

CPT205 – Computer Graphics (2020-21)**Assessment 3 – Discussion Questions and 3D Modelling Project**

Assessment number	1
Contribution to overall module assessment	70%
Date on which assessment given	Tuesday, 8 December 2020
Submission deadline	Thursday, 7 January 2021

This assessment has two parts to test your understanding and application of the general knowledge, techniques and algorithms covered in the lecture and lab sessions. It will assess all four learning outcomes of the module.

PART I – Discussion Questions**[30 Marks]**

In order to answer the following two questions, you are required to first identify and read from around five sources. You will need to properly acknowledge the sources (and other places where sources are described as references).

- Q1)** Briefly describe the graphics pipeline, identify pipeline bottlenecks, and discuss possible ways to tackle the bottlenecks for enhancing the performance from both software (e.g. algorithms) and hardware perspectives.

[10 marks]

- Q2)** Discuss applications of computer graphics incorporating artificial intelligence. This should cover techniques, key issues and possible solutions with directions for future development.

[20 marks]

PART II – 3D Modelling Project**[70 marks]**

3D Scene – You will create a 3-dimensional scene which is suitable to demonstrate your knowledge and skills in computer graphics. You should make use of the graphics techniques and OpenGL functions covered in the module. In particular, you should consider the following when completing the task:

- A well thought-out design of 3D scene with a number of static and moving objects (the scene, which is not to be very complex, could still represent daily life, for example the train track used for the lab);
- A good range of graphics techniques appropriately utilised, e.g. creation of geometry, hierarchical modelling, transformations, viewing/projection, lighting and materials, texture mapping, animation and interactions;
- Effective use of relevant OpenGL libraries for implementing relevant functions;
- Good programming practice (e.g. necessary comments and neat format of the code) – do not copy from other sources without appropriate acknowledgment.

Written Report – You will produce a Word-processed report of no more than 6 A4 sides that

- describes the design and features of your work (relating to graphics techniques used but not explaining your code in detail);
- provides an instruction section about how your program can be run effectively (e.g. interactive commands with the mouse and keyboard);
- contains a set of typical screenshots to show your program in action.

TEMPLATE

A **template will be provided** for use in answering the two questions, and presenting the 3D project report.

SUBMISSION

The deadline for submission of your work is **Thursday, 7 January 2021**. The following will be required for the submission via a link in the Assessments section for the module in Learning Mall.

- a) A **pdf document** (using the **template provided** and save it as a pdf file) which is named as yourID_Surname_GivenName (e.g. **1891234_Yue_Yong.pdf**);
- b) A **single zip/rar file** containing your **source code** and **other necessary files** (e.g. header, texture image and the executable files, **but not the entire project folder** which may result in a very large file size). Your zip/rar file should be named as YourID_Surname_GivenName (e.g. **1891234_Yue_Yong.zip/rar**).

BACKUP

As a good practice, you should always make sure that your work is securely backed up on a regular basis.

PLAGIARISM AND COLLUSION

This assignment is **individual work**. **Plagiarism** (e.g. copying materials from other sources, including your own previous work, without proper acknowledgement) is a serious academic offence. Plagiarism will not be tolerated and will be dealt with in accordance with the University Code of Practice on Assessment.

Your submission will be **checked with Turnitin for similarity**.

Marking Scheme

PART I. Discussion Questions

[30 marks]

Q1 – Key aspects: a brief description of the graphics pipeline, major pipeline bottlenecks, and possible solutions considering both software and hardware.

[10 marks]

Q2 – Key aspects: background study, review/discussion of technologies relevant to computer graphics, key issues identified and possible solutions with future perspectives.

[20 marks]

Around 5 reference resources are required with appropriate acknowledgement, which can be used for both questions.

PART II. 3D Modelling Project

[70 marks]

In the following table, each category builds on the requirements contained in the preceding category. For this part of assessment, the 3D model/scene is worth 60 marks and the report 10 marks.

Category	Requirement
First Class (≥70%)	<p>Overall outstanding work. Very neat program implements effectively all the graphics techniques covered in the module.</p> <p>Excellent 3D model/scene designed and produced with real-life effect, utilising appropriate OpenGL functions.</p> <p>Well-structured and concisely written report providing all the required information.</p>
Second Upper (60 to 69%)	<p>Comprehensive program that utilises effectively a wide range of the graphics techniques covered in the module. Good commenting and layout of the program.</p> <p>An impressive 3D model/scene design with a range of objects produced with a good range of features achieved, utilising appropriate OpenGL functions.</p> <p>Comprehensive and clear report with all required information within the page limit.</p>
Second Lower (50 to 59%)	<p>Substantial working program implementing a good range of graphics techniques among hierarchical modelling, transformations, viewing/projection, lighting and materials, texture mapping, animation and interactions.</p> <p>Good design of the 3D model/scene with a range of objects.</p> <p>Written report contains all the required information.</p>
Third (40 to 49%)	<p>Working program that generates a basic 3D model/scene with some objects and a limited range of the graphics techniques utilised.</p> <p>Written report describes all the basic information for the work completed and provides a good overview.</p>
Fail (0 to 39%)	<p>Some code produced attempting to some or very limited use of graphics techniques covered in the module.</p> <p>No or very limited artefact produced.</p> <p>Written report covers very limited or few of the items required in the assignment brief, acknowledging properly sources used if any.</p>
Non-submission	A mark of 0 will be awarded.