# Computer Graphics Coursework – Self Assessment Document

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Complete the self-assessment grid below by writing a short explanation of how you have satisfied the requirement and how it has implemented in your code.

|  |  |  |
| --- | --- | --- |
| **Learning outcome** | **Mark** | **Weighted mark** |
| 1. Use appropriate mathematical tools (40%) |  | 0 |
| 2. Develop a 3D graphics application (30%) |  | 0 |
| 3. Write shader code (30%) |  | 0 |
|  | Total | 0 |

Your mark for each Learning Outcome (LO) is the highest mark achieved based on the criteria specified in the self-assessment grid. Note that you will need to have satisfied all criteria at the lower mark bands to be awarded marks in the higher mark bands, e.g., to get a mark in the 70 - 80 band for a learning outcome you will have needed to have satisfied all criteria in the 40 – 50 and 50 – 60 mark bands.

## Learning Outcomes:

**LO1** Select and use appropriate mathematical tools for constructing and manipulating geometry in 3D space.

**LO2** Develop an interactive 3D graphics application using an industry-standard API.

**LO3** Write shader code for the programmable pipeline on modern graphics hardware using an industry standard shader language.

## Self-assessment Grid

|  |  |  |
| --- | --- | --- |
| **Mark** | **Criterion** | **Comments (state how and where you have achieved the criterion)** |
| 42, 45, 48 | LO1: Basic use of vector and matrix objects | In my project, I’ve effectively utilized basic vector and matrix objects from the GLM (OpenGL Mathematics) library to handle transformations and camera functions.  I use glm::vec3 for 3D positions, rotations, and scaling. For instance, in my Object struct, the position, rotation, and scale of each object are defined using glm::vec3, which makes it easy to manipulate objects in 3D space including translating, rotating, and scaling them.  For transformations, I rely on glm::mat4 matrices. Specifically, I calculate:  - the translation matrix using Maths::translate(objects[i].position),  - the scaling matrix using Maths::scale(objects[i].scale),  - the rotation matrix using Maths::rotate(objects[i].angle, objects[i].rotation).  I combine these to form the model matrix (model = translate \* rotate \* scale), which represents each objects transformation in world space. |
| LO2: Application compiles and runs without alterations to the source code of CMake file. | Paste a screenshot of your application below |
| LO3: Implementation of shaders to apply appropriate textures to objects. |  |
| 52, 55, 58 | LO1: Basic use of translation, rotation and scaling transformations. |  |
| LO1: Implementation of glm library functions for calculating view and projection matrices. |  |
| LO2: 3D virtual world has been created using instances of a single object type. |  |
| LO3: Use of shaders to apply dynamic lighting from point light sources |  |
| 62, 65, 68 | LO1: Implementation of students own functions for calculating view and projection matrices. |  |
| LO2: 3D world created using multiple object types. |  |
| LO2: Users can navigate the virtual world using keyboard and mouse inputs. |  |
| LO3: Use of shaders to apply dynamic lighting from different types of light sources. |  |
| 72 75, 78 | LO1: Implementation of students own functions to replace glm functions (e.g., glm::length(), glm::dot(), glm::cross() etc.). |  |
| LO1: Implementation of quaternions to calculate rotation matrix. |  |
| LO2: Interactive dynamic aspects of the virtual word and controllable by the user (e.g., position of objects, location and function of light sources etc.). |  |
| LO3: Appropriate implementation of normal and specular maps. |  |
| 85, 90, 100 | LO1: Use of quaternions to calculate view matrix. |  |
| LO1: Use of SLERP to smooth out changes in camera direction. |  |
| LO2: Implementation of a third person camera with the ability to switch between first and third period view. |  |
| LO2: The position of the camera or character obeys the constraints of the physical space (e.g., can’t pass through objects, can’t hover in midair etc.). |  |
| LO3: Use of shaders to apply parameter driven effects within the scene, e.g., light properties controlled using camera/character position. |  |