

Sub Title : COMPUTER GRAPHICS AND VISUALIZATION		
Sub Code: CS64	No. of Credits: 3=3 : 0 : 0 (L-T-P)	No. of lecture hours/ week : 3
Exam Duration: 3 Hrs	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of lecture hours: 42

Course objectives:

This course will help students to achieve the following objectives:

1. Identify the software and hardware components of a computer graphics system,
2. Understand basics of Open GL API's and write graphics programs with input interaction using mouse and keyboard.
3. Understand the concept of geometrical transformations, coordinate systems in graphics systems.
4. Understand Rasterization, clipping, hidden surface algorithms, and other implementation details and viewing of graphics primitives in three-dimensions.
5. Understand the rendering and Lighting techniques.

Unit No.	Syllabus content	No. of hours
1.	Introduction: Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging Systems; The synthetic camera model; The programmer's interface; Graphics architectures; Programmable Pipelines; Performance Characteristics Graphics Programming: The Sierpinski gasket; Programming Two Dimensional Applications.	07
2.	The Open GL: The Open GL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket; Plotting Implicit Functions. Input and Interaction: Interaction; Input devices; Clients and Servers; Display Lists; Programming Event Driven Input; Menus; Animating Interactive Programs; Design of Interactive Programs; Logic Operations.	10

3.	Geometric Objects and Transformations: Scalars, Points, and Vectors; 3-D Primitives; Coordinate Systems and Frames; Modeling a Colored Cube; Affine Transformations; Rotation, Translation and Scaling; Geometric Objects and Transformations; Transformation in Homogeneous Coordinates; Concatenation of Transformations; Open GL Transformation Matrices.	08
4.	Implementation: Basic Implementation Strategies; Four major tasks; Clipping; Line-segment clipping; Polygon clipping; Rasterization; Bresenham's algorithm; Hidden-surface removal; Viewing: Classical and computer viewing; Viewing with a Computer; Positioning of the camera; Simple projections; Projections in OpenGL; Parallel-projection matrices; Perspective-projection matrices;	10
5.	Lighting and Shading: Light and Matter; Light Sources; The Phong Lighting model; Polygonal Shading; Light sources in OpenGL; Specification of materials in OpenGL;	07

Note 1: Unit 2 and Unit 4 will have internal choice.

Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.

Assignment - 2 from units 3 and 4.

Assignment - 3 from unit 5.

Course Outcomes:

At the end of the course students will be able to:

CO1: Describe the software and hardware components of a computer graphics system, Graphics Architecture and basics of OpenGL API's.

CO2: Identify the input and output devices of graphics system and design interactive graphics programs using OpenGL.

CO3: Explain the geometrical transformations in different coordinate systems.

CO4: Identify different types of viewing and projections in OpenGL and derive their matrix formulations and clipping, rasterization and hidden surface algorithms, and implement using OpenGL.

CO5: Apply the rendering and Lighting techniques to 3D graphics using OpenGL.

Cos	Mapping with Pos
CO1	PO1,PO3,PO5
CO2	PO2,PO3,PO4,PO5
CO3	PO1,PO2,PO3
CO4	PO1,PO2,PO3
CO5	PO2,PO3

Text Book:

1. Edward Angel: Interactive Computer Graphics A Top-Down Approach with OpenGL, 5th Edition, Pearson Education, 2013. ISBN-13: 9788131797259

Reference Books

1. Donald Hearn, Pauline Baker and Warren Carithers: Computer Graphics with OpenGL, 4th Edition, Pearson Education, 2015. ISBN-13: 9789332518711
2. F.S. Hill Jr.: Computer Graphics Using OpenGL, 3rd Edition, Pearson education, 2013. ISBN-13: 9780131496705

FACULTY NAME :

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2. Prof. Vinod Kumar K P