
	Daffodil International University Department of Computer Science and Engineering (CSE) OBE Course Outline			
Course Code:	CSE422			
Course Title:	Computer Graphics Lab			
Program:	B.Sc. in CSE			
Faculty:	Faculty of Science and Information Technology (FSIT)			
Semester:	Fall	Year:	2025	
Credit:	2	Contact Hour:	4hr 30mnt/week	
Course Level:	L4T2	Prerequisite:	CSE213L, CSE222L	
Course Category:	Core Engineering			
Instructor Name:	Tapasy Rabeya			
Designation:	Lecturer (Senior Scale)			
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Course Content

Output Primitives: Points and Lines, Different shape design, Line Drawing Algorithm, DDA Algorithm, Bresenham's Line Algorithm, Circle-Generating Algorithms, Properties of Circles, Midpoint Circle Algorithm. **Two-Dimensional Geometric Transformations:** Basic Transformations, Translation, Rotation, Scaling, Reflection, Shear. **Color Models and Color Applications:** Properties of Light, RGB Color Model. **Computer Animation:** Design of Animation Sequences

Course Rationale

Computer Graphics and Design - Foundation Level 2 provides applied learning opportunities for learners with an interest in computer graphics who are looking to foster a career within design-based industries and/or wish to prepare for further study in Computer Graphics and Design Level 3.

Course Objective

- To understand interactive graphics applications and primitives for graphics drawing
- To use OpenGL graphics tools for implementing graphics programming
- To perform simple 2D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of anti-aliasing techniques.
- To design and create a project by performing effective communication skill.

Program Outcomes (POs):

PO1: Engineering knowledge

PO5: Modern Tool Usage

PO9: Individual Work / Team work

PO10: Communication

Learning Domains:

Cognitive – C1: Understanding, C2: Remembering, C3: Applying, C4: Analyzing, C6: Creating

Psychomotor – P3: Manipulation

Affective – A2: Responding

Knowledge Profile:

K1: A systematic, theory-based understanding of the natural sciences applicable to the discipline.

K2: Conceptually-based mathematics, numerical analysis, statistics, and formal aspects of computer and information science

K3: Systematic understanding of engineering fundamentals required in the engineering discipline.

K4: Engineering specialist knowledge providing theoretical frameworks and bodies of knowledge for accepted practice areas in the engineering discipline, often at the forefront of the discipline.

K6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline

Complex Engineering Problem:

EP1: Depth of knowledge required

EP3: Depth of analysis required

EP5: Extent of applicable codes

Complex Engineering Activities (EA)

EA1: Range of resources (Diverse resources)

Course Outcomes (CO's):

After completion of this course students will be able to:

CO1	Understand computer graphics system and implement graphics primitives for drawing a graphics scene.
CO2	Apply appropriate OpenGL programming techniques, resources and modern engineering and IT tools to solve graphics programming issues including different shapes, 2D and 3D transformation
CO3	Perform effectively as an individual or a member or a leader of diverse teams through proper documentation and initialization of project work
CO4	Create a project by explaining complex computer engineering activities with the computer engineering community by performing effective communication through effective reports, design documentation, make effective presentations and give and receive clear instructions.

Program Outcomes (PO's)

Program Outcomes are reported in Appendix-I.

Mapping Course Outcome (COs) with the Teaching-Learning and Assessment Strategy:

CO's	CO Statement	Corresponding PO number	Domain Level/ Learning Taxonomy	Level of Knowledge Profile (K)	Complex Engineering Problem (EP)	Complex Engineering Activities (EA)
CO1	Understand computer graphics system and implement graphics primitives for drawing a graphics scene.	PO1	C1, C2	K1-K4	EP1	

CO2	Apply appropriate OpenGL programming techniques, resources and modern engineering and IT tools to solve graphics programming issues including different shapes, 2D and 3D transformation	PO5	C3, C4	K1-K4, K6	EP1, EP3	
CO3	Perform effectively as an individual or a member or a leader of diverse teams through proper documentation and initialization of project work	PO9	C4, A2	K6	EP1, EP3	
CO4	Create a project by explaining complex computer engineering activities with the computer engineering community by performing effective communication through demonstration and presentation	PO10	C6, P3, A2	K4	EP3, EP5	EA3

Mapping of Assessment Tools with Course Outcomes (COs):

Assessment Tools	Course Outcomes (COs)
Lab Performance	CO1: Basic Graphics application and primitives for graphics drawing
	CO2: Apply OpenGL graphics tools for implementing graphics programming
	CO3: Individually performs lab task
Lab Report	CO1: Basic Graphics application and primitives for graphics drawing
	CO2: Apply OpenGL graphics tools for implementing graphics programming
	CO3: Individually performs lab report
Lab Project	CO3: Perform group work for completing lab project
	CO4: Develop a new project to solve a real world problem

Course Delivery Plan/Lesson Delivery Plan

Week/ Lesson (Hour)	Experiment Name and Details	Mapping with CO	Assessment Plan
Lab 1	Exp Name: Draw a Home Fundamental knowledge about OpenGL, installation and working with some basic built in functions.	CO1, CO3	Lab Performance, Lab report
Lab 2	Exp Name: Draw 4 stars Working with different shapes by changing colors like star, home.	CO1, CO3	Lab Performance, Lab report

Week/ Lesson (Hour)	Experiment Name and Details	Mapping with CO	Assessment Plan
Lab 3	Exp Name: Draw 8 X 8 chess board Working with shapes by using for loops to create a chess board	CO1, CO3	Lab Performance, Lab report
Lab 4	Exp Name: Implementation of DDA line drawing algorithm -Exercise based on class discussion -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 5	Exp Name: Implementation of Bresenham's Line Drawing algorithm -Exercise based on class discussion -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 6	Exp Name: Implementation of Mid-Point Circle Drawing algorithm -Exercise based on class discussion -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 7	Project Follow up	CO3, CO4	Lab Project
Lab 8	Exp Name: Draw a flag of Bangladesh by using Circle algorithm -Exercise based on class discussion -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 9	Exp Name: Draw a "Shahid Minar" of Bangladesh by using Circle algorithm -Exercise based on class discussion -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 10	Exp Name: Draw a bi-cycle -Exercise based on class discussion -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 11	Exp Name: Implementation of 2D transformation -Exercise based on class discussion -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 12	Project follow-up	CO3, CO4	Lab Project
Lab 13	Exp Name: Implementation of moving particles -Problem solving in the lab	CO2, CO3	Lab Performance, Lab report
Lab 14	Project Presentation, Project Show and Viva	CO3, CO4	Lab Project & Viva

Laboratory Performance Assessment Scheme:

Lab Perfor	Lab Exp. Name	COs	Cognitive Domain	Psycho motor	Affect ive	CO's Mark	Total Marks
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mance No			C1	C2	C3	C4	Domain P3	Doma in A2	CO1	CO2	CO3	of CO
LP-1	Draw 4 stars	CO1	1	1					2			2
		CO3						0.5			0.5	0.5
LP-2	Draw 8 X 8 chess board	CO1	1	1					2			2
		CO3						0.5			0.5	0.5
LP-3	Implementation of DDA line drawing algorithm	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
LP-4	Implementation of Bresenham’s Line Drawing algorithm	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
LP-5	Implementation of Mid-Point Circle Drawing algorithm	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
LP-6	Draw a flag of Bangladesh by using Circle algorithm	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
LP-7	Draw a “Shahid Minar” of Bangladesh by using Circle algorithm	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
LP-8	Draw a bi-cycle	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
LP-9	Implementation of 2D transformation	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
LP-10	Implementation of moving particles	CO2			1	1				2		2
		CO3						0.5			0.5	0.5
Totals			2	2	8	8		5	4	16	5	25

Lab Report Assessment Scheme:

Lab Report	Lab Report Name	COs	Cognitive Domain	Psychomotor	Affective	CO's Mark	Total Marks
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tNo							Domain P3	Doma in A2				of CO
			C1	C2	C3	C4			CO1	CO2	CO3	
LR-1	Draw 4 stars	CO1	1	1					2			2
		CO3				0.5					0.5	0.5
LR-2	Draw 8 X 8 chess board	CO1	1	1					2			2
		CO3				0.5					0.5	0.5
LR-3	Implementation of DDA line drawing algorithm	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
LR-4	Implementation of Bresenham’s Line Drawing algorithm	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
LR-5	Implementation of Mid-Point Circle Drawing algorithm	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
LR-6	Draw a flag of Bangladesh by using Circle algorithm	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
LR-7	Draw a “Shahid Minar” of Bangladesh by using Circle algorithm	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
LR-8	Draw a bi-cycle	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
LR-9	Implementation of 2D transformation	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
LR-10	Implementation of moving particles	CO2			1	1				2		2
		CO3				0.5					0.5	0.5
Totals			2	2	8	13			4	16	5	25

Lab Project Assessment Scheme

Assessment	Assessment Criteria	COs	Cognitive Domain		Psychomotor Domain	Affective Domain	CO Marks				CO's Total Marks
			C4	C6	P3	A2	CO1	CO2	CO3	CO4	
Lab Project (Open-Ended Problem)	Graphics Complexity & Algorithm Usage (EP1)	CO1	Y				8				40
	Analysis & Logical Structure (EP3)	CO2	Y				8				
	Application of Graphics Codes & Realism (EP5)	CO3		Y	Y				8		
	Documentation & Project presentation & Viva (EA1 & EA3)	CO4		Y		Y				16	

List of Open Ended Problems (Project List):

Serial No.	Open-Ended Problem
1	Draw a “Village Scenery” with some moving objects by Using OpenGL
2	Design and implement a “City Scenery” using OpenGL
3	Draw an “interior design” with some moving objects of a room.
4	Draw a “Village Hut-Bazar” with some moving objects
5	Draw “Bangladesher Shadhinota” with some real time objects
6	Draw the scenery of a “Primary School” of Bangladesh
7	Draw “Three moving cartoons in a jungle” by using OpenGL

Overall Assessment Scheme:

Assessment Tools	CO Marks				PO Marks				Total
	CO1	CO2	CO3	CO4	PO1	PO5	PO9	PO10	
Class Participation									10
Lab Performance	4	16	5		4	16	5		25
Lab Report	4	16	5		4	16	5		25
Lab Project	8	8	8	16	8	8	8	16	40
Total	16	40	18	16	16	40	18	16	
Grand Total									100

Learning Materials:

Textbook

Computer Graphics, by Donald Hearn, M. Pauline Baker

Reference Books

1. Schaum's Outline of Computer Graphics by Ray Plastock, Gordon Kalley, Zhiang Xiang, Zhingang Xiang
2. C Programming Using Turbo C++ by Robert Lafore
3. Fundamentals of Computer Graphics, by Peter Shirley et al., ISBN 978-1568812694
4. Interactive Computer Graphics: A Top-Down Approach with Shader-Based OpenGL by Shreiner and Angel, Pearson Education ISBN 9780273752264
5. Computer Graphics: Principles and Practice by Foley, Van Dam, Feiner, & Hughes, Addison-Wesley ISBN 0201848406