

Game Design in Unity (Bailey) Syllabus

High School (140 - 155 Contact Hours)

Course Overview and Goals

The Game Design in Unity course teaches the fundamentals of designing a game using the most widely accessed and preferred editing engine in the world. The intent of this course is to prepare high school students with the industry related skills needed for the workplace and higher learning environments. By the end of this course, they will understand the design planning process, be knowledgeable of industry related careers, and be able to navigate the Unity environment in order to create 3D games.

Learning Environment

While this course adapts the blended learning approach, it can also be delivered within a virtual learning environment. Course content is a combination of web-based and offline activities. Students will access lessons through the CodeHS platform and perform activities directly within the Unity game engine. Students and instructors will need to sign up for and download the Unity game engine in order to complete this course. Steps to do so are included within this course.

Programming Environment

Students illustrate comprehension of game design skills using the CodeHS platform and apply their knowledge using the Unity game engine. Students will create their games and configure scripts in the Unity game engine. They'll share their projects with their teacher and classmates.

Presentations

Some lessons include an activity where students create a presentation using Google Slides. Teachers have the choice of structuring this slideshow as either having the students deliver an oral presentation or having the students complete and turn in as a hands-on, visual activity.

Prerequisites

Game Design in Unity is designed for high school students with a basic level of technical proficiency or exposure to digital design. Students do not need a background in programming.

More Information

Browse the course content: <https://codehs.com/course/17394>

Course Breakdown

Module 1: Intro to Game Design (1 week / 2 - 3 hours)

In this module, students will be introduced to the gaming industry by exploring what it means to be a game designer and observing the role of the consumer. The module includes an overview of the industry, the history of video games, and a case study review. The content of this module is mostly specific to the gaming industry.

Objectives / Topics Covered	<ul style="list-style-type: none"> ● Intro to Game Design ● History of Video Games
Example Assignments / Labs	<ul style="list-style-type: none"> ● Intro to Game Design <ul style="list-style-type: none"> ○ Students get an overview of game design. They get to reflect on what they already know about video games and what they hope to learn in the course. ● History of Video Games <ul style="list-style-type: none"> ○ It's important to understand the context of how modern video games came to be before jumping into developing their own games. Students get a glimpse of how games and consoles have developed over time.

Module 2: Exploring the Industry (1 - 2 weeks / 3 - 6 hours)

Students learn about the game design industry, different roles involved in the creation of video games, and what it means to be a game designer.

Objectives / Topics Covered	<ul style="list-style-type: none"> ● Careers in Game Design ● Scavenger Hunt: Careers in Game Design ● Game Industry Insights
Example Assignments / Labs	<ul style="list-style-type: none"> ● Careers in Game Design <ul style="list-style-type: none"> ○ Students watch videos that shadow employees at game design studios in order to get insight into what it means to be a game designer / developer. Students then reflect on what they saw and where their interests lie. ● Scavenger Hunt: Careers in Game Design <ul style="list-style-type: none"> ○ Building off the last lesson, students learn more about the different roles involved in game design and development. They get to think about which role interests them and why. ● Game Industry Insights <ul style="list-style-type: none"> ○ Rounding out this module, this lesson has students conduct research about a game design studio. They investigate everything from the size and location of the studio, to the roles on the development teams, to the studio's game design philosophy. Students then present their findings.

Module 3: Get Started with Unity (1 week / 3 - 4 hours)

In this module, students will continue their understanding of game design by becoming familiar with the Unity game engine. Here, they will learn how to set up a Unity account, download and install the engine, and share Unity projects throughout this course. They will also learn how to access Unity documentation. The content in this module is mostly specific to the Unity game engine.

Objectives / Topics Covered	<ul style="list-style-type: none">● Intro to Unity and Unity Setup● Course Management
Example Assignments / Labs	<ul style="list-style-type: none">● Intro to Unity<ul style="list-style-type: none">○ Students learn more about Unity as a game engine and what sort of games have been developed with it.● Unity Setup<ul style="list-style-type: none">○ They set up their own Unity accounts and install the free software on their computer.● Course Management<ul style="list-style-type: none">○ Students learn how to share Unity projects and submit assignments throughout this course.

Module 4: Create Interactive Worlds (2 - 3 weeks / 10 - 15 hours)

In this module, students will begin learning how to create game objects in the Unity game engine. They'll learn how to navigate the Unity interface, build basic game scenes, and manipulate game physics to control how objects interact with the game environment. They'll also learn how to access necessary game assets. The content in this module is mostly specific to the Unity game engine.

Objectives / Topics Covered	<ul style="list-style-type: none">● Unity Basics● Building a Scene with Prefabs● Game Physics
Example Assignments / Labs	<ul style="list-style-type: none">● Unity Basics<ul style="list-style-type: none">○ Students work on their first project in Unity, learning the basics about GameObjects and how to transform them and add colors.● Building a Scene<ul style="list-style-type: none">○ Students get to apply the skills they've learned in this module in building a full custom scene with polygonal nature assets. They learn a few best-practice tips about designing their scene as well.● Game Physics<ul style="list-style-type: none">○ Students explore and apply rigid bodies and colliders○ Students explore collisions events and character controllers

Module 5: Legal and Ethical Consideration (2 weeks / 8 - 10 hours)

Students explore legal and ethical issues in the field of game design.

Objectives / Topics Covered	<ul style="list-style-type: none">● Copyright Rules● Ethical Considerations● Security in Game Design● Representation in Technology
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<p>Example Assignments / Labs</p>	<ul style="list-style-type: none"> ● Applying Copyright Laws to Video Game Design <ul style="list-style-type: none"> ○ Students learn about copyright laws as they apply to games and examine the case between Atari v. North American Phillips. ● Ethical Consideration <ul style="list-style-type: none"> ○ Students learn about the role of governing bodies and developers in the context of developing games. ● Security in Game Design <ul style="list-style-type: none"> ○ Students read about the current cybersecurity threats in gaming and think how developers can be proactive in mitigating these threats. ● Representation in Technology <ul style="list-style-type: none"> ○ Students learn about the lack of representation of women and minorities in the game design industry, think about the effects this has on the industry, and identify ways a developer or design studio can address these issues.
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Module 6: Project: Your First Game (4 - 6 weeks / 24 - 30 hours)

This module guides students through the game design process as they create their first simple game from scratch. In doing so, they investigate basic principles of good games and think about how to apply these ideas in their own creations.

<p>Objectives / Topics Covered</p>	<ul style="list-style-type: none"> ● What Makes a Good Game? ● Planning Your Game ● Making Your Game ● Publishing and Presenting Your Game
<p>Example Assignments / Labs</p>	<ul style="list-style-type: none"> ● What Makes a Good Game? <ul style="list-style-type: none"> ○ Students examine a few basic principles that all good games follow. ● Planning Your Game <ul style="list-style-type: none"> ○ Students brainstorm ideas for their game and slowly whittle their first game concept. In doing so, they receive feedback from their peers and iterate on their plan. ● Making Your Game <ul style="list-style-type: none"> ○ Students start by developing quick prototypes of their game's environment, character, and gameplay. After more peer feedback, they iterate their designs and finalize their game. ● Publishing and Presenting Your Game <ul style="list-style-type: none"> ○ Students learn how to publish a game in Unity so that all may play it! They update their game design document and present their design process and game to the class.

Module 7: Create Visual and Sound Effects (4 - 5 weeks / 20 - 25 hours)

In this module students learn about different game elements and environments, and the impact they have on gameplay. Students add effects such as light objects, particle systems, camera angles and movement, and sound effects.

<p>Objectives / Topics Covered</p>	<ul style="list-style-type: none"> ● Gameplay and Effects ● Cameras ● Lighting Effects ● Particle Systems
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	<ul style="list-style-type: none"> ● Sound Effects
Example Assignments / Labs	<ul style="list-style-type: none"> ● Gameplay and Effects <ul style="list-style-type: none"> ○ Students examine how different effects impact gameplay by looking at real-world examples ● Cameras <ul style="list-style-type: none"> ○ Students learn how to change the camera locations positions relative to players, including following a player ○ Students extend camera with special views like top-down and two player views ● Lighting Effects <ul style="list-style-type: none"> ○ Students exam how to place lights and the effects they have on the scene ○ Students learn how to update different lighting properties ● Particle Systems <ul style="list-style-type: none"> ○ Students learn about particles in Unity and how to add them to objects to enhance the game ● Sound Effects <ul style="list-style-type: none"> ○ Adding sound effects to objects ○ Adding music to enhance gameplay ● Make It Your Own <ul style="list-style-type: none"> ○ Students extend lesson projects to a game using the skills they learned in this module

Module 8: Project: Design Your Game (2 weeks / 8 - 10 hours)

This module introduces students to the larger project that will be developed over the remainder of the course. They will then learn about storyboarding and different elements of game design to start planning the development of their project.

Objectives / Topics Covered	<ul style="list-style-type: none"> ● Project Introduction ● Storyboarding ● Developing Game Ideas ● Creating Storyboards
Example Assignments / Labs	<ul style="list-style-type: none"> ● Project Introduction <ul style="list-style-type: none"> ○ Students are introduced to the Keep America Beautiful project and goals ● Storyboarding <ul style="list-style-type: none"> ○ Students learn about what storyboarding is and look at case studies ● Developing Game Ideas <ul style="list-style-type: none"> ○ Students are introduced to the game development process ○ Students continue developing ideas around their projects ● Creating Storyboards <ul style="list-style-type: none"> ○ Student create their initial storyboard ideas for their project

Module 9: Creating Components and Mechanics (4 weeks / 18 - 20 hours)

In this module, students will dive deeper into larger Unity development concepts. They will have an opportunity to develop their own prefabs, create different models, use character animation, and apply different user interfaces to their games.

Objectives / Topics Covered	<ul style="list-style-type: none">● Model Creation● Character Animation● User Interface● AI in Unity
Example Assignments / Labs	<ul style="list-style-type: none">● Model Creation<ul style="list-style-type: none">○ Students build low poly models and learn to apply materials and textures to the models○ Students extend their models by creating and applying colliders and control scripts.● Character Animation<ul style="list-style-type: none">○ Students animate a character using a given controller and rigging● User Interface<ul style="list-style-type: none">○ Students enhance their games by adding different user interfaces such as HUD, game scores, and various menus● AI in Unity<ul style="list-style-type: none">○ This tutorial guides students to add an AI jet to their prefab jet scene. They learn how to manipulate the components of both jets and change the path of the AI jet.

Module 10: Project: Prototyping and Testing Your Game (3 - 4 weeks / 15 - 20 hours)

Students continue designing their final projects as they learn about prototypes and different testing techniques. In this module, students will develop prototypes for their final game and test different variations on their final product.

Objectives / Topics Covered	<ul style="list-style-type: none">● Prototyping and Testing● Building and Testing a Minimal Viable Product
Example Assignments / Labs	<ul style="list-style-type: none">● Prototyping and Testing<ul style="list-style-type: none">○ Reflect on industry examples of how prototyping and testing are used○ Create a prototype for their project● Building and Testing a Minimal Viable Product (MVP)<ul style="list-style-type: none">○ Students will create an MVP○ Test and update MVP based on feedback

Module 11: Project: Finish Your Game (3 weeks / 12 - 15 hours)

Students wrap up their final game projects in this module. Applying all the different techniques from earlier modules as well as incorporating feedback from the previous module, students will complete and present their final game design. They'll also create a gameplay trailer to learn about game promotion.

Objectives / Topics Covered	<ul style="list-style-type: none">● Finish Your Game● Promoting Your Game
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<p>Example Assignments / Labs</p>	<ul style="list-style-type: none"> ● Finish Creating Game <ul style="list-style-type: none"> ○ Students use feedback from testing and implement a final game based on their work throughout the semester. ○ Students present their learnings and describe how their game meets the project goals. ● Promote Your Game <ul style="list-style-type: none"> ○ Students learn about gameplay trailers and styles used to highlight the awesomeness of a game to potential players ○ Students create a gameplay trailer and share their video
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Optional Supplemental Materials (Remainder of school year)

These supplemental materials should be used following the Prerequisite Units mentioned:

Supplementary Lessons	Prerequisite/Recommended Module(s)	Number of Activities
Game Jam!	Complete <i>Project: Your First Game</i> and prior modules	6
Using Prefab Objects	<i>Get Started with Unity</i>	6
Third Person Game Mechanics	<i>Get Started with Unity</i>	6