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|  | **FACULTY OF COMPUTING, ENGINEERING and SCIENCE** | Final mark awarded:\_\_\_\_\_ |

**Assessment Cover Sheet and Feedback Form 2018/19**

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| Module Code:  CS2S565 | Module Title:  Computer Graphics | | Module Lecturer:  Nathan Thomas |
| Assessment Title and Tasks:  2D Scene Rendering in OpenGL | | | Assessment No.  1 of 2 |
| No. of pages submitted in total including this page: | | | Word Count of submission: N/A |
| Date Set:  Monday 15th Oct 2018 | | Submission Date:  Friday 7th Dec 2018 by 23:59 on BB. | Return Date:  20 working days after submission |

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| ***Part A: Record of Submission (to be completed by Student)*** | |
| **Extenuating Circumstances**  If there are any exceptional circumstances that may have affected your ability to undertake or submit this assignment, make sure you contact the Advice Centre on your campus prior to your submission deadline. | |
| **Fit to sit policy**:  The University operates a fit to sit policy whereby you, in submitting or presenting yourself for an assessment, are declaring that you are fit to sit the assessment. You cannot subsequently claim that your performance in this assessment was affected by extenuating factors. | |
| **Plagiarism and Unfair Practice Declaration:**  By submitting this assessment, you declare that it is your own work and that the sources of information and material you have used (including the internet) have been fully identified and properly acknowledged as required[[1]](#footnote-1). Additionally, the work presented has not been submitted for any other assessment. You also understand that the Faculty reserves the right to investigate allegations of plagiarism or unfair practice which, if proven, could result in a fail in this assessment and may affect your progress. | |
| **Details of Submission:**  Note that all work handed in after the submission date and within 5 working days will be capped at 40%[[2]](#footnote-2). No marks will be awarded if the assessment is submitted after the late submission date unless extenuating circumstances are applied for and accepted (Advice Centre to be consulted).  Work should be submitted as detailed in your student handbook. You are responsible for checking the method of submission. | |
| **You are required to acknowledge that you have read the above statements by writing your student number (s) in the box:** | Student Number:  17065178 |

**IT IS YOUR RESPONSIBILITY TO KEEP A RECORD OF ALL WORK SUBMITTED**

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| **Part B: Marking and Assessment**  **(to be completed by Module Lecturer)** |
| This assignment will be marked out of 100%  This assignment contributes to 40% of the total module marks.  This assignment is bonded |
| **Assessment Task:**  You are required to render an original 2D scene using OpenGL’s modelling and rendering features as discussed in lectures and tutorials. The subject of the scene is left for you to decide. For example, you could develop an outdoor scene, the plan view of a building or a scene from a game or film.  You are required to model the scene as a set of separate components, or objects using the modelling and rendering features that OpenGL provides. Your implementation should make use of the following techniques…   * You should use a variety of rendering modes (GL\_TRIANGLES, GL\_LINES etc.) in your scene to demonstrate your understand what these rendering modes do. Your models should contain at least vertex position data and additional marks will be awarded for the use of per-vertex colour and texture coordinate data. Also, additional marks will be awarded if you use Vertex Buffer Objects and provide your own additional per-vertex data that is then processed in your own modified vertex shader. If you choose to use shaders in your assignment you do not have to use shaders for every object of your scene. * You will be required to apply texture maps to your objects where appropriate. More marks will be awarded for texture mapping more complex objects. You should use the different texture modulation modes to mix the texture image with the per-vertex colour data on your objects to create different effects. * Use OpenGL’s blending feature to create at least one transparent object in the scene. * Your scene should be interactive, allowing the user to control certain objects in the scene with the keyboard and/or mouse and automated transformations. * As well as modelling single, discrete objects, you are also required to create at least one composite object by connecting separate objects, or components together using hierarchical modelling techniques. More marks will be awarded for more complex hierarchies.   You will also be required to explain your design and implementation in a short 5-10 minute code demo which will take place in the tutorial sessions after the assignment has been submitted. As part of the code demo you will be required to discuss how OpenGL’s modelling and rendering features were applied in your application as well as any problems you faced during the development of your application and how you addressed these problems. **The code demo is mandatory. If you do not demonstrate your work then a mark may not be awarded.**  You may use the tutorial or lecture demo code as a starting point for your implementation but this is not a copy code and paste exercise. Any code obtained from the Internet must be sufficiently modified by yourself and referenced (using comments in the code) to show where this has came from. Marks will be awarded for the level of complexity of the scene you are rendering, the quality of the objects, or models that you develop and the use of OpenGL’s modelling and rendering features used to implement each object and the scene as a whole.  **Deliverables**   1. A zip containing the source code and executable of your implementation. This is to be submitted to Blackboard no later than the submission date shown on the assignment front sheet. Please name your zip file with your enrolment number (e.g. 12345678\_cw1.zip). Ensure the file is in accordance with the .zip file format. 2. An electronic copy of this document is to be included in your zip file, with your Student Enrolment Number filled in on the front sheet and the optional Reflection sheet (see Part C below) filled in accordingly. 3. A 5-10 minute code demo discussing your implementation, the results obtained and the problems you faced in implementing the assignment. Date will be announced via Blackboard. Please note that a code demo will need to be carried out and failure to demonstrate your OpenGL scene may result in a mark not being awarded. |
| **Learning Outcomes to be assessed** (as specified in the validated module descriptor <http://icis.southwales.ac.uk/>):  LO1. To understand and evaluate the techniques required to model, render and animate a graphical scene. LO2. To use a suitable API to model, render and animate a graphical scene. |

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| **Criteria** | **Fail (< 40)** | **Fair (40 – 49)** | **Good (50 – 59)** | **Very Good (60 – 69)** | **Excellent (70 +)** |
| Overall Scene Quality  / 10 | Missing or non existent. | Basic rendered scene and is of low quality. | A scene has been rendered and is of good reasonable quality. | A moderately rendered scene making very good use of modelling techniques in OpenGL. | A highly detailed scene that explores all of the techniques of OpenGL. |
| Rendering geometry and rendering modes  / 30 | Missing or not incorporated. | Few basic geometric types explored using immediate mode rendering only. | Some geometry types have been explored using a mixture of mostly immediate mode rendering along with a simple VBO or VAO. | A number of fairly complex geometry types have been explored. These are mostly rendered using VBO’s or VAO’s applied to multiple objects in the scene. One shader program has been applied to multiple objects in the scene. | Several geometry types have been explored from simple to complex. Advanced rendering techniques such as VBO’s or VAO’s applied throughout the scene. More than one shader program has been applied to multiple objects in the scene to render both textured and non textured objects. |
| Texture Mapping & Blending  / 25 | Missing or not incorporated. | Basic use of texture mapping applied to one object utilising immediate mode rendering only. | Good use of texture mapping applied to a few objects in the scene. One type of texture wrapping has been explored. | Very good use of texture mapping applied to a number of objects in the scene. Additional texture wrapping has been explored. | Excellent use of texture mapping has been applied throughout the scene making use of many texture wrapping options with blending applied to one or more objects. |
| Transformations, Animation and Interactivity  / 15 | Missing or not incorporated. | Basic use of a single transformation applied to one or two objects. No animation and interactivity present. | One or more transformations in isolation have been explored and applied to two or more objects in the scene. Scene contains basic animation or interactivity controlled using a mouse or keyboard. | Very good use of multiple transformations but these are mostly used in isolation. Little or no use of combined transformations. Good use of animation and/or user interactivity has been explored and applied to control two or more objects in the scene. | Excellent use of standard transformations both in isolation and in combination applied to multiple objects in the scene. Animation has also been explored to a more advanced level. The user is also able to control one or more objects manually in the scene using keyboard and/or mouse. |
| Hierarchical modelling  / 10 | Missing or not incorporated. | Basic hierarchy has been attempted but does not work properly. | Basic hierarchy is present and works with no problems. | Intermediate hierarchy is present with 2 levels deep. | Detailed hierarchy of at least 3 levels deep is explored with excellent use of a transformation matrix stack. |
| Demo  / 10 | Did not demo. |  |  |  | Attended and provided a working demo. |

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| **Part C: Reflections on Assessment**  **(to be completed by student – optional)** | |
| **Use of previous feedback:**  In this assessment, I have taken/took note of the following points in feedback on previous work: - | |
| **Please indicate which of the following you feel/felt applies/applied to your submitted work**   * A reasonable attempt. I could have developed some of the   sections further.   * A good attempt, displaying my understanding and learning, with   analysis in some parts.   * A very good attempt. The work demonstrates my clear   X  understanding of the learning supported by relevant literature and scholarly work with good analysis and evaluation.   * An excellent attempt, with clear application of literature and   scholarly work, demonstrating significant analysis and evaluation. | |
| **What I found most difficult about this assessment:** | The hierarchical modelling part. |
| **The areas where I would value/would have valued feedback:** | Texture mapping, rendered objects, event handling. |

1. University Academic Integrity Regulations [↑](#footnote-ref-1)
2. Information on exclusions to this rule is available from Campus Advice Centres [↑](#footnote-ref-2)