

Fr. Conceicao Rodrigues College Of Engineering
Department of Artificial Intelligence and Data Science Engineering

S.E. (AI DS) (semester III) (2022-2023)
Course Outcomes & Assessment Plan

Subject: Computer Graphics (CG-CSC305)

Credits-3

Course Objectives:

1. To equip students with the fundamental knowledge and basic technical competence in the field of Computer Graphics..
2. To emphasize the implementation aspect of Computer Graphics Algorithms.
3. To prepare the student for advance areas and professional avenues in the field of Computer Graphics.

Teaching Scheme

Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical/Ora l	Tut	Credits
CSC305	Computer Graphics	03	--	--	03	--	---	03
CSC305	Computer Graphics Lab	--	02	--	--	1	--	01

Examination Scheme

Course Code	Course Name	Theory Marks				Term Work	Practical & Oral	Total
		Internal Assessment			End Sem Exam			
		Test 1	Test2	Avg				
CSC305	Computer Graphics	20	20	20	80 (3hr)	--	---	100
CSC305	Computer Graphics Lab					25	25	50

Syllabus: Prerequisite: Knowledge of C-Programming and basic mathematics

Module	Detailed Contents
01	Introduction and Overview of Graphics System: Definition and Representative use of computer graphics, Overview of the coordinate system, Definition of scan conversion, rasterization and rendering. Raster scan & random scan displays, Architecture of raster graphics system with display processor, Architecture of random scan systems.
02	Output Primitive: Scan conversions of point, line, circle and ellipse: DDA algorithm and Bresenham algorithm for line drawing, midpoint algorithm for circle, midpoint algorithm for ellipse drawing (Mathematical derivation for above algorithms is expected) Aliasing, Antialiasing techniques like Pre and post filtering, super sampling, and pixel phasing). Filled Area Primitive: Scan line Polygon Fill algorithm, inside outside tests, Boundary Fill and Flood fill algorithm.
03	Two Dimensional Geometric Transformations: Basic transformations: Translation, Scaling, Rotation Matrix representation and Homogeneous Coordinates Composite transformation Other transformations: Reflection and Shear
04	Two-Dimensional Viewing and Clipping Viewing transformation pipeline and Window to Viewport coordinate transformation Clipping operations: Point clipping, Line clipping algorithms: Cohen-Sutherland, Liang: Barsky, Polygon Clipping Algorithms: Sutherland- Hodgeman, Weiler-Atherton
05	Three Dimensional Geometric Transformations, Curves and Fractal Generation: 3D Transformations: Translation, Rotation, Scaling and Reflection Composite transformations: Rotation about an arbitrary axis Projections – Parallel, Perspective. (Matrix Representation) Bezier Curve, B-Spline Curve, Fractal-Geometry: Fractal Dimension, Koch Curve.
06	Visible Surface Detection and Animation Visible Surface Detection: Classification of Visible Surface Detection algorithm, Back Surface detection method, Depth Buffer method, Area Subdivision method Animation: Introduction to Animation, Traditional Animation Techniques, Principles of Animation, Key framing: Character and Facial Animation, Deformation, Motion capture

Lecture Plan : SEM III-CSC305**Modes of Content Delivery:**

i	Class Room Teaching	v	Self-Learning Online Resources	ix	Industry Visit
ii	Tutorial	vi	Slides	x	Group Discussion
ii i	Remedial Coaching	vii	Simulations/Demonstrations	xi	
i v	Lab Experiment	vii i	Expert Lecture	xi i	

Term : 18th July – 30 Oct 2022**(UT1 : 05 Sept - 07 Sept) (UT2 : 17Oct -19 Oct)****LECTURE PLAN:**

Sr. No.	Topic Planned	Planned Date	Actual Date	Delivery Mechanisms
1.	Syllabus Discussion, Introduction to Computer Graphics	25/07/22	25/07/22	Board
2.	Raster scan, Random Scan, Scan Conversion	27/07/22	27/07/22	Board + PPT
3.	DDA Algorithm, Examples, C Program for DDA	29/07/22	29/07/22	Board + PPT
4.	Bresenham's Line Algorithm, Examples, C Program	29/07/22	29/07/22	Board + PPT
5.	Midpoint Circle Algorithm Derivation	01/08/22	01/08/22	Board + PPT
6.	Midpoint Circle Algorithm Examples	02/08/22	02/08/22	Board + PPT
7.	Midpoint Ellipse Algorithm Derivation	03/08/22	03/08/22	Board + PPT
8.	Midpoint Ellipse Algorithm Examples	08/08/22	08/08/22	Board + PPT
9.	Aliasing, Antialiasing Inside/Outside Test, Winding Number Method	10/08/22	10/08/22	Board + PPT
10.	Flood Fill : 4 Connected, 8 Connected	22/08/22	22/08/22	Board + PPT
11.	2D Transformation: Translation, scaling	23/08/22	23/08/22	Board + PPT
12.	2D Rotation	24/08/22	24/08/22	Board + PPT

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13.	2D Rotation about arbitrary point, pivot point	29/08/22	29/08/22	Board + PPT
14.	2D Reflection Transformation	30/08/22	30/08/22	Board + PPT
15.	2D Reflection about $y = mx + c$	12/09/22	12/09/22	Board + PPT
16.	3D Transformation	13/09/22	13/09/22	Board + PPT
17.	3D Transformation	14/09/22	14/09/22	Board + PPT
18.	Bezier Curve	18/09/22	18/09/22	Board + PPT
19.	B-Spline Curve, Fractals	20/09/22	20/09/22	Board + PPT
20.	Projections	21/09/22	21/09/22	Board + PPT
21.	Oblique Projection	26/09/22	26/09/22	Board + PPT
22.	Perspective Projection	27/09/22	27/09/22	Board + PPT
23.	Window to Viewport Conversion and its numericals	28/09/22	28/09/22	Board + PPT
24.	Window to Viewport Transformation,	30/09/22	30/09/22	Board + PPT
25.	Point Clipping, Line Clipping	3/10/22	3/10/22	Board + PPT
26.	Cohen Sutherland Line Clipping Algorithm	7/10/22	7/10/22	Board + PPT
27.	Liang-Barsky Line Clipping Algorithm	10/10/22	10/10/22	Board + PPT
28.	Polygon Clipping Algorithms, Text Clipping	12/10/22	12/10/22	Board + PPT
29.	Visible Surface Detection	12/10/22	12/10/22	Board + PPT
30.	Animation, Animation Principles	14/10/22	14/10/22	Board + PPT
31.	Animation Principles, Facial and Character Animation	14/10/22	14/10/22	Board + PPT

Text Books

1. Donald Hearn and M. Pauline Baker, “Computer Graphics”, Pearson Education.
2. James D. Foley, Andries van Dam, Steven K Feiner, John F. Hughes, “Computer Graphics Principles and Practice in C”, 2ndEdition, Pearson Publication
3. Samit Bhattacharya, “Computer Graphics”, Oxford Publication

Reference Books

1. Rogers, “Procedural Elements of Computer Graphics”, Tata McGraw Hill.
2. Zhigang Xiang, Roy Plastock, “Computer Graphics”, Schaum’s Outlines McGraw-Hill Education
3. R. K Maurya, “Computer Graphics with Virtual Reality”, Wiley India.
4. F.S. Hill, Stephen M. Kelley , “Computer Graphics using Open GL” Prentice Hall

Course Outcomes: [Target 2.5]

After successful completion of the course students will be able to:

CO1	Describe the basic concepts of Computer Graphics.
CO2	Demonstrate various algorithms for basic graphics primitives.
CO3	Apply 2-D geometric transformations on graphical objects.
CO4	Use various Clipping algorithms on graphical objects
CO5	Explore 3-D geometric transformations, curve representation techniques and projection methods.
CO6	Explain visible surface detection techniques and Animation.

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS 0 1
CSC305.1	2											3	2
CSC305.2	3	2	3									3	2
CSC305.3	3	3	3									3	3
CSC305.4	3	3	3									3	3
CSC305.5	3	2	2									3	3
CSC305.6	2											3	2
TOTAL	19	10	11									16	15
CO-PO MATRIX	3.16	1.66	1.83									2. 66	2. 5

CO ASSESSMENT TOOLS

	Direct Methods (80%)					Indirect Methods (20%)
	Test 1	Test 2	Lab	Assignment	University Theory Result	(100%)
CSC604.1	40%			40%	20%	(100%)
CSC604.2	30%		30%	20%	20%	(100%)
CSC604.3			30%	20%	20%	(100%)
CSC604.4		30%	30%	20%	20%	(100%)
CSC604.5		30%	30%	20%	20%	(100%)
CSC604.6		40%		40%	20%	

Gurriculum Gap/Content Beyond Syllabus:

Sr.No	Gap/Content Beyond Syllabus	Activity	Topic
1	Open GL programming	Nptel video	https://www.youtube.com/watch?v=XYWjnRV3ty8
2	Virtual Reality	Guest lecture	Computer Graphics with virtual reality perspective

Rubrics for Assignments

Class : S.E. AI & DS

Semester : III

Assignment No:	
Title:	
Date of Performance:	
Roll No:	
Name of the Student:	

Evaluation:

Indicator	Very Poor	Poor	Average	Good	Excellent
Timeline (2)	More than three sessions late (0)	More than two sessions late (0.5)	Two sessions late (1)	One session late (1.5)	Early or on time (2)
Organization (3)	N/A	Very poor readability and not structured (0.5)	Poor readability and somewhat structured (1)	Readable with one or two mistakes and structured (2)	Very well written and structured without any mistakes (3)
Level of content (3)	N/A	Major points are omitted or addressed minimally (0.5)	All major topics are covered, the information is accurate.(1)	Most major and some minor criteria are included. Information is Accurate (2)	All major and minor criteria are covered and are accurate. (3)
Depth of Knowledge(2)	N/A	One answer correct(0.5)	Two answers correct(1)	Three answers correct(1.5)	Four answers correct(2)

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