UNIVERSITY OF GLOUCESTERSHIRE
at Cheltenham and Gloucester

The attached tutorial is a sample of a first-year session for Games Design students. Normally the practical would include a lecture explaining core concepts and a demonstration of software techniques. There would also be video demonstration available on our Virtual Learning Environments. Feel free to explore Unity and develop your ideas further than those contained overleaf. Unity is free to download from: https://unity3d.com

Learning outcomes

By the end of this topic you should be able to:

- Understand purpose of Unity
- Comprehend how to create a new project
- Use the Unity interface to build a 3D environment
- Add a first person controller to a scene
- Bake a shadow map into a scene

Overview of the session

The session will determine the core elements of the game that need to be designed as well as introduce the Unity game engine. Additionally, there will be a discussion of Unity's interface and how to create a 3D environment. Techniques for creating terrains and a first person camera will be demonstrated. Furthermore, the concepts of baking shadows for light maps within Unity will be discussed.

Textbook links

Blackman, S. (2011) *Beginning 3D game development with Unity the world's most widely used multi-platform game engine.* Berkeley, CA: Apress

Geig, M. (2013) *Terrain Sculpting* [Online] Available from: https://unity3d.com/learn/tutorials/topics/graphics/environment-details

Student activities

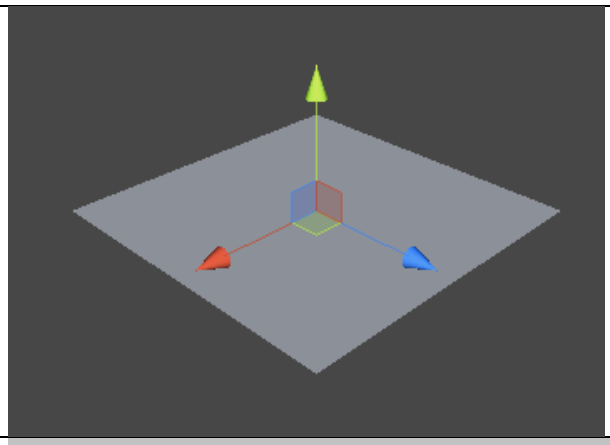
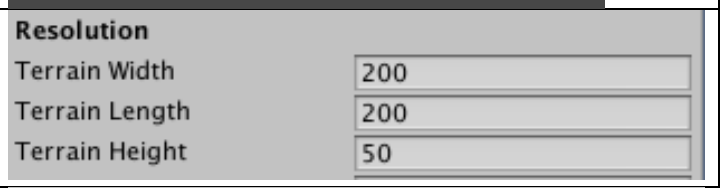
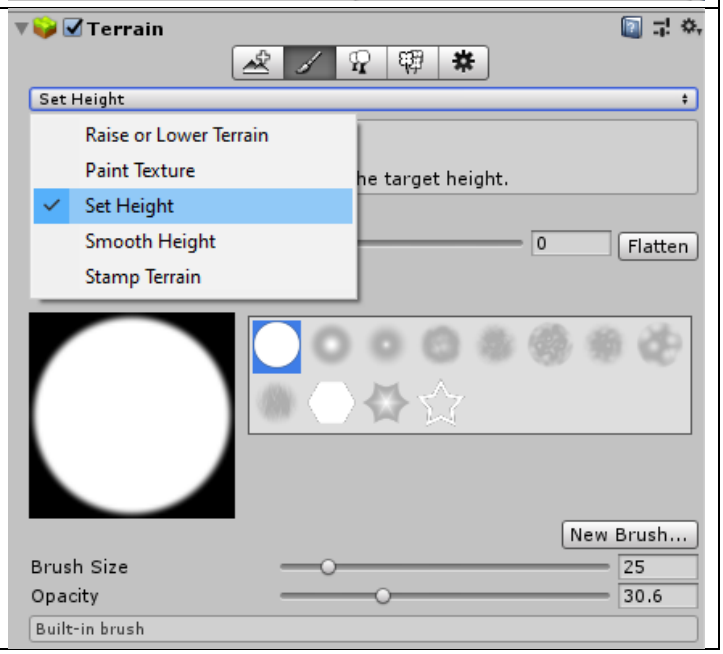
Complete the Unity tutorial overleaf and use it to create your own 3d scene – spend about 1hour doing this. During the rest of the tutorial session, meet with one of the tutors to discuss your ideas for the assignment. If you have not already done so start completing the games design document template.

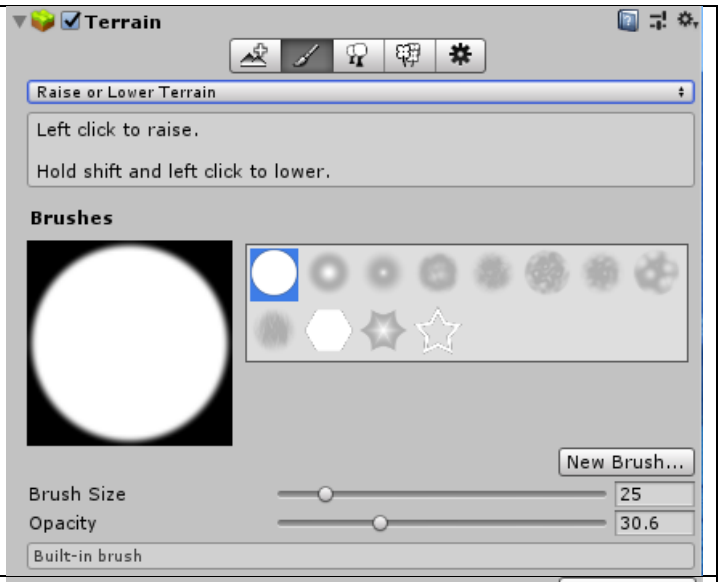
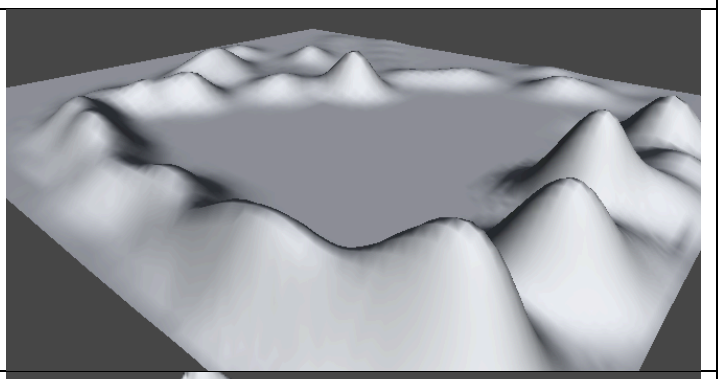
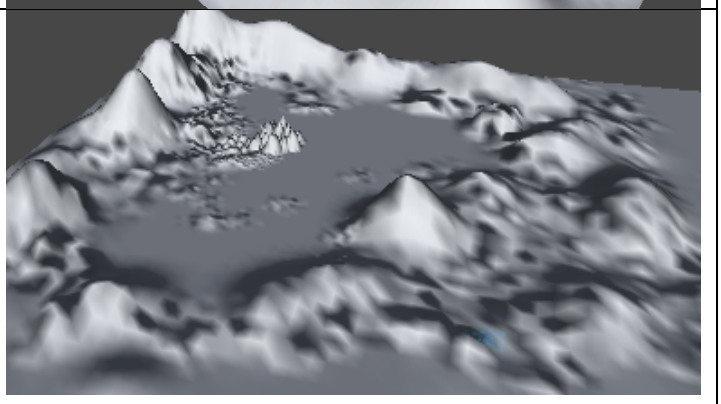
Self-study

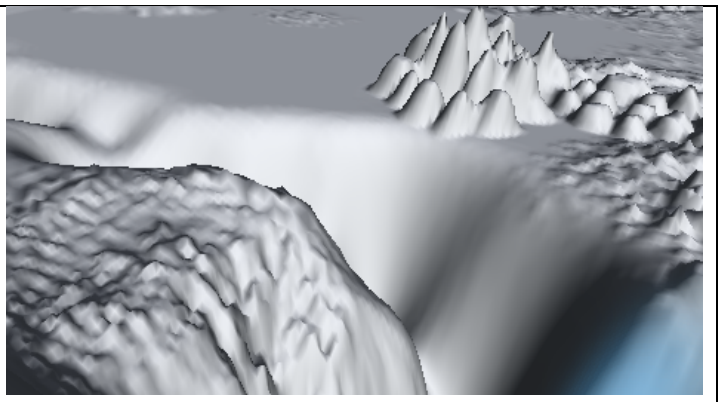
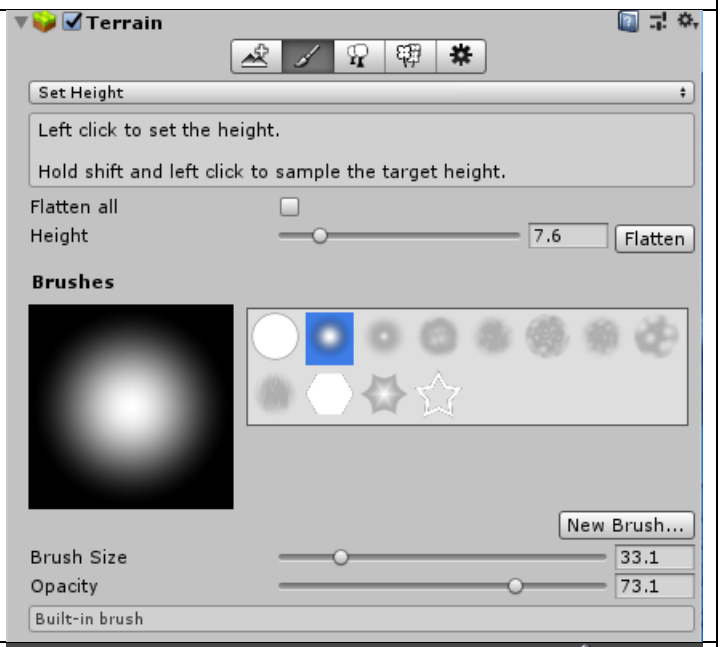
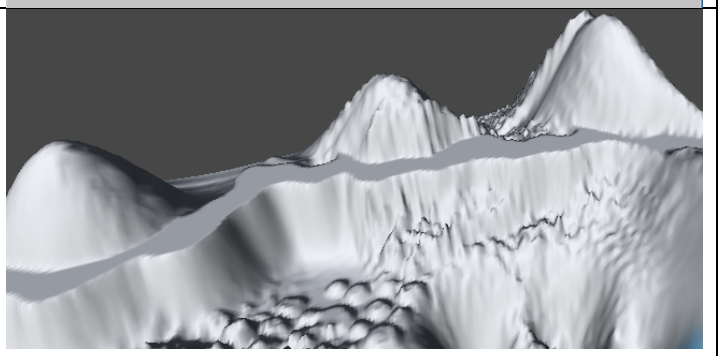
Read the textbook link given above. Continue to develop skills in Unity.

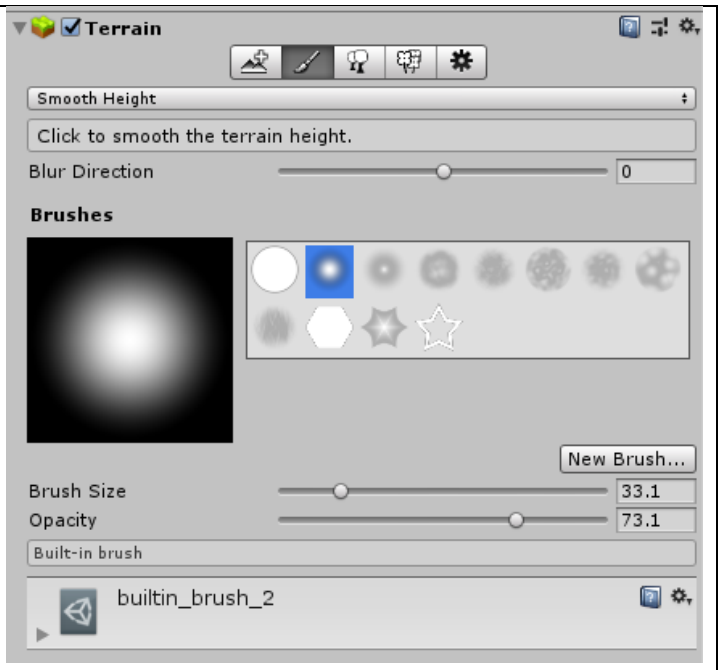
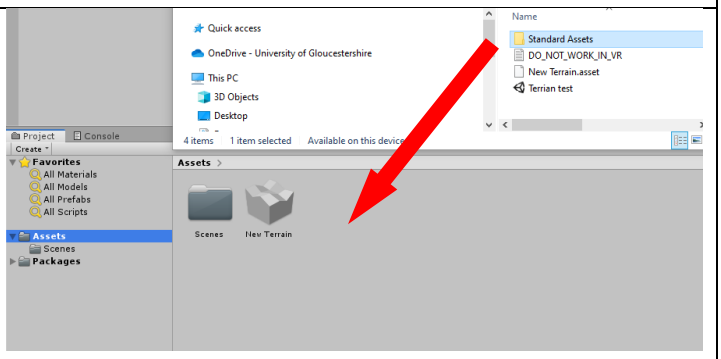
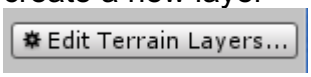
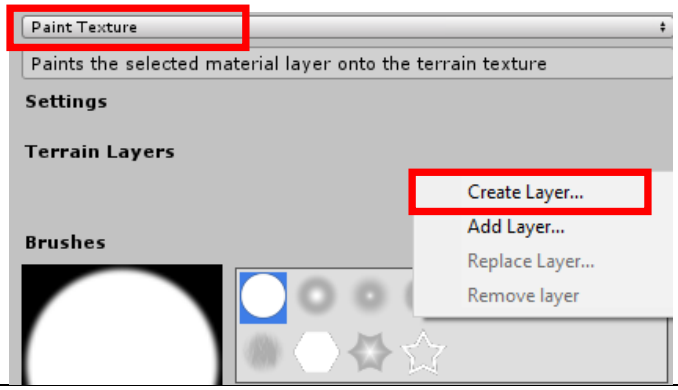
Install Unity on your own PC/MAC, the latest version is available from: https://unity3d.com

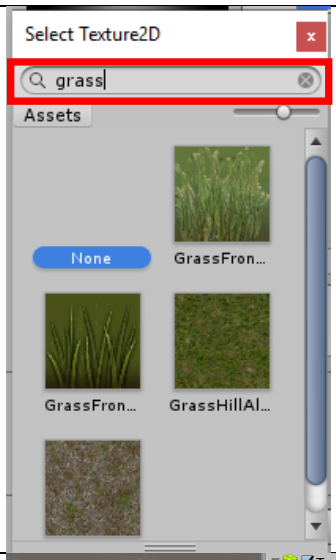
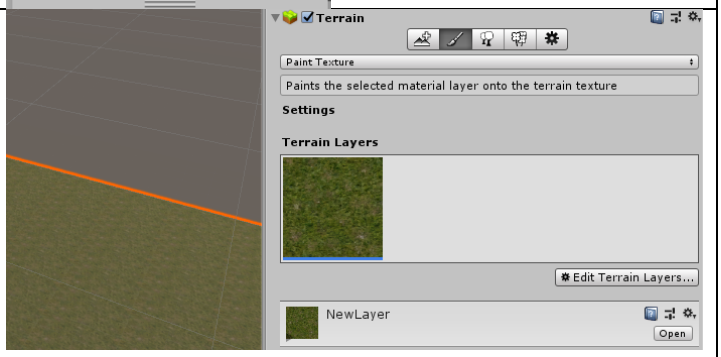
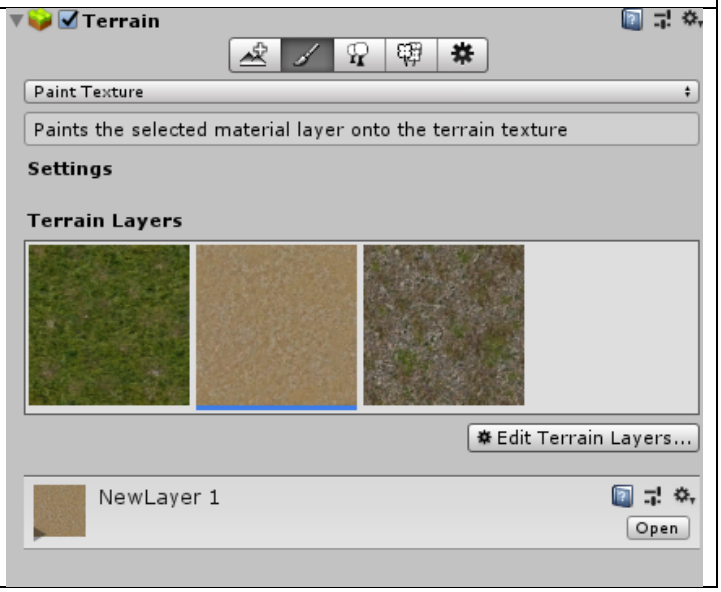
Download and review the help video tutorials for Beginner Editor 001 through 010 (these are available from within Unity or at http://unity3d.com/learn/tutorials/modules/beginner/editor).

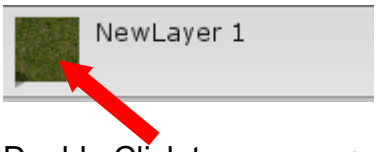
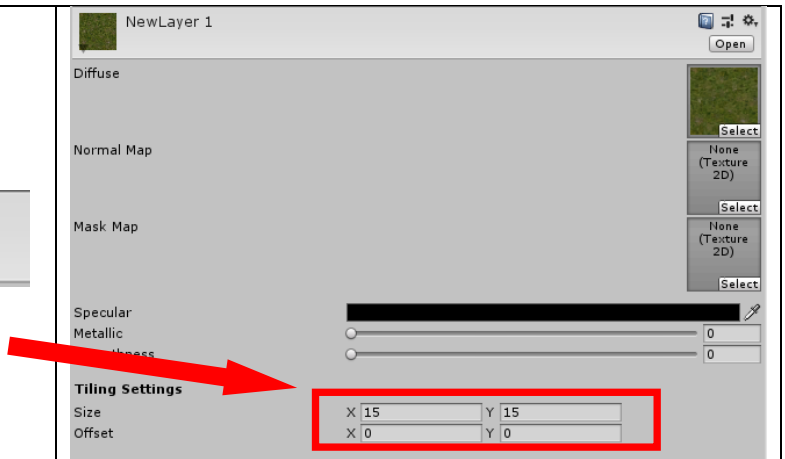
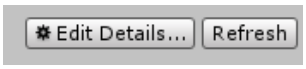
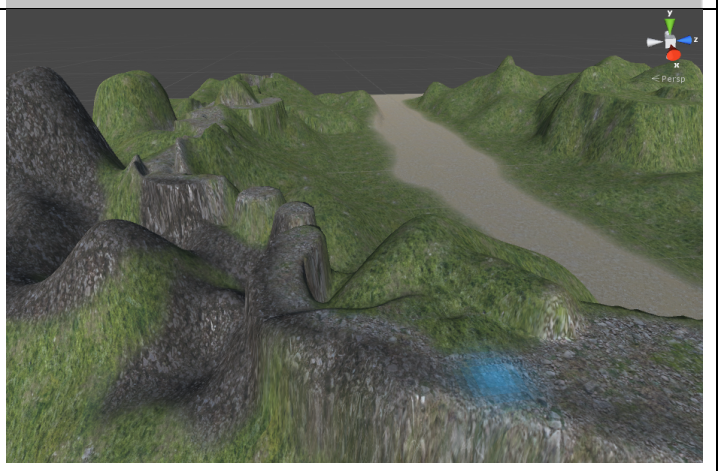
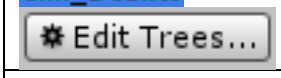
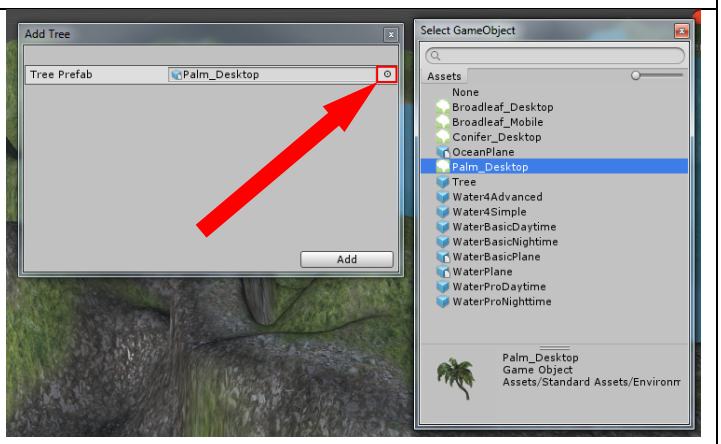
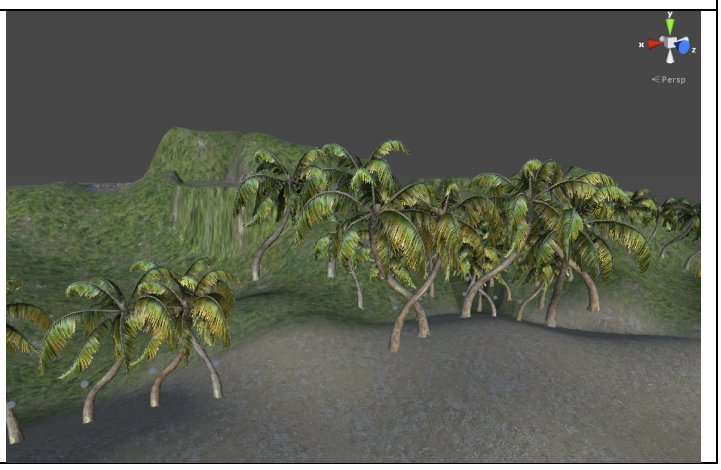
Start Unity and create a new project. Select Game Object > 3d Object >Terrain Make sure the terrain is selected. Press F to focus the terrain in the scene	
Click  and change the default width and length of 200 to 200 and set the height to 50	
Select  and set the height to 0 click Flatten This will set the base height so that the bottom of the terrain will be below sea level.	

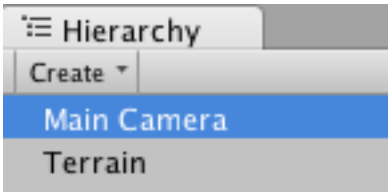
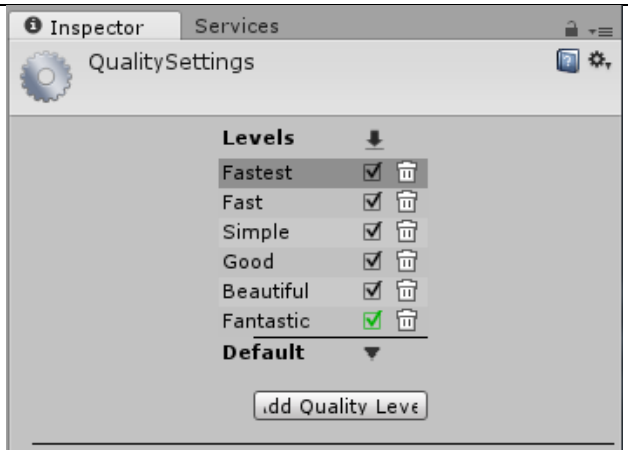
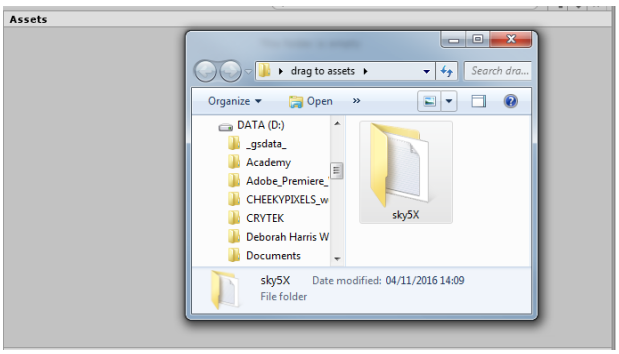
Go the Inspector and select the raise/lower terrain tool – note the different types of brushes available.	
Note that the opacity slider equates to the strength of the brush, lower the value for the brush to have less an effect on the terrain	
Experiment with the terrain creation tools – draw terrains around the edge to start If a hill gets too high hold down the shift key and paint over it	
Progressively add more detail use different types of brushes, sizes and opacity levels	

Hold the shift key and paint to push the ground down below sea level	
Select the paint height tool – note the height setting This tool is useful for painting pathways through mountains at a set height. Either manually set a height or shift click an area to set it	
Paint a path through the mountains	

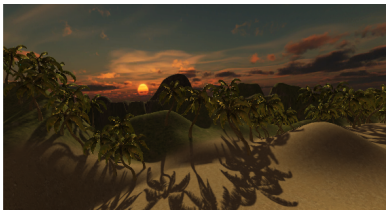
Select the smooth height tool paint over any jagged edges that are too harsh to smooth them. Look at the base of slopes in particular.	
Next, we need to import the Standard Asset Pack so we can texture-paint our environment. To do this, drag the Standard Asset folder from the Desktop of your PC into the assets folder in Unity. (Make sure you unzip first)	
Click the paint texture button  then choose Edit Terrain Layers we need to add different layers so we can add our textures. Click on and create a new layer 	

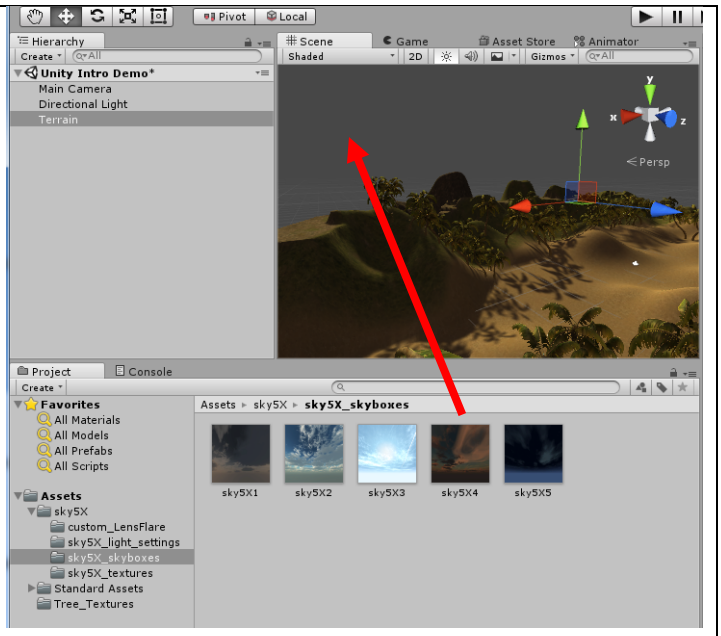
When you create the new layer please select the grass. Tip: Search for grass	
Note you can now paint on the terrain. Make sure your Opacity is 100% and your brush is the correct size to get the desired effect. Please note the first layer should be applied automatically.	
Add new layer and repeat the step adding sand and rock. You should have three layers with three different textures applied.	

Note you may want to change the tiling of the texture to match the environment scale.  Double Click to open parameters.	
Using various brushes, sizes and opacity settings paint your terrain, selecting each layer grass, sand and rock  Make sure your target strength is set to 1; otherwise when you paint your texture my not paint on as full opacity.	
Select the Place Trees button, click Edit Trees and choose Add Tree. Browse for the default palm and select Add   	
Paint trees onto your landscape. Play with the settings • Bush size • Tree Density • Tree Height Hint: zoom in close to the terrain before painting and hold ctrl to remove	

In the hierarchy select the Main Camera, choose Game Object > Align with View  	
When the scene appears too dark – go to Game Object > Create Other and choose Directional Light Rotate/position light so that the scene looks better. Tip switch on your so you can see your shadows 	
Move in closer to the trees – depending on the quality of your graphics card you may be able to improve the render Select Edit > Project Settings > Quality Select the levels by clicking on them to see the difference.	
We are now going to add a skybox that was downloaded from Unity Assets Store and should be ready to use on your desktop. Drag the “sky5X” folder from your desktop into your assets window within Unity. You should now see sky5x inside your assets folder.	 (You might need to unzip sky5X.rar first)

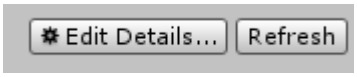
To get the pre-made skyboxes into your scene I want you to open up your sky5x_sykboxes folder and then simply drag any skybox from your assets in to your scene. It looks like nothing has happened. You won't see this until you click on the game view.
Hint!! think about your lighting, direction of shadows when choosing your skybox. etc

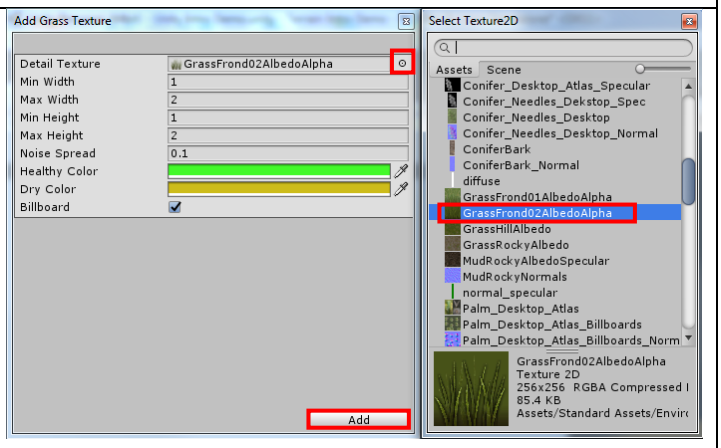


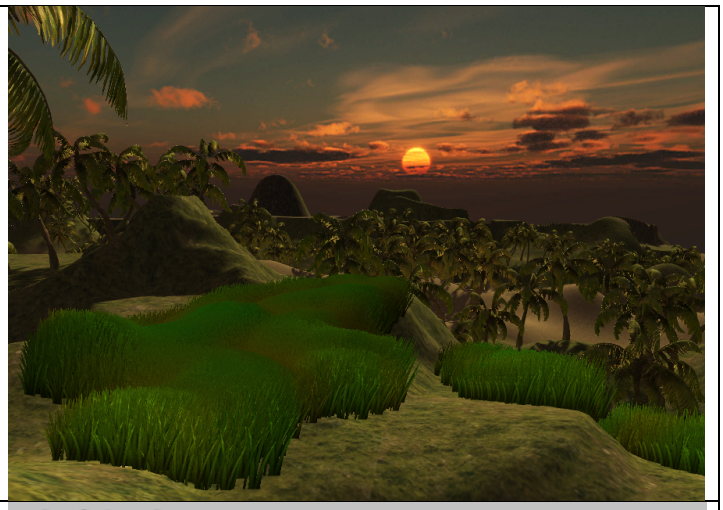
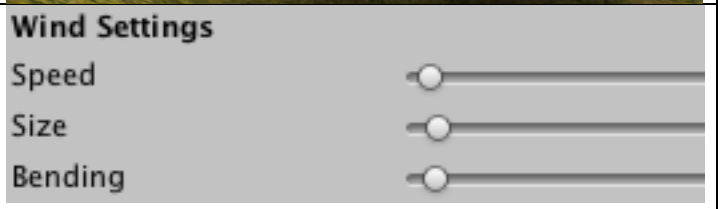
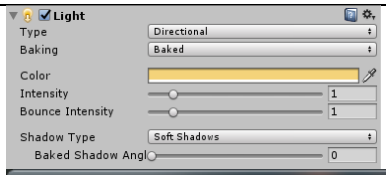
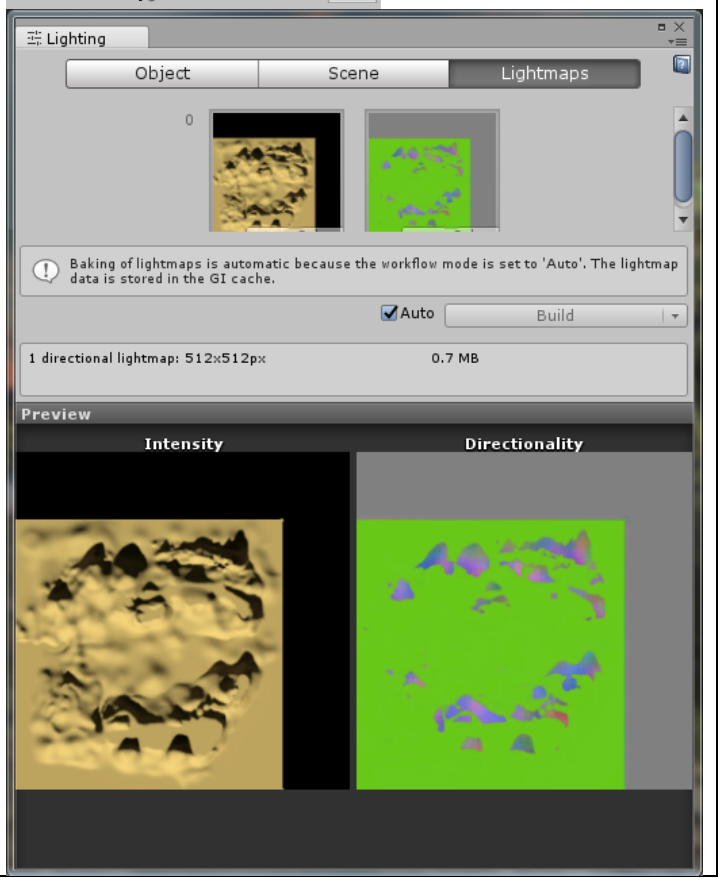


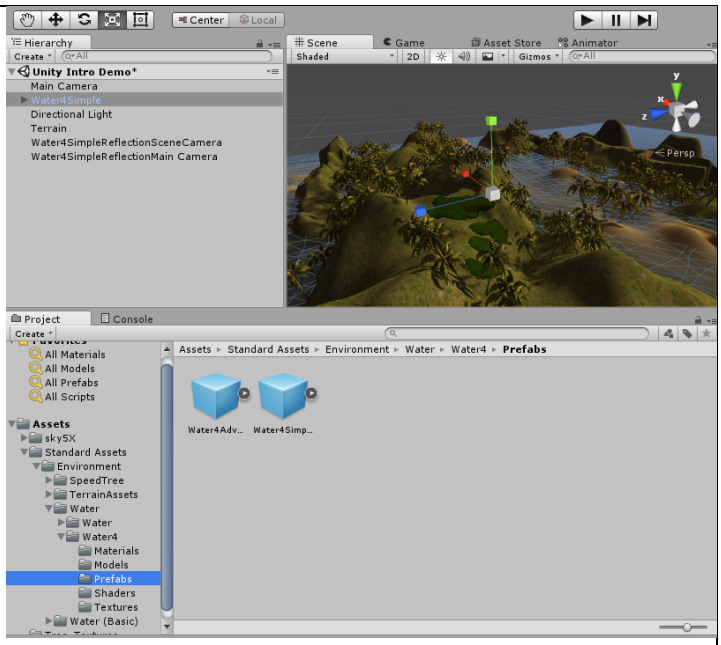
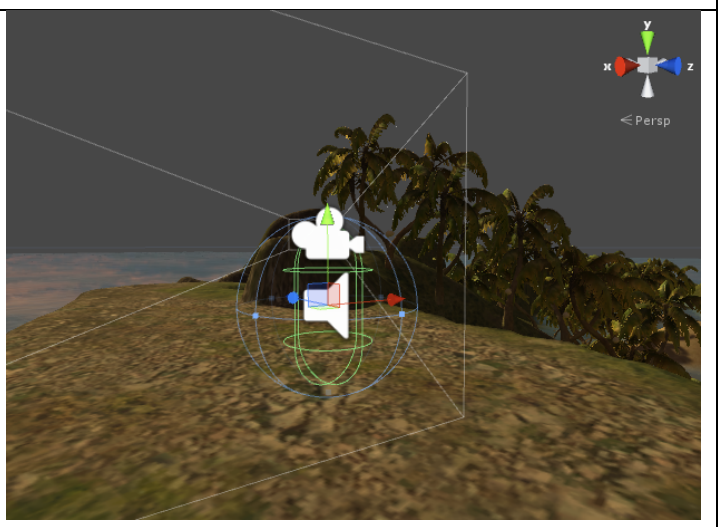
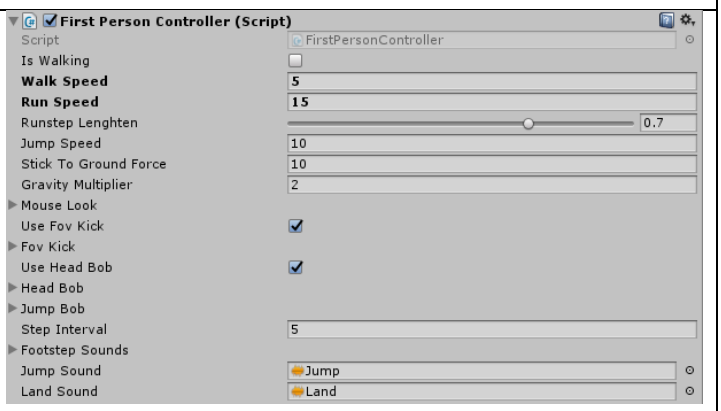
With the terrain selected choose the Paint Details icon

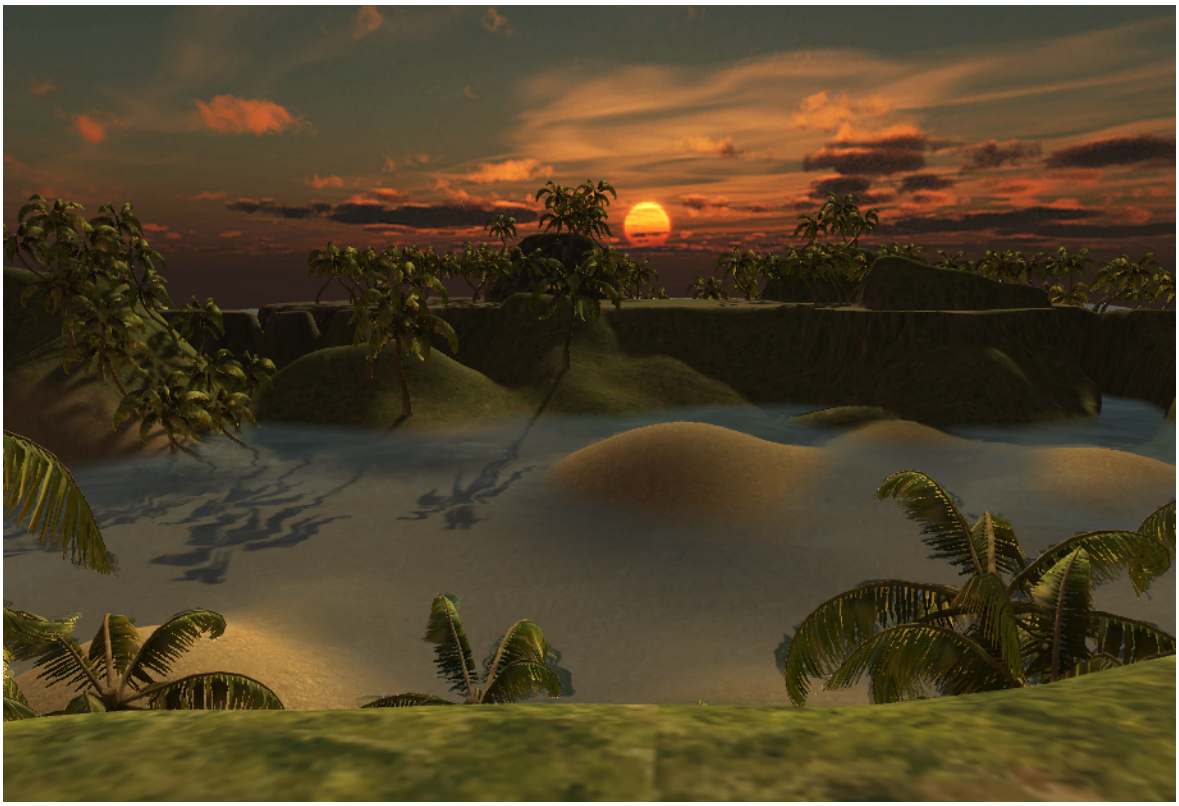
Click Edit Details > Add Grass Texture and browse for Grass





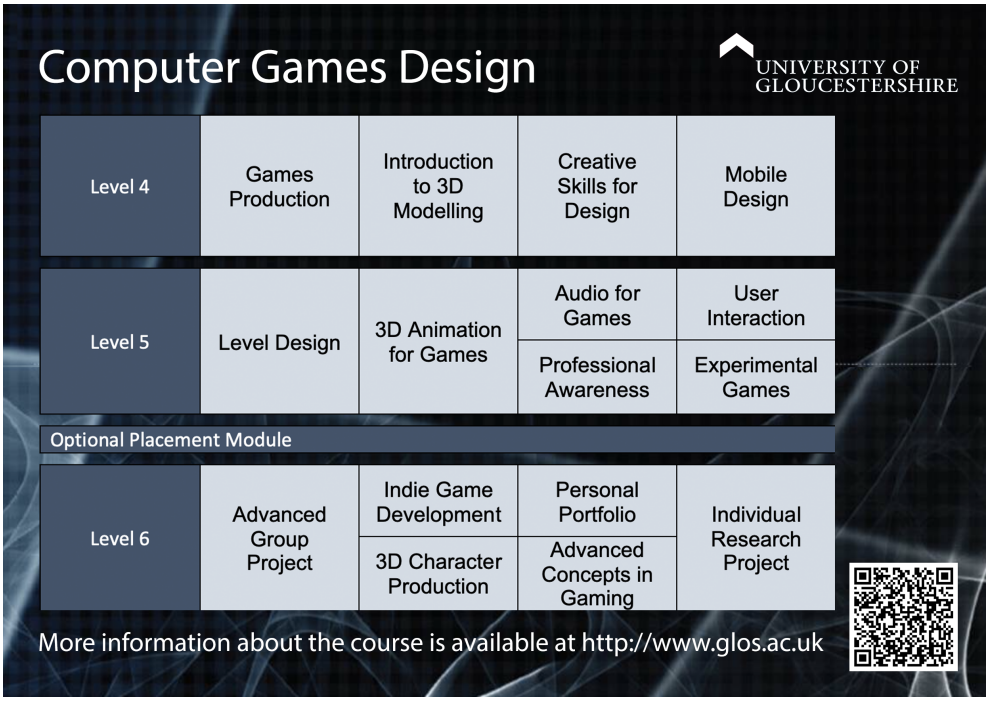
Zoom close into a flat area and paint the grass texture onto the terrain.	
Press play – the grass probably moves too fast Stop the game and select the terrain settings  Dial down the wind speed and size	
To improve performance, it is possible to bake shadows into the scene so real time calculations don't need to be made. For more info on why we bake lighting go here. To bake our lights, we need to select our light/lights in our Hierarchy window and under the inspector we then need to switch this form Realtime to Baked. If we now go to Window / Lighting / Lightmaps we can now see our maps have been baked out.	 

To add water to our scene Go to your assets and then drag in either of the two prefabs and then scale and position as desired.	
In your Assets, go to Character/first person character/Prefabs and then Drag a first person controller to the scene. Position your view of the scene using ALT and mouse then select Game Object > Align with View (make sure you do not deselect the controller	
Press play and navigate the level you have created. Select your fps controller in the Hierarchy Window. You can then edit the walk and run speed of your controller as desired. Save your scene.	
Now that you are comfortable with the basics why don't you download some assets from the Unity assets store to further detail your level.	



Would you like to know more?

For more information about the course visit http://www.glos.ac.uk or email Andre van Rooijen (avanrooijen@glos.ac.uk).The following is an indicative course map for Computer Games Design. There are more options, but this is what most students study!



UoG Games Team