

Glendale Unified School District School

Middle School

May 4, 2021

Department:	Career Technical Education
Course Title:	Virtual Reality Game Design and Programming
Course Code:	9055GV/9056GV
Grade Level(s):	7-8
School(s) Course Offered:	Roosevelt Middle School
UC/CSU Approved (Y/N, Subject):	N/A
Length of course:	Year
Semester Credits:	10
Recommended Prerequisite:	None
Recommended Textbooks:	<ul style="list-style-type: none">• <u>Unity for Absolute Beginners</u>, Sue Blackman(author) Published by Focal Press © 2013 ISBN:9781430249009, 1430249005• <u>Learn C# By Developing Games with Unity 2020</u>. Harrison Ferrone Published by Packt, ISBN 9781800207806• <u>Unity 2020 Virtual Reality Projects: Learn VR development by building immersive applications and games with Unity 2019.4 and later versions</u> Published by Packt, ISBN 978-1-83921-733-3
Course Overview:	Video Game Design and Programming - Virtual Reality is a two semester course in the Arts, Media & Entertainment - Game Design Industry sector. Students will learn basic foundations of video game design for both 2D and 3D games, and then the ability to program their game using C# and Visual Scripting(Bolt). Specialized curriculum in the field of virtual reality games will be introduced, and the games that are built will be played on a virtual reality headset (Oculus and HTC Vive). This course prepares students for

the technology and software packages that they will use to build video games and software applications for careers in the Arts, Media, and Entertainment - Game Design sector. The foundation and pathway standards make explicit the appropriate knowledge, skills, and practical experience students should have to pursue their chosen profession through whatever course of postsecondary, collegiate, and graduate training or apprenticeship it may require. Also certain unity certification tests may be offered

First Semester-Course Content

Unit 1: Introduction to Video Games

(2 weeks)

STANDARDS

Common Core Standards: English Language Arts.7-8.LS.C.1.1, 7-8. Reading 2.6

Career Technical Education Arts, Media & Entertainment - Game Design Pathway Standards:

D1.2, D1.3, D2.1, D2.2, D2.4, D2.5

- A. This module introduces students to video game technology, software, and related fields. Students will explore the different aspects of making a video game, and what characteristics make a video game successful. Students are instructed of the class rules and policies and the safety guidelines of equipment use.
- B. Students will demonstrate an understanding of basic concepts by creating both a 2D and 3D game, naming the game correctly and putting it to a folder on their hard disk, saving a scene, and then compressing and saving the project to their Google Drive. They will then practice downloading and extracting their project on their computer hard drive, and opening it again in unity. Thus insuring they do not lose their projects

EQUIPMENT/SOFTWARE: Unity, Google Drive

Unit 2: Unity Development Environment/Interface

(2 weeks)

STANDARDS

Common Core Standards: English Language Arts ELA.7-8.R.CAGT.2.3, ELA.7-8.R.CAGT.2.5

Career Technical Education Arts, Media & Entertainment - Game Design Pathway Standards:

D6.1, D6.2, D6.3

- A. This module is designed to teach students how to use the Unity Interface/Layout and to get them started Creating their own Scenes/Transitions and to do manipulation of their objects in the Unity Scene editor.
- B. Students will learn how to create new scenes and save their current scene in their project to save all their work

EQUIPMENT/SOFTWARE: Unity

Unit 3: **Building a Virtual World and running through it**

(3 weeks)

STANDARDS

Common Core Standards: Ela -LITERACY.WHST.6-8.1.B

Common Core Standards: ELA.7-8.R.CAGT.2.5

Career Technical Education Arts, Media & Entertainment - Game Design Pathway Standards: :
D1.2, D1.3, D1.4, D1.5, D2.6, D2.7, D2.8

- A. This module is designed to teach students how to use the unity train commands to create their own ground terrain, and shape it creating hills, mountains, valleys, etc.
- B. They will then use the unity standard assets package to bring in trees, different ground surfaces, water for lakes, and other assets to design their world
- C. They will bring in a third person controller from the Unity Standard assets package that will be able to run through their world so they can explore it
- D. Balance, contrast with emphasis on creating an aesthetically pleasing environment that will also capture the players attention when they first start and open the game

EQUIPMENT/SOFTWARE: Unity, Unity Standard Assets Package

Unit 4: **C# Programming Basics**

(4 weeks)

STANDARDS

Common Core Standards: ELA.7-8.LS.C.1.3, ELA.7-8.R.

Career Technical Education Arts, Media & Entertainment - Game Design Pathway Standards:
D3.1, D3.2, D3.3, D3.4, D2.7, D2.8

- A. This module is designed to provide a basic overview of Computer programming and specifically dealing with C-sharp and visual studio and using the unity collection of commands to write scripts for the video game
- B. Introduction to C# Code structure, syntax, terminology, first script; create and manage variables and functions; logistics of methods and statements.
- C. Introduction to Unity Bolt in the advantage of using visual scripting for writing scripts
- D. Students will create two different projects and program and create a script in Visual Studio and then a similar script in Unity Bolt so that they can compare the differences in hand coding and then using visual scripting

EQUIPMENT/SOFTWARE: Unity, Visual Studio, Unity Bolt

Unit 5: **Coding Concepts**

(3 weeks)

STANDARDS

Common Core Standards: ELA.7-8.W.2.5d, ELA.7-8.R.CAGT.2.6,

Career Technical Education Arts, Media & Entertainment - Game Design Pathway
Standards: D3.1, D3.2, D3.3, D3.4, D3.5

- A. Introduction to Code structure, syntax, terminology, first script; create and manage variables and functions; logistics of methods and statements.
- B. Scripting tells our GameObjects how to behave; it's the scripts and components attached to the GameObjects, and how they interact with each other, that creates our gameplay. Now, scripting in Unity is different from regular scripting because students will focus on the gameplay in their scripts.
- C. All scripts must be attached to an object for them to work when the game starts
- D. Students will learn how to define and use variables, functions, methods, and classes in their C# scripts
- E. **Bolt** is a visual scripting asset for **Unity**. It enables **Unity** users to create logic for games or applications without writing code. **Bolt** has visual, node-based graphs that both programmers and non-programmers can use to design final logic or to quickly create prototypes

EQUIPMENT/SOFTWARE: Unity, Visual Studio, Bolt

Unit 6: **Add interaction with game objects**

(3 weeks)

STANDARDS

Common Core Standards: ELA.7-8.R.CAGT.2.6

Career Technical Education Arts, Media & Entertainment Pathway Standards: D3.1, D3.2, D3.3, D3.4, D3.5, D2.6

- A. This module focuses on adding interaction with C# and Bolt, manage collision detection, destroy objects, manage scenes through code, update user interface with scripting, polishing their game
- B. Students study and learn how to use Class Inheritance, Interfaces, Events and Delegate functions

EQUIPMENT/SOFTWARE: Unity, Visual Studio, Bolt

Unit 7: **Build your first 2D video game**

(3 weeks)

STANDARDS

Common Core Standards: ELA.7-8 R.CAGT.2.6, ELA.8.R.NAGT.3.2,

Career Technical Education Arts, Media & Entertainment Game Design Pathway Standards: D4.1, D4.9, D5.1, D5.6, D3.5

- A. Using C# programming language to create your first script. Using C# and Bolt to create a 2D game with 2D scenes, creating new scripts and assets, and attaching your Scripts to Sprites obtained from the Unity Asset store Students study and learn how to use Class Inheritance, Interfaces, Events and Delegate

- B. Students will add the 2D physics properties to their game, Rigidbody2D, Box collider's, Gravity, and set these values
- C. Students will attach the Scripts to their game objects, play their game, and correct any error messages that come up in the Unity console. Students will then build and run their game that come up in the Unity console. Students will then build and run their game

EQUIPMENT/SOFTWARE: Unity, Visual Studio, Unity Bolt

Second Semester-Course Content

Unit 8: Create your First 3D Game

(2 weeks)

STANDARDS

Common Core Standards: ELA.7-8.LS.C.1.1, ELA.7-8.R.CAGT.2.6

Career Technical Education Arts, Media & Entertainment – Game Design Pathway Standards: D3.1, D3.2, D3.3, D3.4, D3.5

- A. Create a 2D and 3D game. Features to add to knowledge base: Sprite Renderer, Prefab creation, Collision Detection, Score management; Create a game environment, navigate cameras, design play area, create and collect objects, display score, build and run the game
- B. Students will follow the video lesson to create a Roll-a-ball game which will I have a ball for a player which will then be controlled what do user to roll across the terrain and pickup tokens they have created and to keep score on a Canvass they created.

EQUIPMENT/SOFTWARE: Unity, Visual Studio, Computergraphics.com, Unity Asset Store

Unit 9: Create 3D Objects in Maya to Export Them into Your Game

(4 weeks)

STANDARDS

Common Core Standards: ELA.7-8.LS.C.1.1, ELA.7-8.R.CAGT.2.5

Career Technical Education Arts, Media & Entertainment – Game Design Pathway Standards: D4.1, D4.2, D4.3, D4.4, D4.5, D4.6

- A. This module is to introduce students into 3D primitives, Nurbs, polygons, edges, faces, vertexes, and Bezier Curve Tool Options.
- B. Students will follow the video lesson and create a 3D house and 3D Open Barn structure to bring into their unity video game
- C. Students will use Maya to export the selected objects or the entire scene to their Unity project. If they have the project open in Unity, they will be able access the FBX file immediately. To see it in their Unity scene, they will drag and drop the file from the Assets folder in the Project Browser into the Scene view.

EQUIPMENT/SOFTWARE: Unity, Visual Studio, Autodesk Maya, Unity Asset Store

Unit 10: Create FPS Game using a Bow and shooting Fruit

(4 weeks)

STANDARDS

Common Core Standards: ELA.7-8.LS.C.1.1, ELA.7-8.R.CAGT.2.5

Career Technical Education Arts, Media & Entertainment – Game Design Pathway Standards:
D4.1, D4.2, D4.3, D4.4, D4.5, D4.6

- A. This module is to introduce students into finding new assets from the unity assets store and then importing them and using them in their video game. They will also be creating new scripts for their objects, creating a a whole new saying for their game to play, and then creating a canvas to keep score as the user your plays their game
- B. Students use the unity asset store to find assets and objects to bring into their game to build their virtual world
- C. Students will use Maya to export the selected objects or the entire scene to their Unity project. If they have the project open in Unity, they will be able access the FBX file immediately. To see it in their Unity scene, they will drag and drop the file from the Assets folder in the Project Browser into the Scene view.

EQUIPMENT/SOFTWARE: Unity, Visual Studio, Unity Asset Store, Unity Bolt

Unit 11: Create A Virtual Reality Video Game

(5 weeks)

STANDARDS

Common Core Standards: ELA.7-8.LS.C.1.1, ELA.7-8.R.CAGT.2.5

Career Technical Education Arts, Media & Entertainment – Game Design Pathway Standards:
D4.1, D4.2, D4.3, D5.1 D5.2 D5.3, D8.1, D8.2, D8.3, D9.2, D9.4

- A. This module is to introduce students into exciting new world of virtual reality. Students will set up unity and using the Unity SDK(Software Development Kit) from the Unity Assets Store bring in the packages and change the settings so that their game will be built to run on both the Oculus, and HTC Vive, Virtual Reality Headsets
- B. Students will also download and use the SteamVR plugin because it renders to both the Oculus Rift and the HTC Vive when they run the game, so it is an easy way to build for leading VR headsets.
- C. Students will learn how to set up the Oculus, HTC Vive and Virtual Reality Toolkit (VRTK integrations) in Unity as well as how to set up a basic VR scene.
- D. Students will get the best practices for making their VR experience comfortable and learn how to implement a teleportation system.
- E. Students will learn how hand interactions work in VR, how to design interactions to manipulate objects and how to overcome challenges with item placement.
- F. Students will learn how to Transition from 2D to VR, review well-established VR interaction paradigms, and to also find out how to design a user-friendly interface for VR.

EQUIPMENT/SOFTWARE: Unity, Oculus VR Headset, HTC Vive Headset, SteamVR SDK package, Unity SDK package, Unity Asset Store, Visual Studio, Google classroom

Unit 12: **Publish Video Game for Test Play and then Post on Itch.io**

(5 weeks)

STANDARDS

Common Core Standards: ELA.7-8.LS.C.1.1, ELA.7-8.R.CAGT.2.5

Career Technical Education Arts, Media & Entertainment – Game Design Pathway Standards:
D5.1, D5.2, D5.3, D5.4, D5.5, D5.6, D6.1, D6.2, D6.3, D7.1, D7.2,, D8.1, D8.3, D9.1, D9.3

- A. This module is to introduce students into the different formats for building in running their game and then publishing it for other students to play. They will publish their game in both the PC and Mac format and then post it to google classroom so that other players can play their game and provide feedback
- B. Students will be required to play at least three games during designated class gameplay time and then provide detailed feedback on their opinion of the game and if there are any glitches or things that need to be fixed. They will be graded on their comments
- C. Students will take the feedback given to them by the different classes and work to correct any issues or problems with their game and to add more features and then publish the game again for more gameplay and comments
- D. Students will then publish their game to the WebGL format and post it up on Itch.io for other students and for anyone else who wants to play their game online. They will also upload PC and Mac versions for their game and decide if they wish to try and charge for the general public to play their game

EQUIPMENT/SOFTWARE: Unity, Visual Studio , Unity Bolt, Google Classroom, Itch.io