

# CE318/CE818 Assignment

Part I due: Friday 10<sup>th</sup> November 2023

Part II due: Friday 15<sup>th</sup> December 2023

The assignment consists of designing and implementing a **3D game** in Unity3D. The assignment is worth 60% of the total mark for this module and will be assessed according to standard degree-grade criteria.

You will be expected to present your game in person on Wednesday 13<sup>th</sup> of December 2023. You have a considerable degree of freedom in your choice of game as long as it meets the criteria listed below. Examples include 3D shooters (e.g., Unreal Tournament), extended 3D Pong with object collection, extended 3D Angry Birds, racing games, spaceship simulators, etc.

The software should be well designed and organised into appropriate scripts, with control structures as simple as possible. Comments should be used in the code where necessary (you have to judge when that is). The following marks break-down is approximate.

Please note that:

- Extensive use of third-party libraries is not allowed.
- All code segments and assets based on or inspired by work created by someone else must be properly acknowledged and referenced, including:
  - Source code
  - Textures
  - 3D models
  - Sprites
  - Audio
- Unity assets **must** be created by yourself or be freely available from the asset store. **Using content that is not created by yourself or is not correctly credited will be grounds for awarding a mark of zero.**
- It is also **forbidden** to submit one of the weekly lab assignments, or extensions of those. The game must be *different* than the ones from the labs.

## Module Assignments

The two assignments for this module are as follows:

- Game prototype and Design (20%)
- Final Game (40%)

# Part I

## Game prototype and Design (20%)

The assessment of the first part of the assignment is divided into two parts. For all students:

- Game prototype (10%)
- Game Design Document (10%)

Additionally, for CE818 students, an optional abstract (maximum 200 words, for feedback only) for the case study can be submitted, in a separate PDF file.

The following sections detail what is required for each one of these deliverables. Please, read carefully, and check also the *submission instructions* at the end.

### Game Prototype

The game prototype must be the initial version of your final game. It doesn't need to be polished in terms of graphics or framerate, but it needs to be played in some degree and show the main idea and dynamics of the game.

The game should contain one playable scene, and it should at least have the following features. The prototype will be assessed on these, but it is recommended that you do not limit yourself to these ones and start with the ones from Part II.

- Some kind of player's input control. For instance, an object (i.e. the player) that is moved with the keyboard.
- A functional, dynamic camera. It can be a camera that follows the player, either moving around the world or fixed but always oriented to its target.
- Collisions and physics should work properly (even if you decide to change them for part II).
- The scene should contain at least one source of audio and at least one source of light (different from Ambient Light).
- The player should be able to interact with something in the environment (other than just colliding with it). For instance, it could be a simple (but better than random) enemy, an opponent or a hazard for the player.

### Game Design Document

The objective of this part is to write a report that describes the game design and specification of the game that you will develop for the second part. A PDF of about 8 pages long must be submitted, which should include:

**Cover Page:** With the module name and code, student ID, and a title for the game.

**Overview:** A short description about what the game is about (max. 250 words).

**Gameplay:** Main components of your game. Describe those that make your game unique and are necessary for your game to work, and also the ones that aim to enhance enjoyment but are not vital. In short, components of the game, and how will the game work.

**Interface:** Description of the intended controls and Head Up Display / GUI.

**Objectives:** Description of the objectives to be accomplished by the player.

**Look & Feel:** General design of the levels, camera settings, style of the art, ambience (i.e. sounds, particle systems) and cultural references that inspire the game (architecture, books, movies, etc.).

**Story:** Backstory and main plot of the game. Characters involved in the game, motivation.

You are welcome to include screenshots of your prototype in this document. For examples of game specifications look at the case studies, (e.g. case study 2.8) in the following book:

*Rollings, Andrew, and Dave Morris, "Game Architecture and Design: A New Edition." NRG, 2003*

See report guidelines in the 'Submitting Your assignment' section.

### Referencing Assets

Your report **must** contain references to the assets (and any third-party scripts) you have used. To reference content from the asset store, please use the following format:

[Asset Pack Name], by [Author Name] ([link if possible]) for example, to reference the '[Standard Assets](#)' pack:

Standard Assets, by Unity Technologies (<https://assetstore.unity.com/packages/essentials/asset-packs/standard-assets-32351>)

You can use the 'share' button to get a link to the asset pack.

### Deliverables

The following components should be included as part of your submission:

- Game prototype (with everything needed for it to be run).
- Game design document (in PDF).
- (CE818 only): You can submit an abstract for your case study to receive feedback.

**Please note** that due to the file capacity limitations of Faser, you will need to use one drive to upload your game. Instructions can be found in the 'Submitting Your Assignment' section.

## Part II

The assessment of the second part of the assignment is divided into several parts.

For CE318 students:

- Full Game (25%)
- Final Report (10%)
- 5-minute presentation + YouTube video of gameplay (5%, peer reviewed)

For CE818 students:

- Full Game (25%)
- Final Report (5%)
- Case Study (5%)
- 5-minute presentation + YouTube video of gameplay (5%, peer reviewed)

### Final Game

The final game consists of a fully implemented game that must include all the following features (1 to 4). These will be graded according to how correctly they are implemented, and how coherent they are within the game (you will lose points for features that you don't implement, but also for implemented features that do not make sense within the game).

#### 1. Game Structure (20%):

- Menus: main menu, options, pause and end menu.
- Splash screen when the game starts.
- 2 playable scenes.
- There must be fade in/out transitions between screens, menus and scenes.
- At least one of the scenes is played on a terrain, or uses a terrain as a background.

#### 2. Gameplay (20%):

- Different collectable items such as health packs, boosters, etc.
- At least two difficulty levels (as in playing in *Easy* or *Hard* mode, for each scene).
- A selection of game parameters, adjustable from the options menu (i.e. music on/off, volume, difficulty, etc.), using the appropriate mode for loading and saving them.
- It must be possible to save and load games.

#### 3. Art (20%):

- Audio: Multiple sound effects, 3D sounds and background music.
- Lights: Multiple sources of light.
- Cameras: Either more than one camera, or camera animation at the beginning of the level.
- Effects: Multiple particle effects, from static and not static emitters.
- Materials: Use of materials and standard/non-standard shaders to give the game a good look.

#### 4. AI artefacts (20%):

- There must be different types of intelligent agents that are controlled by different FSMs and/or Behaviour Trees.
- At least one of these intelligent agents must use Pathfinding (NavMesh) to navigate the level.
- At least two Steering Behaviours should be implemented (i.e. for the other intelligent agents).
- Player and NPCs must be animated.

Optionally, at least one of the following **advanced** features can be implemented for a higher mark.

#### Advanced Features

- A tutorial level (apart from the 2 playable scenes) that demonstrates the user how the game is played.
- Advanced AI: Implementation of a Hierarchical Finite State Machine, a Decision Tree combined with an FSM, or any other modern AI technique for agent behaviour (Monte Carlo Tree Search, Rolling Horizon Evolution, etc.).

#### Final Report

The final report consists of a document (in PDF) of about **15 pages** that must include a **cover page** with the module name and code, student name and ID, and a title for the game. This document is called **Game Description Document**, and it must provide a detailed description of the implemented game. You must include a description of each one of the features (from page 3) implemented and, if any of those has not been included, a well argued reason for this. It is very important that you include **code snippets**, **diagrams** and **screenshots** as appropriate, as well as **acknowledging** assets or other materials taken from somebody else. Additionally, you should include a section that explains how the game is played.

#### Referencing Assets

Your report **must** contain references to the assets (and any third-party scripts) you have used. To reference content from the asset store, please use the following format:

[Asset Pack Name], by [Author Name] ([link if possible])

For example, to reference the '[Standard Assets](#)' pack:

Standard Assets, by Unity Technologies (<https://assetstore.unity.com/packages/essentials/asset-packs/standard-assets-32351>)

You can use the 'share' button to get a link to the asset pack.

#### 5 Minute Presentation

5-minute presentations of each game will take place on Wednesday 13<sup>th</sup> of December 2023. This presentation must include a video of 1 minute of gameplay, which you must also upload to YouTube. You need to submit your presentation slides, in PDF, with your submission, along with the link to the video. This presentation will be assessed as follows:

- 50% Assessed by the lecturer and/or the GLA

- 50%: Assessed by your peer students. All students in the lab session will assess each presentation, giving credit in 4 areas: quality of the presentation, level of “fun” of the game, aesthetics of the game, and overall product. For this part of the assessment, we reserve the right to not taking into account (non-objective) extremely high or extremely low marks. The identity of who marks this will be anonymous to the person being assessed, but not to the lecturer/GLA/GTA of the module.

### **Case Study (Only CE818)**

The case study is a dissertation of 5-10 pages about a topic of the choice of the student (related to games development, of course), although it needs to be agreed with the lecturer beforehand. The study must include appropriate references and a good motivation, and it must have an abstract or summary of 200 words maximum. The study should be based in at least 5 articles. As an example, check the blog posts in <http://www.gamasutra.com/blogs/>.

### **Deliverables**

The following components should be submitted as part of your assignment:

- Final game (with everything needed for it to be run)
- Final report (in PDF)
- Presentation slides (PDF)
- Gameplay video.

(CE818 only): You also need to submit the case study (in PDF).

**Please note** due the file capacity limitations of Faser, you will need to use one drive to upload your game. Instructions can be found in the ‘Submitting Your Assignment’ section.

# Submitting Your Assignment

Both submissions (parts I and II) must be submitted through FASER. All written documents must be in PDF format. Full game and prototype must contain all files needed to run the game.

The following considerations must be observed at all times:

- The final game must be submitted with at least 2 playable scenes. Failing to do this will halve the final mark of the second part of the assignment.
- The game must be playable at least from a laptop with keyboard and mouse. Use of other input devices is allowed and encouraged, but keyboard and mouse must be able to be used at all times.
- No builds will be accepted in the submission. The complete Unity project must be submitted for both parts, and runnable in Unity. The project is expected to be compatible with the version of Unity we use during the labs (**2022.3.8f1**). Projects created in a different version of Unity can be submitted at your own risk (note that version incompatibilities may make your game not work, which could affect your final mark).
- Report Guidelines: All reports must use 11-point Times New Roman font with 1.5 line-spacing. Margins should be 2 cm on all four sides. The pages of text must be numbered consecutively at the bottom centre of each page.

## Game Uploads

Due to the limited file capacity in Faser, the following procedure is set to upload your games, so they can be downloaded and marked. Note that you still need to submit before the specified deadline, and the written documents need to be submitted to Faser as usual!

Follow this procedure to upload your assignment:

1. Zip all the necessary files needed to run your Unity game. This, of course, includes project files, assets, data, source code, etc. Everything that is needed for me to run your project.
2. Upload your assignment to your OneDrive. You have this service enabled in your University account, and you can access it through Office 365. Your uploaded game must not be modified after the deadline (OneDrive registers the timestamp of the last modification).
3. Once it is uploaded, right click on the file (in OneDrive) and select the option "Get Link". A window will appear with a link that you have to copy.
4. Include, in the cover page of your report, the link you obtained in the previous step.
5. Remember to include the link to the YouTube video of your game, in the Final Report of Part II.
6. Submit all your written documents to Faser, normally, in a ZIP file.

## **\* Important READ \* Authorship and Plagiarism**

### **WARNING AND ADVICE ABOUT POSSIBLE ACADEMIC OFFENCES**

Your solutions should be your own unaided work. You can make use of any of the programs from the CE318/CE818 lecture notes and the lab solutions.

You must **NOT** use any third-party classes (e.g. classes that are not provided as part of the module), unless you **clearly** indicate this as comments in the program, and the extent of the reference must be clearly indicated. For more information, please see the University pages on plagiarism and the Academic Offences Procedures.

**DO NOT COPY PROGRAM CODE FOR THIS ASSIGNMENT FROM ANOTHER STUDENT OR FROM THE INTERNET OR FROM ANY OTHER SOURCES. DO NOT LET OTHER STUDENTS COPY YOUR WORK.**