**PLTW Computer Science**
Game Design Development | Course Outline

*Create engaging online experiences. Design competitive multiplayer games that anyone around the world can explore. Learn how to create the exciting features in games that keep players coming back for more. With Roblox and the PLTW curriculum, you will discover that anyone can code to create something fun and enjoyable.*

Game Design and Development (GDD) is designed as a compact (22-day) module. This module is an exciting option for an after-school club, a summer course, or a supplement to any PLTW high school program. The module offers flexibility so students new to computer science will find ample guidance, while students with prior knowledge have opportunities to use their creativity to expand on their projects.

GDD introduces students to game design and development through Roblox Studio, a development environment with a comprehensive set of tools that empowers developers to create expansive worlds. Students learn fundamental game design elements such as goals, rules, advancement, and feedback. As students master the basics of game design, they learn the Lua programming language to develop features that make their games more engaging.

GDD is based on a subset of standards from state and national Game Development and Computer Science frameworks. Students study the following engaging activities in the module:

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| Activity 1 | Getting to Know Roblox | (5%) |
| Activity 2 | Bowling into Advanced IDE Concepts | (9%) |
| Activity 3 | Pirates and Prompts | (14%) |
| Activity 4 | Programming Pirates | (14%) |
| Activity 5 | New Features, New Fun | (14%) |
| Project | The Haunting of Jewel House | (22%) |
| Problem | A Planet Exploration | (22%) |

### Activity 1: Getting to Know Roblox (1 day)

Students learn the basic elements of game design and development. This activity introduces students to Roblox Studio, where they learn the basic elements of game design and development. The goal of this activity is to guide students so they feel comfortable navigating the Roblox Studio user interface. By changing properties, adding interactions, and manipulating parts, students gain an understanding of the physics engine and various tools in Roblox Studio.

### Activity 2: Bowling into Advanced IDE Concepts (2 days)

This activity leads students down a deeper exploration of the physics engine in Roblox Studio. Students create a bowling game with custom meshes that change the look of objects in their game's world. Students learn about scene design as they adjust the shape and size of parts, move and customize objects, and learn how to strategically organize each part in their world.

### Activity 3: Pirates and Prompts (3 days)

Students create an adventure-style game that starts with a prebuilt world in Roblox called Pirate Island. After exploring the pirate island, students customize the game by creating prompts for a player to follow, events and event handlers that reward or set a player back, and particle emitters to provide visual feedback to players. To further enhance a player's experience, students write scripts to add custom behaviors.

### Activity 4: Programming Pirates (3 days)

Students add a leaderboard to their pirate island to track the amount of gold players collect in the game. To make each gameplay experience more interesting, students use conditional statements and random values to vary the amount of gold in treasure chests. This activity reinforces programming concepts by encouraging students to experiment with and even break their code.

### Activity 5: New Features, New Fun (3 days)

To complete their pirate island, students add non-playable characters, text labels, dialog prompts, sound effects, and music to their game. To ensure the game always has resources for a player to collect, students write a script that resets the game every five minutes. Finally, students explore the benefits and drawbacks of customizing parts at creation time versus modifying them in code.

### Project: The Haunting of Jewel House (5 days)

Students learn more advanced gaming elements as they create a fully functional game with a mysterious storyline. Students explore a prebuilt world that resembles a suburban neighborhood, then plan out milestones to create a new game based on a predefined narrative. This project reinforces the skills students learned when making the bowling alley and pirate island games and teaches the importance of project planning and iterative development.

### Problem: A Planet Exploration (5 days)

Students use their knowledge from the module to design and develop a planet exploration game. Students choose from a variety of provided assets and create their own storyline, code a unique leaderboard that fits with their story, and strategically place collectable items around their planet. This activity introduces students to the terrain editor in Roblox Studio so each student will have a unique solution.