

VR/AR Development with Unity  
Course Syllabus

### Week 1: Introduction to Unity

* Introduction to the Instructor
* Unity Overview: Unity Windows, Interface, Navigation, Terminology, GameObjects, Hierarchy, Parenting Objects
* Asset Store, Importing Plugins
* Overview of VR Devices and their representation in scene
* Weekly Project:
* Create a new Project
* Create a Scene within the new Project
* Create Primitives Objects within the Scene
* Create a Terrain

### Week 2/3: Introduction to Scripting

* Introduction to Monobehaviours (Awake, Start, Update)
* Overview of instances vs static
* Public Variables in Unity - Inspector Representation
* Manipulating components in Scripts
* Creating GameObjects via Scripts (new GameObject, prefabs)
* Accessing Components through Scripts (GetComponent)
* Explanation of Transforms and how Parenting affects them (local vs global)
* Input
* Getting input from Keyboard;
* Setting up Unity Input (Axis)
* Discuss controller input
* Weekly Project (Week 3):
* Create a cube, parent the camera to it
* Create a script for your cube that:
  + Move cube with keyboard input (w, a, s, d)
  + Rotate cube with keyboard input (q, e)
* Weekly Project (Week 4):
* Create a prefab of any GameObject
* Create a script that spawns the prefab when key is pressed
* Keep track of spawned GameObjects in script
* Delete all cubes when different key is pressed

### Week 4: Introduction to the Provided VR Interaction System

* Introduction to Interaction System and its Components
* Attaching Components to Objects in Scene (Interactables)
* Attaching Input Components to Controllers
* Weekly Project:
* Set up interaction scripts on controllers
* Attach scripts to some objects in the scene
* Test objects - ensure you’re able to pick up and throw them

### Week 5: Interactions

* Introduction to Colliders and their use
  + OnCollisionEnter, OnCollisionExit, OnCollisionStay
  + Explain OnTrigger vs OnCollision
* Rigidbodies and how colliders report to them
* Raycasting
* Weekly Project:
* Create a script that will modify GameObject when collided with (Shrink/Grow/Change Color)
* Create a script that will modify GameObject when it is triggered (Shrink/Grow/Change Color)
* Attach scripts to GameObjects in scene and test

### Week 6: Deep Dive into Provided VR Interaction System

* Controller Script: Getting Input from Devices
* Base Class: The Middle Man
* Interactable Component
* Discuss pros and cons of “parenting” interactable system
  + Brief talk about joint-based and physics based interactable systems
* Weekly Activity:
* Create a cube and attach the provided interaction script
* Set cube to pick up with grip button instead of trigger
* Create a new script that inherits from the interactable base class
  + When you are holding a GameObject and press the trigger button, make a visible change to the GameObject (Shrink/Grow/Change Color)

### Week 7: Event Systems

* Unity Events (For use with Inspector)
* Static Unity Events/Actions within scripts
* Events and Delegates (C#)
* Weekly Activity:
* Create a script that fires an event when you pull the trigger and are touching the GameObject it is attached to.
* Attach script to a GameObject within the scene
* Create a script that affects a GameObject (Shrink/Grow/Change Color) when the aforementioned event is invoked
* Attach script to a second GameObject in the scene

### Week 8/9: Physics

* Overview of RigidBodies
* Overview of Joints
* Introduction to Physics Materials
* Adding force to objects via scripting
* Discuss the pitfalls of interactions via parenting
  + Show how rapidly dragging objects that you’re holding through others can cause them to clip through
  + Discuss physics based interaction system
* Weekly Activity:
* Create a lever using primitives and a joint
* Create a script that detects when lever is pulled
* Add force to an object when lever is pulled

### Week 10: Publishing your App

* Publishing apps that perform consistently at 90fps (desktop) or 60fps (mobile)
* Help from instructors solving bugs and problems in your personal project
* Resources and Next Steps
* Weekly Activity:
* Combine all your interaction systems into one scene