

# CS4182: COMPUTER GRAPHICS

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Computer Graphics

### Subject Code

CS - Computer Science

### Course Number

4182

### Academic Unit

Computer Science (CS)

### College/School

College of Computing (CC)

### Course Duration

One Semester

### Credit Units

3

### Level

B1, B2, B3, B4 - Bachelor's Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

CS2303 Data Structures for Media or  
CS3334 Data Structures or  
EE3206 Java Programming and Applications

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course aims at introducing the concepts and algorithms of 2D/3D computer graphics and the applications of computer graphics technologies. The main objectives are to cover the basic image generation techniques and to expose students to current graphics technologies and show them how these technologies can be used to solve real-world problems.

### Course Intended Learning Outcomes (CILOs)

| CILOs |                                                                          | Weighting (if DEC-A1 app.) |   | DEC-A2 | DEC-A3 |
|-------|--------------------------------------------------------------------------|----------------------------|---|--------|--------|
| 1     | Identify the main characteristics of basic computer graphics techniques. |                            | x |        |        |
| 2     | Design simple graphics algorithms.                                       |                            |   |        |        |
| 3     | Evaluate and critique different types of graphics systems.               |                            |   | x      |        |
| 4     | Apply computer graphics techniques to real-world applications.           |                            |   | x      |        |

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Learning and Teaching Activities (LTAs)

| LTAs |          | Brief Description                                                                                                                                                           | CILO No.   | Hours/week (if applicable) |
|------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------|
| 1    | Lectures | Students will engage in formal lectures to gain knowledge of the concepts and algorithms of 2D/3D computer graphics and the applications of computer graphics technologies. | 1, 2, 3, 4 | 3 hours/week               |

|   |                |                                                                                                                                                                                                                                                                                                        |      |                  |
|---|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------|
| 2 | Tutorials      | Students will engage in tutorial activities to deepen their understanding of the algorithms learned in lectures through some exercise questions. The answers to the exercise questions are then provided and discussed in order for the students to learn to evaluate and develop graphics techniques. | 2, 3 | 8 hours/semester |
| 3 | Course Project | Students will participate in developing a mini-graphics project, either by themselves or in groups. The project will involve OpenGL programming.                                                                                                                                                       | 2, 4 | After class      |

**Assessment Tasks / Activities (ATs)**

| ATs |                | CILO No. | Weighting (%) | Remarks ("- for nil entry) | Allow Use of GenAI? |
|-----|----------------|----------|---------------|----------------------------|---------------------|
| 1   | Quiz           | 1, 2, 3  | 20            | -                          | No                  |
| 2   | Course Project | 2, 4     | 20            | -                          | Yes                 |

**Continuous Assessment (%)**

40

**Examination (%)**

60

**Examination Duration (Hours)**

2

**Minimum Examination Passing Requirement (%)**

30

**Additional Information for ATs**

For a student to pass the course, at least 30% of the maximum mark for the examination AND 30% of the maximum mark of the course project must be obtained.

**Assessment Rubrics (AR)****Assessment Task**

Quiz

**Criterion**

Capacity in understanding the key concerns of computer graphics techniques

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Note even reaching marginal levels

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**Assessment Task**

Course Project

**Criterion**

Ability to apply computer graphics techniques to develop an application

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Note even reaching marginal levels

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**Assessment Task**

Examination

**Criterion**

Ability to evaluate computer graphics software and to apply computer graphics techniques on applications

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Note even reaching marginal levels

## Part III Other Information

### Keyword Syllabus

2D graphics. 2D transformations. 2D projection. 3D graphics. 3D transformations. 3D projection. Clipping. Object modeling. Rendering pipeline. Ray-tracing. Radiosity. Aliasing. Spatial aliasing. Temporal aliasing. Anti-aliasing. Image processing. Window systems. Virtual reality. Multimedia.

### Syllabus

- Basic computer graphics techniques  
Graphical input/output devices, 2D primitive drawing, 2D transformation, 3D transformation and projection, clipping, object modeling.
- Image Generation Techniques  
Some of the important image generation techniques including scan-conversion, ray-tracing and radiosity. Related issues such as shading, anti-aliasing and texture mapping will also be discussed.
- Applications of Computer Graphics  
Introduction to window system, virtual reality, image processing and multimedia.

### Reading List

#### Compulsory Readings

| Title |     |
|-------|-----|
| 1     | Nil |

#### Additional Readings

| Title |                                                                                                                                                                 |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | J. Hughes, A. van Dam, M. McGuire, D. Sklar, J. Foley, S. Feiner, and K. Akeley (2014) Computer Graphics: Principles and Practice. Addison Wesley, 3rd edition. |
| 2     | J. Foley, A. van Dam, S. Feiner, J. Huges, and R. Phillips (1994). Introduction to Computer Graphics. Addison Wesley.                                           |
| 3     | D. Hearn and M. Baker (2014). Computer Graphics. Prentice-Hall, 4th edition.                                                                                    |