

Semester VIII

DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE):

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Computer Art and Design Techniques (DSE)	4	1	0	3	Class XII pass	Programming languages

Learning Objectives

This course provides an introduction to the principles of computer graphics. In particular, the course will consider methods for modeling 3-dimensional objects and efficiently generating photorealistic renderings on color raster graphics devices. The emphasis of the course will be placed on understanding how the various elements that underlie computer graphics (algebra, geometry, algorithms and data structures, optics, and photometry) interact in the design of graphics software systems.

Learning outcomes

After completing this course, student should be able to;

- Understand all Display devices and their background
- Understand and implement the Transformation algorithms
- Understand basics of Ray Tracing and shading.
- Understand the process of Camera and image formation and implementation
- Understand the concept of 2D and 3D transformation modeling
- have the basics of the Animations and Motion Pictures
- Have basic understanding of video databases and understanding indexing and retrieval of video.

SYLLABUS

Theory

Unit I: Basic Introduction, Overview of Graphics systems - Refreshing display devices, Random and raster scan display devices, Colour Models: RGB, HSV, etc., coordinates systems, Devices, plotters, Drawing techniques, projections, 2D & 3D Transformations, clipping, viewing curves and shading basics. (15 hours)

Practice /LAB

Unit II: Implementation of DDA Line drawing algorithm, Bresenham's Line Drawing Algorithm, Midpoint circle algorithm, Mid-point Ellipse algorithms. Performing basic Transformation, Matrix representations, Composite Transformations, reflection and shear transformations. (30 hours)

Unit III: Implementing Bary line clipping algorithm, Algorithm for polygon clipping, Sutherland-Hodgeman polygon clipping, Curves - Bezier Curves, 4 point and 5 point Bezier curves using Bernstein Polynomials (30 hours)

Unit IV: Perform Shading and Hidden Surface Removal - Shading, Guard Shading, Phong Model, Back Face Detection, Depth Buffer (Z-Buffer, A-Buffer) Method (30 hours)

Essential/recommended readings

1. Watt, Alan, 3D Computer Graphics. Addison-Wesley, 1999.
2. Shirley, Peter, Michael Ashikhmin, Steve Marschner, Fundamentals of Computer Graphics. 3rd ed. A K Peters/CRC Press, 2009.
3. The Illusion of Life – Disney Animations, Frank Thomas, Ollie Johnston, Walt Disney, 1981
4. Computer Graphics, C Version, 2nd Edition, Hearn & Baker, Pearson Education, 1997
5. Computer Graphics: Principles and Practice in C, 2nd Edition, J. Foley, Addison Wesley, 1995

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

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