University of South Wales
Prifysgol De Cymru

Faculty of Computing, Engineering and Science

Assessment Cover Sheet 2021-22

Module Code:	Module Title:	Module Team:
CS3S664	Real-time Rendering Techniques	Carl Jones Marius Miknis
Assessment Title:		**Assessment No.:**
3D Scene using DirectX		2
Date Set:	**Submission Date:**	**Return Date:**
September 27, 2021 9:00 PM	April 1, 2022 11:55 PM	April 27, 2022 11:55 PM

IT IS YOUR RESPONSIBILITY TO KEEP RECORDS OF ALL WORK SUBMITTED.

Marking and Assessment

This assignment will be marked out of **100%**.

This assignment contributes to **60%** of the total module marks.

Learning Outcomes to be assessed

As specified in the validated module descriptor https://icis.southwales.ac.uk

- 1) To be able to analyse and critically evaluate techniques used to render 3D scenes in real-time
- 2) To design, implement and evaluate GPU shaders in order to render effects in real-time

Awarded mark is only provisional: subject to change and / or confirmation by the Assessment Board.

Assessment Task

You are required to implement a 3D Castle scene showing a courtyard, tower or dungeon for example that uses some of the rendering techniques discussed in lectures. The rendering techniques you should use in the creation of your scene are as follows:

1.Texture mapping filtering, (e.g. anisotropic), normal mapping, environment mapping

2.Water Effect

You should also implement at least 1 of the following...

1.Foliage Effects

2.Particle Systems

3.Lighting and Glow effects

How the techniques are applied within the castle scene is left for the student to decide. For example, water effects can be used to create a moat or lava effect for example. You are required to implement the scene using the DirectX 11 API discussed in lectures and tutorials. Content for your scene can be created using procedural techniques or can be loaded from existing models using mesh import libraries. You are also required to write a report that discusses the techniques used, and the impact the techniques have on the frame rate. For each technique, discuss different ways the desired effect can be achieved by looking at existing approaches in the literature. Discuss which approach you have implement and show screenshots of the final result. You are to then discuss the frame rate impact after each technique has been implemented. Discuss how the parameters used can be changed to improve frame rate (for example, different resolution textures or numbers of particles),and discuss how the implementation might be improved given more development time. The report should be no longer that 1500 words, word processed and include appropriate references to the literature used.

Deliverables:

1)A zip containing the source code and executable of your implementation. This is to be submitted to UniLearn no later than the submission date shown on the assignment front sheet. Please name your zip file with your enrolment number (e.g. 12345678.zip).

2)A word processed report discussing your implementation and evaluating the techniques used.

3) A short video demonstrating your implementation, the results obtained and the problems you faced in implementing the assignment. Please note that failure to demonstrate your scene may result in a mark not being awarded.

4)A copy of this document is also to be included in your zip file.

Marking Scheme

	Fail (0/29)	**Narrow Fail (30/39)**	**3rd Class / Pass (40/49)**	**Lower 2nd Class / Pass (50/59)**	**Upper 2nd Class / Merit (60/69)**	**1st Class / Distinction (70/100)**
1. Implementation (60%)	☐ No objects in scene. The overall quality of the final 3D scene is very poor ☐ Only a few of the required rendering techniques have been implemented. A basic implementation showing only a rudimentary understanding of rendering techniques	☐ Only basic scene is implemented with no animation. The overall quality of the final 3D scene is very poor ☐ Only a few of the required rendering techniques have been implemented. The implementation is basic showing some understanding of rendering techniques	☐ Only basic scene is implemented with limited animation of objects. The overall quality of the final 3D scene is poor ☐ Most of the required rendering techniques have been implemented. The implementation is basic using only standard techniques	☐ A reasonable scene is implemented with limited animation of objects. The scene is coherent and is of good visual quality ☐ A good implementation using all of the required techniques is presented showing sound understanding of the techniques	☐ A comprehensive scene is created with numerous elements animated. The scene is coherent and of high quality ☐ A very good implementation using most of the listed techniques is presented demonstrating a good understanding	☐ A comprehensive and coherent scene is created with numerous elements animated. The visual appearance is of excellent quality ☐ All of the required rendering techniques have been implemented to good effect in the scene. The techniques implemented have been improved upon the tutorial code. Additional techniques might have been researched and implemented

Discussion of each Rendering Techniques (20%)	☐ The student demonstrates no understanding of the rendering techniques covered ☐ No discussion on how the techniques might be improved upon is given ☐ No references	☐ The student demonstrates a limited understanding of the rendering techniques covered ☐ Little discussion on how the techniques might be improved upon is given ☐ Limited use of references	☐ The student demonstrates a satisfactory understanding of the rendering techniques covered ☐ Satisfactory discussion on how the techniques might be improved upon is also given ☐ Satisfactory use of references	☐ A good discussion on the techniques is presented, showing some understanding of the techniques covered ☐ Good discussion on how the techniques might be improved upon is also given ☐ Good use of references	☐ A detailed discussion on the techniques covered is presented ☐ A very good discussion on how the techniques might be improved upon is also given ☐ Very good use of references	☐ Excellent in-depth discussion on the techniques covered is presented ☐ A detailed discussion on how the techniques might be improved upon is also presented ☐ Excellent use of references
Discussion of efficiency of techniques Techniques (20%)	☐ No discussion of the impact on the frame rate for the rendering techniques covered is given ☐ No references	☐ Little discussion of the impact on the frame rate for the rendering techniques covered is given ☐ Limited use of references	☐ A basic discussion of the impact on the frame rate for the rendering techniques covered is given ☐ Satisfactory use of references	☐ A good discussion of the impact on the frame rate for the rendering techniques covered is given, showing an understanding of the techniques used ☐ Good use of references	☐ A good discussion of the impact on the frame rate for the rendering techniques covered is given, showing an understanding of the techniques ☐ Very good use of references	☐ A detailed discussion of the impact on the frame rate for the rendering techniques covered is given, showing a very good understanding of the techniques ☐ Excellent use of references
Global:						