

MCA402 GRAPHICS AND VISUAL COMPUTING

L	T	P	Cr
3	0	2	4.0

Course Objective: Detailed study of computer graphics, 2 D and 3 D transformations, representations and visualization.

Fundamentals of Computer Graphics: Applications of computer Graphics in various, Video Display Devices, Random scan displays, raster scan displays, DVST, Flat Panel displays, I/O Devices.

Graphics Primitives: Algorithms for drawing Line, circle, ellipse, arcs & sectors, Boundary Fill & Flood Fill algorithm, Color Tables

Transformations: 2D & 3D Scaling, Translation, rotation, shearing & reflection, Composite transformation, Window to View port transformation.

Clipping: Cohen Sutherland, Liang Barsky, Nicholl - Lee - Nicholl Line clipping algorithms, Sutherland Hodgeman, Weiler Atherton Polygon clipping algorithm.

Three Dimensional Object Representations: 3D Modeling transformations, Parallel & Perspective projection, Clipping in 3D. Curved lines & Surfaces, Spline representations, Spline specifications, Bezier Curves & surfaces, B-spline curves & surfaces, Rational splines, Displaying Spline curves & surfaces.

Basic Rendering: Rendering in nature, Polygonal representation, Affine and coordinate system transformations, Visibility and occlusion, depth buffering, Painter's algorithm, ray tracing, forward and backward rendering equations.

Visualization: Visualization of 2D/3D scalar fields: color mapping, isosurfaces. Direct volume data rendering: ray-casting, transfer functions, segmentation. Visualization of: Vector fields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallel coordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitive foundations, Evaluation of visualization methods, Applications of visualization.

Laboratory work: Lab work should be done in OpenGL. Covers all the basic drawing, filling, transformation and clipping algorithms.

Recommended Books:

1. Donald D Hearn, M. Pauline Baker, Computer Graphics C version, Pearson Education, 2nd ed.
2. OpenGL Programming Guide: The Official Guide to Learning OpenGL, Dave Shreiner, Mason Woo, Jackie Neider, Tom Davis, 5th Edition, 2013
3. James D. Foley, Andries van Dam, Steven K. Feiner and John F. Hughes, Computer Graphics: Principles & Practice in C, Addison Wesley Longman, 2nded.
4. Zhigang Xiang, Roy A Plastock, Computer Graphics, Schaums Outline, TMH, 2nd ed.