

**CENTRAL UNIVERSITY OF KERALA
DEPARTMENT OF COMPUTER SCIENCE
M.Sc. COMPUTER SCIENCE**

CORE COURSE					
COURSE CODE	COURSE TITLE	CONTACT HRS/WEEK			CREDITS
		LEC	LAB	TUT	
CSC5302	Image Processing	2	2	1	4

Lec = Lecture, Tut = Tutorial, Lab = Practical

This is an experimental, problem solving and **skill development course**.

Course Objective

The objective of the course is to provide theoretical and practical aspects of image processing.

By completing this course, students will obtain the following course/learning outcomes:

1. Knowledge gained:
 - (i) State-of-art image processing features, algorithms and techniques
2. Skill gained:
 - (ii) Critically analyze digital images and get extract required information
3. Competency gained:
 - (iii) Implement real world image processing applications
 - (iv) To do research on emerging areas of image processing

Prerequisites: Basic knowledge in mathematics.

Grading:

Lab experiments and implementation	– 15%
Mini project (individual)	– 10%
Class Test	- 10%
Assignment/Quiz/presentation	– 5%
Final Exam	– 60%

CSC5302 - Image Processing

Module 1

Digital Image Fundamentals: - Image representation and modelling - Image sampling and quantization, gray level resolution. Relationships between pixels, adjacency, connectivity, regions and boundaries, distance measures, image operations on pixel basis. Image Enhancement in the spatial domain: - point operations, spatial operations. Color models and conversions.

Module 2

Image Enhancement in frequency domain - Fourier Transform, DFT and its inverse, filtering in the frequency domain. Smoothing and sharpening filters in frequency domain, Homomorphic filters-Unsharp Masking, High-Boost Filtering, High-frequency Emphasis Filtering. Concepts of image restoration and degradation models.

Module 3

Morphological Image Processing: Logical operations on binary Images-Dilation-Erosion-Opening and Closing-Hit-or-Miss Transformation. Morphological Algorithms: - Boundary Extraction-Region Filling-Extraction of connected Components-Convex Hull-Thinning-Thickening-Skeletons-Pruning.

Module 4

Image Segmentation: - Detection of discontinuities: -point detection-line detection-edge detection. Hough Transform, Thresholding. Region-based segmentation, Region Growing/splitting/merging. Fundamentals of video processing.

Text book:

1. Rafael C. Gonzalez, Richard E. Woods, "*Digital Image Processing*", 3rd Ed., PHI, 2007.

References:

2. Anil K. Jain, "*Fundamentals of Digital Image Processing*", Prentice Hall, US Ed., 1988.
3. William K. Pratt, "*Digital Image Processing: PIKS Scientific Inside*", Wiley Interscience, 4th Ed., 2007.
4. Aziel Rosenfield, Avinash C. Kak, "*Digital Picture Processing*", Morgan Kaufmann, 2nd Ed., 1982.
5. Bernd Jahne, "*Digital Image Processing*", Springer, 6th Ed., 1997