



# SILVER OAK UNIVERSITY

College of Technology

Bachelor of Technology

Information Technology

Course Name: Computer Graphics

Course Code:1010043337

Semester:5<sup>th</sup>

## Prerequisite:

Basics concepts of C programming

## Objective:

1. This Course provides an introduction to the principles of computer graphics. In particular, the course will consider methods for modeling 2-D objects and how it generates photorealistic renderings on color raster graphics devices. The emphasis of the course will be placed on understanding how the various elements that like algebra, geometry, algorithms and data structures interact in the design of graphics.
2. This course provides an idea on hardware system architecture for computer graphics. This includes, but it is not limited to: graphics pipeline, frame buffers, and graphic co – processors.
3. To give idea about basic building blocks of multimedia and a study about how these blocks together with the current technology and tools.

## Teaching Scheme:

Teaching Scheme				
L	T	P	Contact Hours	Credit
3	0	2	5	4

## Contents:

Unit	Topics	Teaching Hours	Weightage %
1	<b>Basic of Computer Graphics:</b> Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards.	6	15
2	<b>Graphics Primitives:</b> Points, lines, circles primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.	8	20
3	<b>2D object transformation and viewing:</b> Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang	8	20

	bersky, NLN), polygon clipping		
4	<b>3D concepts and object representation:</b> 3D display methods, polygon surfaces, tables, equations, meshes, curved lines and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, B-spline curves and surfaces, B-spline curves and surfaces.	6	15
5	<b>3D object transformation and viewing:</b> 3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations.	8	20
6	<b>Advance topics of visualization:</b> visible surface detection concepts, back-face detection, depth buffer method, illumination, light sources, illumination methods (ambient, diffuse reflection, specular reflection), Color models: properties of light, XYZ, RGB, YIQ and CMY color models.	6	10

### Course Outcomes:

Sr. No.	CO Statement	Unit
CO-1	Describe the basic computer graphics primitives.	1
CO-2	Evaluate various transformation techniques.	2,3
CO-3	Design basic animations using latest graphics package software.	4
CO-4	Classify the concept of spline and B-spline curves.	4,5
CO-5	Explain the Concept of the visualization.	6

### Teaching & Learning Methodology:

The various methods or tools to teach the above subject:

1. The course includes a laboratory, where students have an opportunity to build an appreciation for the Concepts being taught in lectures.
2. Lectures with live practical examples using Projector and Computer.
3. Experiments shall be performed in the laboratory related to course contents.

### List of Experiments:

**Total Hours: 28**

Sr. No.	Practical Name
1	To study the various graphics commands in C language.
2	Develop the DDA Line drawing algorithm using C language.
3	Develop the Bresenham's Line drawing algorithm using C language.
4	Develop the mid-point Circle drawing algorithm using C language.
5	Develop the 8-connected and 4-connected boundary fill algorithm using C language.
6	Develop the 8-connected and 4-connected Flood fill algorithm using C language.

7	Perform the following 2D Transformation operation - Translation, Rotation and Scaling.
8	Perform the Line Clipping Algorithm.
9	Perform the Polygon clipping algorithm.
10	Perform the following tasks using MATLAB commands. - Read the grayscale and color image. a. Display images on the computer monitor b. Write images in your destination folder

### Books Recommended:

1. D.Hearn And P.Baker, "Computer Graphics", Pearson Education - C Version.
2. Hearn and Baker, "Computer Graphics, with OpenGL", Pearson
3. Sinha & Udai, "Computer Graphics", TMH
4. Foley and van Dam, "Computer Graphics", Pearson Education

### List of Open-Source Software/learning website:

1. GIMP - GNU Image Manipulation Program
2. Inkscape - Open Source vector graphics editor
3. C Compiler
4. MATLAB/SciLAB

### CO-PO-PSO Matrix:

Co. No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	1		1									1	1	2
CO-2	3	2	2	2							1	2	1	2
CO-3	2	2	3	1	3				1		1	2	1	3
CO-4	2		2	1					1			1	2	2
CO-5	2			1								1	2	3