PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Video Game Design

Curriculum writing committee: Audrey Dennis

Grade Level: 9-12

Date of Board Approval: June 2025

Course Weighting: Video Game Design

Projects	**60%**
Quizzes	**30%**
Participation/Soft Skills	**10%**
Total	**100%**

Curriculum Map

Overview:
Video Game Design is a fun and interesting course that encompasses a student's curiosity or knowledge of programming, game design, and animation. Projects are created using Unity or other software programs. The course includes game-theory reading with game-building application lessons by integrating cross-curriculum and STEM activities. Topics include but are not limited to animation, scene construction, interactive design, digital art, gravity, and C# programming.

Time/Credit for the Course: 1 Semester, ½ Credit

Goals:

Marking Period 1 Understanding of:
Creating and managing unity projects
Unity Editor essentials
Real-time industry essentials
Scene building essentials
Publishing
Beginner Audio Design Principles
Beginner Audio Implementation
Beginner User Interface
Beginner Job Preparation
Beginner Design Process
Beginner Project Management
Beginner Render Pipelines
Beginner Digital Citizenship
Beginner Research
Beginner Materials

Beginner Shader Scripting
Beginner Shaders
Beginner Lighting
Beginner Animation Systems
Beginner 3D Animation (Native Unity)
Beginner 3D Animation (Imported)
Beginner Particles and Visual Effects
Beginner Unity Cameras
Beginner Post-Processing

Marking Period 2 Understanding of:

Beginner Audio
Beginner User Interface
Beginner Prototyping
In Depth Player Control
In Depth Project Management & Teamwork
In Depth Basic Gameplay
In Depth Sound & Effects
In Depth Gameplay Mechanics
In Depth User Interface

Big Ideas:

Big Idea # 1:
Computer and Information Technologies:
Computer technology is a data management and communication tool essential for business and personal productivity, problem solving, and decision making in the global world.

Textbook and Supplemental Resources:

Unity Learn. https://learn.unity.com/ December 13, 2024.

Video Game Design and Programming Concepts 1st Edition. D. Michael Ploor. Goodheart-Wilcox Publisher, 2020.

Computing & Game Design with ClickTeam Fusion. Daniel Block. First Printing, 2017.

Curriculum Plan

45 Days Per Unit

Unit 1

Standards:

PA Business, Computer Information Technology Academic Standards

Standard Area - 15.4: Computer and Information Technologies
Standard - 15.4.12.A

Apply the creative and productive use of emerging technologies for educational and personal success.

Standard - 15.4.12.B
Evaluate the impact of social, legal, ethical, and safe behaviors on digital citizenship.

Standard - 15.4.12.C
Develop criteria for analyzing hardware options to meet defined needs.

Standard - 15.4.12.D
Evaluate emerging input technologies.

Standard - 15.4.12.G
Create an advanced digital project using sophisticated design and appropriate software/applications.

Standard - 15.4.12.H
Use programming languages to develop logical thinking and problem-solving skills.

Standard - 15.4.12.J
Create a complex computer program to solve a problem.

Standard - 15.4.12.M
Evaluate the impact of emerging technologies on various career paths and provide examples of industry certifications within the field.

Common Core Standards

CC.2.3.HS.A.13
Analyze relationships between two-dimensional and three-dimensional objects.

Anchors:

CC1.2.1112Bc
Cite the most important details and evidence from the text to answer literal and inferential questions, including conclusions or summaries

CC1.2.1112.La
Read and answer a question using informational material

International Society for Technology in Education (ISTE) https://iste.org/standards

Domain	#	
1 Empowered learner	1a	Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them, and reflect on the learning process itself to improve learning outcomes.
	1c	Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

	1d	Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use, and troubleshoot current technologies, and are able to transfer their knowledge to explore emerging technologies.
3 Knowledge constructor	3b	Students evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.
	3c	Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
	3d	Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.
4 Innovative Designer	4a	Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.
	4b	Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
	4c	Students develop, test, and refine prototypes as part of a cyclical design process.
	4d	Students exhibit a tolerance for ambiguity, perseverance, and the capacity to work with open-ended problems.
5 Computational thinker	5a	Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.
	5c	Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
6 Creative communicator	6b	Students create original works or responsibly repurpose or remix digital resources into new creations.
7 Global collaborator	7b	Students use collaborative technologies to work with others, including peers, experts, or community members, to examine issues and problems from multiple viewpoints.

Objectives:

Unit 1:

Lessons – Unity Essentials & Creative Core Objectives:

- Install the Unity Editor for the first time (DOK 1)
- Create and manage projects in the Unity Hub (DOK 4)
- Identify and use essential features of the Unity Editor (DOK 1)
- Create and manage scenes (DOK 4)
- Navigate in 3D space in the Scene view (DOK 1)
- Navigate in 2D space in the Scene view (DOK 1)
- Summarize and understand Unity's history and role within the industries that rely on real-time creation (DOK 2)
- Explain the real-time production cycle (DOK 3)
- Identify the default elements in a new scene (DOK 1)
- Create GameObjects (DOK 4)
- Manipulate GameObjects (DOK 4)
- Work with components and scripts
- Change the appearance of GameObjects (DOK 4)
- Implement basic physics for GameObjects (DOK 4)
- Create and share a basic build (DOK 4)
- Prepare yourself for the job search (DOK 2)
- Create a portfolio, enabling you to pursue a job in real-time development (DOK 4)
- Cultivate professional attitudes (DOK 2)
- Plan your Unity learning journey by setting goals (DOK 2)
- Practice continuous personal and professional growth (DOK 2)
- Apply the topics covered in Creative Core (DOK 4)
- Create a guided project in which to apply your new skills (DOK 2)
- Create a new project in Unity and make some technical decisions about that project (DOK 4)
- Apply and learn how to use other people's work in your projects responsibly (DOK 2)
- Tour Unity's technical documentation as another resource for learning (DOK 1)
- Conduct critical evaluation in decision-making for creative projects. (DOK 3)
- Explain how surfaces in Unity are defined and rendered (DOK 3)
- Select a type of shader for your own project (DOK 1)
- Create materials for a common shader, using a wide variety of properties (DOK 4)
- Create your own simple shader using Shader Graph (DOK 4)
- Implement appropriate lighting in a scene in a manner that will simulate the real-world behavior of light (DOK 4)
- Apply the appropriate lighting system to achieve common outcomes in a Universal Render Pipeline (URP) project (DOK 2)
- Configure light sources and shadows to functionally light a scene (DOK 4)
- Configure ambient (diffuse environmental) lighting to convey mood or enhance realism (DOK 4)
- Generate a lightmap to implement baked lighting in a scene (DOK 3)
- Configure Light Probes to increase the realism of baked lighting (DOK 4)
- Configure Reflection Probes to achieve accurate reflections (DOK 4)
- Troubleshoot common lighting errors to appropriately light a scene (DOK 3)
- Explain the relationship between different animation components (DOK 3)
- Create simple keyframed 3D animation sequences (DOK 4)
- Explain key components of an Animator Controller (DOK 3)
- Configure Animation Clips imported from third-party 3D modeling software or the Asset Store for use in a project (DOK 4)
- Configure a humanoid rig for use with the Humanoid Animation system (DOK 4)

- Explain whether to use Unity's Particle Systems or VFX Graph to produce an effect in your scene (DOK 3)
- Produce environmental and burst effects by configuring Unity's Particle System object (DOK 4)
- Interpret a simple VFX Graph asset (DOK 3)
- Decide which camera setup to use, given a project's requirements (DOK 3)
- Configure a single Unity camera in a 2D or 3D scene (DOK 4)
- Evaluate whether post-processing is an appropriate tool for a given goal (DOK 3)
- Implement a particular visual style in a project by configuring a post-processing profile (DOK 4)
- Implement audio in Unity (DOK 4)
- Produce customized results by correctly configuring audio in a scene (DOK 4)
- Create interactive experiences by synthesizing audio experience design principles (DOK 4)
- Refine existing audio in a Unity project (DOK 3)
- Solve accessibility challenges in an audio design (DOK 2)
- Create a particular visual style in a project by configuring a post-processing profile (DOK 4)

Core Activities and Corresponding Instructional Methods:

- Identify and define terminology related to game design.
- Utilizing Software: Unity, Unity Hub
- Students will perform student activities/projects for lessons in the Unity Creative Core and Unity Jr. Programmer on https://learn.unity.com/ which include activity files.
- Students will complete the following in the Video Game Design and Programming Concepts textbook; review questions, higher order thinking strategies, word hunt, crossword puzzle, integration activity, game build, working in teams, and G-W Learning mobile website problems for each chapter.

- Handouts
  - Concept Map
  - KWL Chart
  - Notetaking
  - Venn Diagram

- Rubrics
  - Group Participation
  - Individual Participation
  - Individual Reports
  - Soft Skills

- Students will view videos and complete game builds/projects with Unity https://learn.unity.com/

Instructional Methods:

Direct instruction, Demonstration, Discussion, Questioning, Cooperative learning
https://learn.unity.com/ http://www.stemchallenge.org/stem/#/home
Teacher-prepared handouts
Guest speakers
https://www.yoyogames.com/ https://www.piskelapp.com/
https://github.com/
www.m.g-wlearning.com

Assessments:

Diagnostic:

Discussion of student's prior knowledge (pretest)
Terminology preview
Oral responses during class discussion
Responses to questions from the beginning of the chapter/lesson and projects
Responses from videos

Formative:

Checkpoint exercises throughout the chapter/project Review questions for each lesson
Vocabulary quiz for each lesson
Successful completion of homework/classwork assignments:
Crosswords and Integration Activities

Summative:

Graded audit checks on homework
Objective tests covering theory and terminology
Graded video game build projects/challenges/labs

Unit 2

Standards: – Business, Computer and Information Technology
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Unit 2:
Lessons Unity Creative Core & Jr. Programmer

- Decide on a user interface approach for a project (DOK 3)

- Create and configure visual UI components in a manner that will respond appropriately to different screen sizes and resolutions (DOK 4)
- Create and configure interactive UI components, such as buttons, toggles, and sliders, to implement simple UI functionality (DOK 4)
- Determine the appropriate prototyping approach for a specific project (DOK 3)
- Decide the critical project features required to create a functional prototype (DOK 3)
- Create a functional prototype in Unity (DOK 4)
- Integrate external assets and tools into your prototype (DOK 3)
- Refine a prototype environment using ProBuilder and Terrain (DOK 3)
- Test a basic experience prototype (DOK 4)
- Apply C# skills (DOK 4)
- Apply Unity skills (DOK 4)
- Apply Project management skills (DOK 4)
- Apply basic player control as you program a car that can steer down a floating road, avoiding (or hitting) obstacles in the way (DOK 4)
- Implement basic gameplay with this top-down game where you throw food at animals, who are charging towards you (DOK 4)
- Create items to add sound, animation, and effects with this side-scrolling game where the player needs to time their jumps over oncoming obstacles (DOK 4)
- Create gameplay mechanics in a game where the player tries to knock off waves of enemies, using power-ups to help defeat them (DOK 4)
- Implement a user interface in a game where the player needs to click on objects tossed in the air before they fall off the screen (DOK 4)
- Explore the purpose of user feedback and how user testing can be integrated into your design and development process (DOK 2)
- Research career areas, job titles, and the necessary certifications and qualifications to help you identify career goals (DOK 3)
- Review the goals and uses of a portfolio (DOK 1)
- Plan your own portfolio using a flowchart (DOK 3)
- Select and organize content (DOK 1)
- Explore the basics of real-time 3D experience design (DOK 2)
- Create the basics of Version Control, and the reasons to implement it in your own projects, even if you're developing applications by yourself (DOK 4)
- Apply concepts of object-oriented programming paradigm and its four associated principles (DOK 4)
- Apply concepts to set up the scene flow between the Menu and Main scenes, and the exit flow for the application in the application (DOK 4)
- Use data persistence to preserve information across different scenes by taking a color that the user selects in the Menu scene and applying it to the transporter units in the Main scene (DOK 4)
- Apply the first pillar of object-oriented programming: Abstraction (DOK 4)
- Apply inheritance and polymorphism, two closely related pillars of OOP (DOK 4)
- Apply the second pillar in object-oriented programming: encapsulation (DOK 4)
- Apply the Profiler to analyze a scene and identify where optimization bottlenecks are occurring (DOK 4)

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