Programme	**Bachelor of Technology in Computer Science and Engineering**	Year of Regulation	**2019-20**
Department	**Computer Science and Engineering**	Semester	**VI**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
CS 312	**Computer Graphics**	3	0	0	3	50	50	100	200

Course Objectives		Course Outcomes	
1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.		CO1	Able to acquire knowledge about the basic concepts used in computer graphics
2. To introduce the mathematical foundation of computer graphics like the basic principles of 2D and 3D concept of computer graphics.		CO2	Able to interpret the mathematical foundation of the concepts like 2D and 3D geometrical concepts of computer graphics.
3. To introduce Color perception, color models (RGB model), color transformations.		CO3	Able to implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
4. To provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.		CO4	Able to describe the importance of viewing and projections.
		CO5	Students will be able to acquire knowledge about rasterization: line drawing via Bresenham's algorithm, clipping, polygonal fill etc.
5. Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.		CO6	Students will be able to understand a typical graphics pipeline and 3D modelling.
6. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.			

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	2	1	0	1	0	0	0	0	2	0	0	0	3	0	3
2	CO2	1	1	0	1	0	0	0	0	2	0	0	0	2	0	2
3	CO3	1	2	3	1	2	0	0	0	0	0	0	0	2	3	2
4	CO4	0	2	3	0	2	2	3	0	2	0	0	1	2	3	2
5	CO5	0	2	3	0	2	2	0	0	2	0	0	1	3	3	3
6	CO6	0	0	1	2	0	0	0	0	1	0	2	1	2	2	0

SYLLABUS			
No.	Content	Hours	COs
I	Introduction Graphic areas, Major Applications, Graphic APIs, 3D Geometric Models, Graphics Pipeline, Numerical Issues, Efficiency	08	CO1 CO2
II	Miscellaneous Math Sets and Mappings, Solving Quadratic Equations, Trigonometry, Vectors, 2D Implicit and Parametric Curves, 3D Implicit and Parametric Curves, Linear Interpolation, Determinants and Matrices, Basic 2D and 3D transforms, Inverses of Transformation Matrices.	08	CO2 CO3
III	Raster Algorithms Raster Displays, Monitor Intensities, RGB color, Line Drawing, Simple Anti-aliasing, Image Capture and Storage, Graph Algorithms	05	CO2 CO3
IV	Ray Tracing The basic Ray Tracing Algorithm, Computing Viewing Rays, Ray-Object Intersection, A Ray Tracing Program, Shadows, Specular Reflection, Refraction, Instancing, Constructive Solid Geometry, Distribution Ray Tracing.	03	CO4 CO3 CO4
V	Data Structures for Graphics Triangle Meshes, Winged Edge Data Structure, Scene Graphs, Scene Graphs, Tiling Multidimensional Arrays.	04	CO4 CO5
VI	Sampling Integration, Continuous Probability, Monte Carlo Integration, Choosing Random Points.	08	CO5 CO6
VII	Reflection Models Real World Materials, Implementing Reflection Models. Specular Reflection Material, Smooth Layered Model, Rough Layered Model.	04	CO6
	Total Hours	40	

Essential Readings

1. Computer Graphics: Principles and Practice in C (3rd Edition), by James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, 2014.

2. Fundamentals of Computer Graphics, by Peter Shirley, Michael Ashikhmin, Steve Marschner, A K Peters/CRC Press; 3 edition, 2009.

3. Computer Graphics, C Version (2nd Edition) by Donald Hearn, M. Pauline Baker, Prentice Hall; 1996.

Supplementary Readings

1. Introduction to Computer Graphics, David J. Eck, Hobart and William Smith Colleges, Copyright Year: 2016, Publisher: David J. Eck.

2. Computer Graphics: using OpenGL / F.S. Hill, Jr., Prentice Hall ; 2001.

3. Interactive computer graphics: data structures, algorithms, languages, By W. K. Giloi, Prentice-Hall, 1989.