
	<b>Daffodil International University</b> <b>Department of Computer Science and Engineering (CSE)</b> <b>Course Outline</b>			
<b>Course Code:</b>	CSE 421			
<b>Course Title:</b>	Computer Graphics			
<b>Program:</b>	B.Sc. in CSE			
<b>Faculty:</b>	Faculty of Science and Information Technology (FSIT)			
<b>Semester:</b>	Spring	<b>Year:</b>	2021	
<b>Credit:</b>	3.00	<b>Contact Hour:</b>	3hrs/week	
<b>Course Level:</b>	L4T2	<b>Prerequisite:</b>	MAT211, CSE213, CSE222, STA 223	
<b>Course Category:</b>	Core Engineering			
<b>Instructor Name:</b>	Nazmun Nessa Moon			
<b>Designation:</b>	Assistant Professor			
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<b>Office Address:</b>	Room-421, CSE Building, DIU			
<b>Class Hours:</b>	<b>Section</b>	<b>Class Day</b>	<b>Class Hours</b>	<b>Classroom</b>
<b>Google Classroom Code:</b>				

## 1. Course Rationale

Computer Graphics is a 3-credit senior-level course that introduces the concepts and implementation of computer graphics. As one of the important subject areas of the study of computer science and information systems, this course will focus on the theoretical aspects and implementation of computer graphics using OpenGL.

### 1.1. Course Objective

Computer Graphics and Design - Foundation provides potential for the engagement of integrated learning opportunities and the capacity to develop design thinking skills to effectively transfer knowledge and understanding across disciplines. The applied design thinking and problem solving focus of this course helps equip learners to develop skills essential for the digital age.

### 1.2. Course Outcomes (CO's)

CO1	Able to explain the core concepts of computer graphics, including output primitives, anti-aliasing, transformation and viewing in 2D.
CO2	Able to apply the concepts of 3D display, projection, perspective, modelling and transformation.
CO3	Able to describe the fundamentals of colour models, lighting and shading models, animation, dithering, parametric curves, hidden surface elimination and rendering.
CO4	Able to demonstrate effective OpenGL programs to solve graphics programming issues, including output primitives, 2D and 3D transformation, objects viewing and modelling, colour modelling, lighting and shading.

### 1.3. Program Outcomes (PO's)

Program Outcomes are reported in Appendix-I.

### 1.4. CO-PO Mapping

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
3	3	2									
2	3	3									
2		3									
		2									

### 1.5. CO Assessment Scheme

Assessment Task	CO's					Mark (Total=100)
	CO1	CO2	CO3	CO4	CO5	
Attendance	--	--	--	--	--	7
Class Test (CT1, CT2, CT3)	--	--	--	--	--	15
Assignment	--	--	--	--	--	5
Presentation	--	--	--	--	--	8
Midterm Examination	--	--	--	--	--	25
Semester Final Examination	--	--	--	--	--	40
Total Mark						100

## 2. Strategies and approaches to learning

### 2.1. Teaching and Learning Activities (TLA)

<b>TLA1</b>	Lectures twice a week using multimedia and whiteboard of different topics.
<b>TLA2</b>	Active discussion in class regarding efficient solving of the logical and mathematical problems.
<b>TLA3</b>	Group discussion and presentation regarding diverse problems and corresponding lectures.
<b>TLA4</b>	Evaluation of class performances to reach each student in a class for every topic.

### 3. Course Schedule and Structure

#### 3.1. Textbook

Computer Graphics, by Donald Hearn, M. Pauline Baker

#### 3.2. 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

#### 3.3. Course Plan/Lesson Plan

Week	Lesson	Topic	Teaching and Learning Activities (TLAi)	Textbook & Video Reference	Related CO's
1	Les. 1	Introduction: A Survey of Computer Graphics, Application of Computer Graphics	TLA1	Chapter-1 [page 4-page 34]	CO1
	Les. 2	Video Display Devices: Refresh Cathode Ray Tubes, Raster and Random Scan Displays, Color CRT Monitors, DVST, Flat-Panel Displays.	TLA1, TLA2	Chapter-2 [page 36-page 52]	CO1
2	Les. 3	Points and Lines, Line Drawing Algorithm, DDA Algorithm	TLA2, TLA3	Chapter-3 [page 84-page 88]	CO1
	Les. 4	DDA Algorithm-example with plot in a graph.	TLA4	Do	CO1, CO4
		(Class Test – 1, Assignment – 1)			
3	Les. 5	Bresenham's Line Algorithm with Parameter description.	TLA2, TLA3	Chapter-3 [page 88-page 92]	CO1
	Les. 6	Bresenham's Line Algorithm with example	TLA4	Do	CO1, CO4
4	Les. 7	Circle Generating Algorithm, Properties of Circle, Midpoint Circle Algorithm	TLA2, TLA3	Chapter-3 [page 97-page 101]	CO1
	Les. 8	Midpoint Circle Algorithm with example	TLA4	Do	CO1, CO4

5		(Class Test – 2)			
	Les. 9	Antialiasing-Different techniques	TLA1	Chapter-4 [page 171-page 178]	CO1
	Les. 10	Two-Dimensional Geometric Transformation	TLA1, TLA2	Chapter-5 [page 184-page 190]	CO1, CO4
6	Les. 11	Two-Dimensional Viewing, Window-to-Viewport Coordinate Transformation	TLA1, TLA2	Chapter-6 [page 217-page 221]	CO1
	Les. 12	Two-Dimensional Clipping, Cohen-Sutherland Line Clipping Algorithm	TLA2, TLA3	Chapter-6 [page 224-page 230]	CO1, CO4
(MID-TERM EXAM)					
7	Les. 13	Polygon Clipping: Sutherland-Hodgeman Polygon Clipping Algorithm	TLA2, TLA3	Chapter-6 [page 237-page 242]	CO1
	Les. 14	Sutherland- Hodgeman Polygon Clipping Algorithm-Example	TLA4	Do	CO1, CO4
8	Les. 15	Polygon Clipping: Weiler-Atherton Polygon Clipping Algorithm	TLA2, TLA3	Chapter-6 [page 242-page 243]	CO1
	Les. 16	Weiler-Atherton Polygon Clipping Algorithm-Example	TLA4	Do	CO1, CO4
9	Les. 17	Three Dimensional Display Methods, Parallel Projection, Perspective projection	TLA1, TLA3	Chapter-9 [page 297-page 299]	CO2
	Les. 18	Depth Cueing, Visible Line and Surface Identification, Surface Rendering	TLA1, TLA3	Chapter-9 [page 299-page 301]	CO3
10		(Class Test-3, Assignment – 2)			
	Les. 19	Bezier Curves, Spline Curves	TLA1, TLA3	Chapter-10 [page 327-page 346]	CO3
	Les. 20	3D Geometric Transformation	TLA2, TLA3	Chapter-11 [page 408-page 423]	CO2
11	Les. 21	Halftone Pattern and Dithering Techniques	TLA1, TLA3	Chapter-14 [page 516-page 522]	CO3
	Les. 22	Color Models and Color Applications	TLA1, TLA3	Chapter-15 [page 572-page 575]	CO3, CO4
12	Les. 23	Computer Animation: Design of Animation Sequences	TLA1, TLA3	Chapter-16 [page 299-page 301]	CO3
	Les. 24	Review Class			
(FINAL EXAM)					

#### 4. Assessment Methods

##### Grading System

Numerical Grade	Letter Grade	Grade Point
80-100	A+	4.00
75-79	A	3.75
70-74	A-	3.50

65-69	B+	3.25
60-64	B	3.00
55-59	B-	2.75
50-54	C+	2.50
45-49	C	2.25
40-44	D	2.00
Less than 40	F	0.00

## 5. Additional Support for Students

Student Portal:

<http://studentportal.diu.edu.bd/>

Academic Guidelines

<https://daffodilvarsity.edu.bd/article/academic-guidelines>

Rules and Regulations of DIU

<https://daffodilvarsity.edu.bd/article/rules-and-regulation>

Career Development Center:

<https://cdc.daffodilvarsity.edu.bd/>

For general queries:

<http://daffodilvarsity.edu.bd/>

## Program Outcomes and Assessment

Program Outcomes (POs) are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills and attitudes that students acquire while progressing through the program. The program must demonstrate that by the time of graduation, students have attained a certain set of knowledge, skills and behavioral traits to some acceptable minimum level. The BAETE specifically requires that students acquire the following graduate attributes.

<b>PO1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem analysis:</b> Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.
<b>PO4</b>	<b>Investigation:</b> Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage:</b> Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.
<b>PO9</b>	<b>Individual work and teamwork:</b> Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.
<b>PO11</b>	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.
<b>PO12</b>	<b>Life-long learning:</b> Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.