CS5182: COMPUTER GRAPHICS

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Computer Graphics

Subject Code
CS - Computer Science
Course Number
5182

Academic Unit
Computer Science (CS)

College/School
College of Computing (CC)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate 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 covers the core concepts and algorithms of 2D/3D computer graphics and the applications of computer graphics technologies. The main objective is to familiarize students with current computer graphics techniques and their applications in different domains.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Identify and explain the motivation and the main characteristics of different computer graphics techniques.		x		
2	Design and develop computer graphics algorithms.			x	
3	Evaluate and critique different types of graphics systems.			x	
4	Apply computer graphics/geometry processing techniques to real-world applications.			x	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	Lecture	Students will engage in lectures on the introduction of various 2D/3D computer graphics techniques.	1, 2, 3, 4	2 hours/ week
2	Tutorial	In the tutorials, students will complete exercise questions provided during the class. The answers to the exercise questions are then provided and discussed.	2, 3	1 hour/ week

3	Project	In the project, students will apply deep learning-based techniques for 3D geometry data processing or computer graphics techniques to develop an application. The project may involve OpenGL or deep learning-based programming.	2, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Mid-term Quiz	1, 2, 3	15	-	No
2	Course Project	2, 4	25	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.	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

1. Mid-term Quiz (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

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) Not even reaching marginal levels

Assessment Task
2. Course Project (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to apply computer graphics/geometry processing 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) Not even reaching marginal levels

Assessment Task
3. Final Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

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) Not even reaching marginal levels

Assessment Task
1. Mid-term Quiz (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Capacity in understanding the key concerns of computer graphics techniques

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
2. Course Project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to apply computer graphics/geometry processing techniques to develop an application

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
3. Final Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

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

Excellent
(A+, A, A-) High

Good
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Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- Object modeling
- 2D/3DTransformation
- Projection and Clipping, Hidden Surface Removal and Shading
- Rendering Pipeline
- Deep Learning for 3D Point Clouds
- Ray-Tracing and Radiosity
- Spatial and Temporal Aliasing, and Anti-aliasing methods
- Real-time rendering
- GPU Architecture, Computer Animation
- Image-based rendering
- Neural rendering

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.
4	Research papers on deep learning-based 3D geometry data processing