon and R.M. Mersereau, , 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, , 'Digital Image Processing', John Wiley, New York, 2002
5. Milan Sonka et al, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999,

**iii) Online Learning:**

- [www.amazon.com/Digital image processing-Applications.../dp/1852333081](http://www.amazon.com/Digital-image-processing-Applications.../dp/1852333081)
- [www.myreaders.info/01 Introduction to \*\*digital image processing\*\*.pdf](http://www.myreaders.info/01_Introduction_to_digital_image_processing.pdf)