Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110
(An Autonomous Institution affiliated to Anna University, Chennai)

Date: 17.08.2022

Course Code	**UCS1703**	Course Name	**Graphics and Multimedia**				
Course Type	**Theory**	Course Category	Professional Elective (PC)	**L**	**T**	**P**	**C**
				3	**0**	**0**	**3**
Regulation	**2018**		Academic Year	**2022-23**			
Degree and Branch	**B.E. Computer Science & Engineering**		Batch	**2019-23**			
Semester	**VII**		Faculty Name	**Dr.N.Sujaudeen/ Ms.S.Lakshmi Priya**			
Department Offering the Course			**Computer Science and Engineering**				

COURSE OBJECTIVES

- To gain knowledge on different display devices and its working principles
- To understand the 2D and 3D dimensional graphics representation and object transformations
- To understand illumination principles and color models used in output devices
- To understand basic concepts of multimedia
- To explore Blender graphics tool and design animations.

UNIT I DISPLAY SYSTEMS AND OUTPUT PRIMITIVES 8

Introduction to computer graphics – Applications; Overview of graphics systems: Video display devices – Raster scan systems – Random scan systems; Output primitives: Points and lines – Loading the frame buffer – Line drawing algorithms: DDA and Bresenham's line drawing algorithms – Circle and ellipse generating algorithms – Pixel addressing and object geometry.

UNIT II TWO DIMENSIONAL GRAPHICS 9

Two dimensional geometric transformations: Basic transformations – Matrix representations and homogeneous coordinates – Composite transformations; Two dimensional viewing: Viewing pipeline – viewing coordinate reference frame – Window to viewport coordinate transformation – Clipping operations: Point and text clipping – Line and polygon clipping algorithms.

UNIT III THREE DIMENSIONAL GRAPHICS 10

Three dimensional concepts; Three dimensional object representations: Polygon surfaces – Polygon tables – Plane equations – Polygon meshes – Curved lines and surfaces – Quadratic surfaces– Blobby objects – Spline representations – Bezier curves and surfaces; Three Dimensional Geometric and Modeling Transformations: Translation – Rotation – Scaling – Composite transformations; Three Dimensional Viewing: Viewing pipeline – Viewing coordinates – Projections – View volumes – Clipping.

UNIT IV ILLUMINATION MODELS AND ANIMATION 8

Light sources – Basic illumination models: Ambient, Diffuse, Specular Components of the Phong model; Color Models: Properties of light – Standard primaries and chromaticity diagram – RGB, YIQ, CMY, HSV and HLS color models; Computer Animation: Design of animation sequences – Keyframe systems – Motion specifications.

UNIT V MULTIMEDIA 10

Multimedia Systems Design: Multimedia elements – Multimedia applications – Multimedia systems architecture – Defining objects for multimedia systems – Multimedia data interface standards; Compression and decompression; Data and File Format Standards; Hypermedia Messaging; Case Study – Blender Graphics: Fundamentals – Drawing Basic Shapes – Modelling – Shading & textures.

TOTAL PERIODS: 45

COURSE OUTCOMES

After the completion of this course, students will be able to:

1. Apply the algorithms to manipulate output primitives such as line, circle, ellipse (K3)
2. Demonstrate transformations, representations and clipping on 2D objects and map window to viewport transformations (K3)
3. Apply three Dimensional concepts like representations, geometric transformations, and projections (K3)
4. Understand the working of different illumination and color models used to render an animation scene (K2)
5. Understand different types of multimedia file formats, compression techniques and design basic 3D Scenes using Blender (K2).

TEXT BOOKS

1. Donald Hearn, Pauline Baker M, “Computer Graphics”, Prentice Hall, New Delhi, 2007.
2. Andleigh P K, Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003.

REFERENCES

1. Foley, Vandam, Feiner, Hughes, “Computer Graphics: Principles and Practice”, 2nd Edition, Pearson Education, 2003.
2. Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers, 2006.
3. Hill F S Jr, “Computer Graphics”, Maxwell Macmillan, 1990.
4. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, AK Peters, “Fundamentals of Computer Graphics”, CRC Press, 2010.
5. https://www.blender.org/support/tutorials/

COURSE PLAN

COURSE OUTCOMES

After the completion of this course, students will be able to:

1. Apply the algorithms to manipulate output primitives such as line, circle, ellipse (K3)
2. Demonstrate transformations, representations and clipping on 2D objects and map window to viewport transformations (K3)
3. Apply three Dimensional concepts like representations, geometric transformations, and projections (K3)
4. Understand the working of different illumination and color models used to render an animation scene (K2)
5. Understand different types of multimedia file formats, compression techniques and design basic 3D Scenes using Blender (K2)

Content Delivery Methods (CDM): P: Presentations, D:Demo PS: Problem Solving, S: Seminar
Delivery Tools: Powerpoint presentations, Blackboard, Projector, LMS
Assessment Tools: Test, Assignment

S. No.	Topic	K Level	CDM	No of Periods		Deviations if any
				Proposed	Actual	
UNIT – I DISPLAY SYSTEMS AND OUTPUT PRIMITIVES [CO1]				**9**		
1.	Course objectives and Outcomes, Course Plan, Computer Graphics Introduction and Applications	K2	P	1		
2.	Video display devices, Random & Raster Scan Systems	K2	P	1		
3.	Output primitives – Points and Lines, Loading frame buffer	K2	P	1		
4.	DDA Line drawing algorithm	K3	P,PS	1		
5.	Bresenham's Line drawing algorithm	K3	P,PS	1		
6.	Circle Drawing algorithm	K3	P,PS	1		
7.	Ellipse drawing algorithm	K3	P,PS	2		
8.	Pixel Addressing and Object Geometry	K2	P	1		
UNIT – II TWO-DIMENSIONAL GRAPHICS [CO2]				**9**		
9.	2D Transformations – Translation, Rotation, Scaling, Reflection and Shear	K3	P, PS	2		
10.	Homogeneous Coordinates and Composite transformations	K2	P, PS	1		
11.	2D Viewing: Viewing Pipeline and view coordinate reference frame,	K2	P, PS	1		

	Window to Viewport transformations					
12.	Clipping: Line clipping -Cohen Sutherland Line clipping algorithm	K3	P, PS	1		
13.	Line clipping – Liang Barsky Line clipping algorithm	K3	P, PS	1		
14.	Polygon clipping: Sutherland Hodgeman polygon clipping algorithm	K3	P, PS	1		
15.	Weiler-Atherton Polygon clipping algorithm	K3	P, PS	1		
16.	Problem Solving on clipping algorithms, Point and Text clipping	K3	PS	1		
UNIT – III THREE DIMENSIONAL GRAPHICS [CO3]				**10**		
17.	Polygon Surfaces, curved lines and surfaces and quadric surfaces, Blobby Objects	K2	P	2		
18.	Spline representations: Bezier curves and Surfaces	K2	P	1		
19.	3D basic & composite transformations	K3	P	2		
20.	Problem Solving on 3D transformations	K3	PS	1		
21.	3D Viewing: Pipeline, viewing coordinates and Projections	K2	P	1		
22.	Parallel and Perspective projection with matrix representations	K3	P,PS	2		
23.	View Volumes and clipping	K2	P	1		
UNIT – IV ILLUMINATION MODELS AND ANIMATION [CO4]				**8**		
24.	Light Sources & Basic Illumination Models: Ambient, Diffuse and Specular components of Phong model	K2	P	2		
25.	Properties of Light- Standard primaries and Chromaticity Diagram	K2	P	1		
26.	Color Models: RGB, CMY, HSV models	K2	P, PS	1		
27.	YIQ, HLS models	K2	P	1		
28.	Computer Animation : Design of animation sequences	K2	P	1		
29.	Keyframe systems	K2	P	1		
30.	Motion Specifications	K2	P	1		

UNIT – V MULTIMEDIA [CO5]				10		
31.	Multimedia Elements and applications	K2	P	1		
32.	Multimedia system architecture	K2	P	1		
33.	Defining objects for multimedia systems	K2	P	1		
34.	Data interface standards	K2	P	1		
35.	Compression and decompression	K2	S	1		
36.	Data and file format standards	K2	P	2		
37.	Hypermedia messaging	K2	P	1		
38.	CaseStudy: Blender-Drawing basic shapes	K2	S, D	1		
39.	Modelling, shading and textures	K2	S, D	1		
40.	Tableau for scientific Visualization – Introduction ***(Content Beyond Syllabus)***	K2	D	1		

Total Number of Syllabus Hours : 45

Total Number of Planned Hours : 47

Reasoning for Content Beyond Syllabus Topic: Tableau is an open-source scientific visualization tool which will be useful for final year students to use in their project work to visualize data and create reports.

Mapping of Course Outcomes with Program Outcomes

COURSE OUTCOMES (CO) MAPPED TO PROGRAMME OUTCOMES (PO) AND PROGRAM SPECIFIC OUTCOMES (PSO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											2		
CO2	3	2											2		
CO3	3	2											2		
CO4	2	1											1		
CO5	2	1			1								1		
sum	13	8			1								8		
Score	3	2			1								2		

Assessment Tools for Assessing COs

Assessment Tool	Unit	CO1	CO2	CO3	CO4	CO5
CAT-1	I & II	✓	✓			
CAT-2	II & III		✓	✓		
CAT-3	IV & V				✓	✓
Assignment K3	II, III		✓	✓		

CAT 1 assesses CO1, CO2 (from Units I and II) mapping to PO1, PO2, and PSO1. CAT 2 assesses CO2 and CO3 (from Units II and III) mapping to PO1, PO2 and PSO1. CAT 3 assesses CO4 and CO5 (from Units IV and V) mapping to PO1, PO2, and PSO1. Assignment involving complex engineering problem attributes assesses CO2 and CO3 mapping to PO5 and PSO1.

Assessment Format and Details

<table>
<tr><th colspan="3">Continuous Assessment Test</th><th rowspan="2">End Semester Examination</th></tr>
<tr><th>CAT-1</th><th>CAT-2</th><th>CAT-3</th></tr>
<tr><td>Theory</td><td>Theory</td><td>Theory</td><td>Theory</td></tr>
<tr><td>50 Marks</td><td>50 Marks</td><td>50 Marks</td><td>100 Marks</td></tr>
<tr><td colspan="3">Part A (6 * 2) Part B (3 * 6) Part C (2 * 10)</td><td rowspan="2">Part A (10 * 2)
Part B (5 * 6)
Part C (5 *10)</td></tr>
<tr><td colspan="3">i. Average of the best two test – 30 Marks
ii. 10 marks for Assignment</td></tr>
<tr><td colspan="3">40 Marks</td><td>60 Marks</td></tr>
</table>

- ✓ Average of two Continuous Assessment Tests with a weightage of 30% as per college schedule
- ✓ Assignment with a weightage of 10% as per the course instructor's schedule
- ✓ End Semester Examination with a weightage of 60% as per final examination schedule

Prepared By	Verified by	Approved By
Dr.N.Sujaudeen & Ms.S.Lakshmi Priya Course In-charge	UG-PAC Team	Dr.T.T.Mirnalinee HOD, CSE