CS4182: COMPUTER GRAPHICS

Effective Term
Semester A 2023/24

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 Engineering (EG)

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)

<table>
<thead>
<tr>
<th>CILOs</th>
<th>Weighting (if app.)</th>
<th>DEC-A1</th>
<th>DEC-A2</th>
<th>DEC-A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the main characteristics of basic computer graphics techniques.</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Design and develop simple graphics algorithms.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Evaluate and critique different types of graphics systems.</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>Apply computer graphics techniques to real-world applications.</td>
<td></td>
<td></td>
<td>x</td>
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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.

Teaching and Learning Activities (TLAs)

<table>
<thead>
<tr>
<th>TLAs</th>
<th>Brief Description</th>
<th>CILO No.</th>
<th>Hours/week (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>Introduce the concepts and algorithms of 2D/3D computer graphics and the applications of computer graphics technologies.</td>
<td>1, 2, 3, 4</td>
<td>3 hours/week</td>
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<tr>
<td>Tutorials</td>
<td>In most tutorials, students are provided with exercise questions and asked to do them during the class. The answers to the exercise questions are then provided and discussed in order for the students to learn to evaluate and develop graphics techniques.</td>
<td>2, 3</td>
<td>8 hours/semester</td>
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</table>
In the project assignment, students are asked to develop a mini-graphics project, either by themselves or in groups. The project will involve OpenGL programming.

### Assessment Tasks / Activities (ATs)

<table>
<thead>
<tr>
<th>ATs</th>
<th>CILO No.</th>
<th>Weighting (%)</th>
<th>Remarks (e.g. Parameter for GenAI use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz</td>
<td>1, 2, 3</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Course Project</td>
<td>2, 4</td>
<td>20</td>
<td></td>
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### Continuous Assessment (%)

40

### Examination (%)

60

### Examination Duration (Hours)

2

### 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
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

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

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

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<tr>
<th>Title</th>
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<td>Nil</td>
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Additional Readings

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