

School of Computing

Module Coordinator Other lecturers	Dr. Jiacheng Tan < jiacheng.tan@port.ac.uk >
Date Issued	2021-03-11
Code	M30236
Title	3D Computer Graphics and Animation



Schedule and Deliverables

Item	Value	Format	Deadline	Lat deadline Ecf deadline
Coursework	50%	A single .zip file containing all source code and documents	2021-05-07 23:59 [GMT/BST]	2021-05-21 23:59
Final Examination	50%	Paper-based, closed book examination.	Timetabled assessment period: May-June 2021	

Notes and Advice

- The [Extenuating Circumstances procedure](#) is there to support you if you have had any circumstances (problems) that have been serious or significant enough to prevent you from attending, completing or submitting an assessment on time.
- [ASDAC](#) are available to any students who disclose a disability or require additional support for their academic studies with a good set of resources on the [ASDAC moodle site](#)
- The University takes plagiarism seriously. Please ensure you adhere to [the plagiarism guidelines](#). And watch the video on [Plagiarism](#)
- Any material included in your coursework should be fully cited and referenced in **APA 7** format. Detailed advice on referencing is available from the [library](#)
- Any material submitted that does not meet format or submission guidelines, or falls outside of the submission deadline could be subject to a cap on your overall result or disqualification entirely.
- If you need additional assistance, you can ask your personal tutor, student engagement officer ana.baker@port.ac.uk , academic tutor xia.han@port.ac.uk or your lecturers.

M30236 3D Computer Graphics and Animation Coursework 2020-21

Introduction

This coursework assesses the practical aspects of the module, i.e., the module Learning Outcomes 3 & 4 (see Module Description for detail). It accounts for 50% of the overall assessment of the unit. In this coursework, you are required to create two 3D artefacts (**Tasks 1 & 2**, below) and a report that documents your work. A marking scheme is attached at the end of this document.

WARNING!

Your work/submission must satisfy these requirements:

- The artefacts **MUST** be created using Autodesk 3DS Max. You should use a version of the software that is compatible with the version in the university labs. It is your responsibility to ensure the compatibility and integrity of the files that you submitted. Faulty or incompatible files will result in your work being inaccessible and therefore cannot be correctly marked. To access the software or the PCs in the university labs via VPN and AppsAnywhere, follow the instruction at <https://servicedesk.port.ac.uk/>
- The work that you submit **MUST** be entirely of your own. You **MUST NOT** obtain all or part of the required artefacts from any of the numerous 3D libraries on the web or elsewhere. Failure to comply with these requirements may result in plagiarism procedures being taken.

Submission

1. Submit all the deliverables of both task 1 and 2 in the form of *a single zip file named with your student number* (do not use any special compression software that is not available on the university PCs) through the **Coursework Submission** folder on Moodle. It is your responsibility to make sure that all the files are intact and function properly on the PCs in the University labs.
2. Submission on Moodle will open a week before the deadline.
3. The submission must be anonymous. Do **NOT** write your name on any artefact.
4. Emailed work will **NOT** be accepted.

Task 1: 3D Modelling and Rendering (50%)

Requirements

In this task, you are required to model a human character and render it in a suitably set scene.

(1) *The Model*

The model should represent accurately human facial features such as eyes, nose, mouth and ears. Do not use a hairstyle or a hat that obscures the facial features. For hairs, teeth, eyeballs and eyebrows, you can use the outline shapes and cover them with appropriate textures. You can choose to model naked (with appropriate skin materials) or clothed (with suitable textures) body for arms, legs, torso and other parts.

(2) *Modelling Methods*

To show that you can use important modelling techniques competently, you must use *Polygon Mesh* (*editable mesh* or *editable poly*) or *spline surfaces* (*Bezier patch* or *NURBS*), or a combination of them as the main modelling method by which most of your modelling work will be done. In addition to the main method, you are expected to use other modelling techniques and appropriate *modifiers* in situations where their use is deemed to be necessary.

NB: When modelling, **DO NOT** collapse the modifiers to convert the entire model into one single editable mesh object or do anything that would prevent the assessors from accessing the modelling sequences and identifying the techniques used. This information will be used as evidence that you have used the claimed modelling techniques. If it is absolutely necessary to collapse the modifiers at a major step, you should save an intermediate file (in the format of appropriate version of 3DS Max) before collapsing them and submit the intermediate file with your submission pack. Failing to comply with this requirement may result in a maximum of 10 marks being deducted.

(3) *Textures and Materials*

Design materials or textures for your model and the objects in the scene so that they render with appropriate surface properties, i.e., correct colours, glossiness, softness or texture.

(4) *Scene Design & Rendering*

Choose a photograph as the background of rendering environment. If necessary, create a simple scene such as a room for your character. Design appropriate lighting for the scene so that the character blends well with the background when rendered. Choose and justify a suitable rendering method and rendered the scene from a viewpoint that best demonstrates your work.

(5) *Report*

Prepare a short report (no more than 1000 words) that **CONCISELY** explains the modelling methods used (not operational details), discusses your decisions in material, scene and lighting designs and justifies your selection of rendering method. Use screenshots where appropriate.

(6) Deliverables

You must submit:

- A rendered image (.jpg) of the final scene showing the scene features and effect of lighting, for example, shadows and/or highlights.
- Close-up renderings (.jpg image) showing the detailed features of eyes, nose, mouth and ears.
- The final and any intermediate *.max files and any supporting files, for example, texture and background images.
- A copy of the coursework report.

Task 2: Figure Animation (50%)

Requirements

In this task you are required to create a short animation (approximately 15 seconds) of a human or an equivalent (in complexity) biped character/creature.

(1) *Motion Selection & Design*

The animation can be an imitation of real-life activities such as dancing, doing sports, and etc., or artistic impressions of such activities. The animation should convey a story, a concept or feelings. A meaningless collection of actions or a monotonic periodical action (e.g., a gait cycle in walking) will be considered as a serious design failure. The animation should show the coordination and synchronisation of the motions of all body parts (e.g., not a rigid top body with moving legs). Apply the *animation principles* whenever possible in your design and implementation.

You are **NOT** allowed to use motion capture data to animate the character.

(2) *Skin Models*

In principle, you should use the model developed in **Task 1** as the skin of your character. However, if you decide that it is impossible or inappropriate to use the model of Task 1, at no disadvantage to you and with permission and acknowledgement, you can use other reasonably accurate models that you can find from various resources (e.g., books and websites) or the skin models provided with this assignment.

(3) *Skeleton Design & Skin Binding*

You can use the default biped provided with 3DS Max, but you should customize it to suit the needs of your character. Binding the skin to the biped should leave no exposed skeleton, excessive mesh collapse/distortion. All binding envelopes should be correctly set. To show the quality of skin binding and envelope editing, *take screenshots of the shoulder, hip and ankle joints when they are bent to about 45 degrees and include the screenshots in your report.*

(4) *Rendering*

Design a suitable scene and lighting for your animation and render the animation in .avi format at a resolution of 640 x 480. The video should focus more on showing the motion of the character than on any fancy camera actions.

(5) *Report*

A short report (no more than 1000 words) that documents the motion design such as storyboarding and/or keyframe selection, biped customisation, and skin binding (including the required screenshots in Requirement 3).

(6) *Deliverables*

For this task, you should submit:

- A video of the animation (*.avi format, at 640 x 480 resolution).
- Screenshots of knee, ankle, hip, shoulder and elbow joints bent at 45 degrees.
- A .max file named *final.max* that contains the entire animation.
- A copy of the report.

Coursework Marking Scheme

Task 1: 3D Modelling & Rendering		
Modelling: Details and accuracy of facial features, overall head and other body parts	20	
Surface attributes and scene design Materials, textures, staging objects & background, lighting	15	
Rendering: Selection and use of rendering methods, rendered images & realism	10	
Report Documentation of modelling decisions, material, scene and lighting design, rendering method selection, and required screenshots of the rendered images.	5	
Total	50	
Task 2: Figure Animation		
Animation Design & Implementation: Animation plot & scene design, accuracy/realism of motion, complexity & completeness of motion, smoothness of action transitions, elegance & overall realism, and storytelling.	30	
Rigging & Binding: Biped customization, accuracy of skin fitting, excessive mesh deformations/distortions.	10	
Renderings Video & visual effect. Required renderings	5	
Report Documentation of design decisions, required screenshots, presentation	5	
Total	50	