PATERSON PUBLIC SCHOOLS

Preparing All Children for College and Career

Department of College and Career Readiness

Game Development: 2D/3D Modeling Curriculum

5.0 Credits

Unit Four

Game Development: 2D/3D Modeling

Course Description

This course provides an introduction to 2D and 3D video game history, design, theory, development, and programming. Emphasis is placed on understanding the history of video games and analyzing industry roles, game genres, game play, art design, playability, storytelling, rule dynamics and what makes quality game. In the first half of the course, students will be responsible for every aspect of creating a 2D game. This will entail preplanning, 2D art creation, 2D animation creation, creating music and sound effects, creating rules and balance for the game, and testing the game for bugs and playability. The second half of the course extends to the introduction to 3D modeling, 3D Animation, and creating a 3D game. Topics include geometric transformation, 3D object models, understanding what makes up a mesh, texturing, lighting, animation, creating physics, and creating interactivity in a 3D world.

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Game Development: 2D/3D Modeling

Pacing Guide		
Unit	**Topic**	**Suggested Timing**
Unit 1	Video Game History & Theory, and Understanding and Creating 2D Graphics	approx. 6 weeks
Unit 2	2D Game Development, Design, and Creation	approx. 10 weeks
Unit 3	3D Modeling, Texturing, and Lighting	approx. 9 weeks
Unit 4	3D Game Development, Design, and Creation	approx. 10 weeks

Educational Technology Standards

8.1.12.A.2, 8.1.12.A.3, 8.1.12.B.2, 8.1.12.D.1, 8.1.12.D.1, 8.1.12.F.1

- ➢ **Technology Operations and Concepts**

  - ▪ Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.

  - ▪ Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

- ➢ **Creativity and Innovation**

  - ▪ Apply previous content knowledge by creating and piloting a digital learning game or tutorial.

  - ▪ Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

- ➢ **Digital Citizenship**

  - ▪ Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.

- ➢ **Critical Thinking, Problem Solving, Decision Making**

  - ▪ Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee
Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.
Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP3. Attend to personal health and financial well-being.
Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

CRP4. Communicate clearly and effectively and with reason.
Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready

Career Ready Practices

individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.
Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.
Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.
Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP9. Model integrity, ethical leadership and effective management.
Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding

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Career Ready Practices

in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.
Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.
Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.
Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

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Differentiated Instruction

Strategies to Accommodate Students Based on Individual Needs

Time/General	Processing	Comprehension	Recall
• Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for reports and projects • Communication system between home and school • Provide lecture notes/assignments, and tutorials outline	• Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Video lessons online	• Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory learning	• Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers
Assistive Technology	**Tests/Quizzes/Grading**	**Behavior/Attention**	**Organization**
• Computer/whiteboard • Video lesson • Spell-checker • Text speech software	• Adjusted rubrics for projects • Study guides • Shortened tests • Read directions aloud	• Consistent daily structured routine • Simple and clear classroom rules • Frequent feedback	• Individual daily planner • Display a written agenda • Note-taking assistance • Color code materials

Enrichment

Strategies Used to Accommodate Based on Students Individual Needs:

- Adaption of Material and Requirements

- Evaluate Vocabulary

- Elevated Text Complexity

- Elevated Projects Rubrics

- Independent Written and Video Online Tutorials

- Projects completed individual or with Partners

- Self Selection of Research

- Tiered/Multilevel Activities

- Online Learning Communities

- Individual Response Board

- Independent Book Studies

- Open-ended activities

- Community/Subject expert mentorships

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Assessments
Suggested Formative/Summative Classroom Assessments

- Storyboards

- Teacher-created Unit Assessments, Topic Assessments, Quizzes

- Teacher-created DBQs, Essays, Short Answer

- Accountable Talk, Debate, Oral Report, Role Playing, Think Pair, and Share

- Projects, Portfolio, Presentations, Prezi, Gallery Walks

- Homework

- Concept Mapping

- Primary and Secondary Source analysis

- Photo, Video, Political Cartoon, Radio, Game Analysis

- Create an Original Song, Animation, Board Game

- Game salad Video Tutorials

- Khan Academy intro to coding.

Interdisciplinary Connections

English Language Arts
- Story writing
- Close reading of industry-related content
- Keep a running word wall of industry vocabulary

Social Studies
- Research the history of a given industry/profession
- Use historical references to solve problems
- Research the social impact of a given career or industry

World Language
- Translate industry-content
- Create a translated index of industry vocabulary

Math
- Use geometry to create objects
- Create objects and shapes on a coordinate plane
- Assign variables and values for the variables

Fine & Performing Arts
- Create graphics (landscapes, menus, characters etc.) for use in game.
- Design 2D images that appear 3D.

Science
- Research latest developments in industry technology
- Investigate applicable-careers in STEM fields
- Use physics to create believable movements in game

New Jersey Student Learning Standards

8.2 Technology

TECHNOLOGY AND SOCIETY

- 8.2.12.B.1 Research and analyze the impact of the design constraints (specifications and limits) for a product or technology driven by a cultural, social, economic or political need and publish for review.

COMPUTATIONAL THINKING: PROGRAMMING:

- 8.2.12.E.3 Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
- 8.2.12.E.4 Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements)

9.1 Personal Financial Literacy

- 9.1.12.E.4: Evaluate how media, bias, purpose, and validity affect the prioritization of consumer decisions and spending.

9.3– Career and Technical Education

CAREER CLUSTER: ARTS, A/V TECHNOLOGY & COMMUNICATIONS (AR)

- 9.3.12.AR.1: Analyze the interdependence of the technical and artistic elements of various careers within the Arts, A/V Technology & Communications Career Cluster.
- 9.3.12.AR.3: Analyze the lifestyle implications and physical demands required in the arts, audio/visual technology and communications workplace.

- 9.3.12.AR.4: Analyze the legal and ethical responsibilities required in the arts, audio/visual technology and communications workplace.
- 9.3.12.AR.6: Evaluate technological advancements and tools that are essential to occupations within the Arts, A/V Technology & Communications Career Cluster.

PATHWAY: VISUAL ARTS (AR-VIS)

- 9.3.12.AR-VIS.2 Analyze how the application of visual arts elements and principles of design communicate and express ideas.
- 9.3.12.AR-VIS.3: Analyze and create two and three-dimensional visual art forms using various media.

INFORMATION TECHNOLOGY CAREER CLUSTER

- 9.3.IT.2: Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
- 9.3.IT.3: Demonstrate the use of cross-functional teams in achieving IT project goals.
- 9.3.IT.6: Describe trends in emerging and evolving computer technologies and their influence on IT practices.

PATHWAY: PROGRAMMING & SOFTWARE DEVELOPMENT (IT-PRG)

- 9.3.IT-PRG.4: Demonstrate the effective use of software development tools to develop software applications.
- 9.3.IT-PRG.5: Apply an appropriate software development process to design a software application.
- 9.3.IT-PRG.6: Program a computer application using the appropriate programming language.
- 9.3.IT-PRG.7: Demonstrate software-testing procedures to ensure quality products.

PATHWAY: INFORMATION SUPPORT & SERVICES (IT-SUP)

- 9.3.IT-SUP.3: Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.

CAREER CLUSTER: SCIENCE, TECHNOLOGY, ENGINEERING & MATHEMATICS (ST)

- 9.3.ST.6: Demonstrate technical skills needed in a chosen STEM field.

PATHWAY: ENGINEERING & TECHNOLOGY CAREER PATHWAY (ST-ET)

- 9.3.ST-ET.3: Apply processes and concepts for the use of technological tools in STEM.
- 9.3.ST-ET.4: Apply the elements of the design process.

Common Career Technical Core (CCTC)

Arts, A/V Technology & Communications Career Cluster (AR)

AR 1– Analyze the interdependence of the technical and artistic elements of various careers within the Arts, A/V Technology & Communications Career Cluster.

- AR 1.1 Summarize the features of the partnership that technology and the arts have in developing presentations and productions.
- AR 01.4 – State how various Career Pathways within the cluster work together to generate productions, media and other activities.

AR 03 – Analyze the lifestyle implications and physical demands required in the arts, audio/visual technology and communications workplace.

- AR 03.3 – 3. Analyze ethical conduct that provides proper credit to those whose ideas and content have been used.

AR 06 - Evaluate technological advancements and tools that are essential to occupations within the Arts, A/V Technology & Communications Career Cluster.

- AR 06.1 – Research the impact of potential new technological advancements related to this cluster in the future.

AR VIS 1 - Analyze how the application of visual arts elements and principles of design communicate and express ideas.

- AR VIS 01.5 – Analyze the development of tools and technologies employed in the visual arts.

AR VIS 3 - Analyze and create two- and three-dimensional art forms using various media.

- AR VIS 03.3 – Analyze multimedia applications of software/hardware for the purposes of visual communications.
- AR VIS 03.5. -- Apply art elements and principles to virtual and interactive platforms.

Information Technology Career Cluster (IT)

IT 02 - Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.

- IT 1.1 Summarize the process of IT product/service design.

IT 07 - Perform standard computer backup and restore procedures to protect IT information.

- IT 07.2 – Configure, perform and maintain backup procedures.

IT PRG 02 - Demonstrate the use of industry standard strategies and project planning to meet customer specifications.

- IT PRG 02.3 Design project plan.

IT PRG 04 - Demonstrate the effective use of software development tools to develop software applications.

- IT PRG 04.1. Employ tools in developing software applications.
- IT PRG 04.2. Demonstrate use of computer-aided software engineering (CASE) tools.
- IT PRG 04.3. Apply language-specific programming tools/techniques.

IT PRG 05 - Apply an appropriate software development process to design a software application.

- IT PRG 05.1 Describe software development processes and methodology.

IT PRG 06 – Program a computer application using the appropriate programming language.

- IT PRG 06.1. Summarize program development methodology.
- IT PRG 06.3. Demonstrate proficiency in developing an application using an appropriate programming language.
- IT PRG 06. Resolve problems with integration.

IT WD 04 - Demonstrate the effective use of tools for digital communication production, development and project management.

- IT WD 04.1 - Select and use appropriate software tools.

IT WD 06 - Design, create and publish a digital communication product based on customer needs.

- IT WD 06.3. Create product visual design.
- IT WD 06.4. Acquire and produce content for a digital communication product.
- IT WD 06.7. Employ basic motion graphic programming knowledge.

Common Core State Standards (CCSS)

CCSS - English-Language Arts

Craft and Structure:

- CCSS.ELA-LITERACY. RI.12.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

Research to Build and Present Knowledge:

- CCSS.ELA-LITERACY. W.12.9b. Draw evidence from informational texts to support analysis, reflection, and research; apply *grade 12 Reading standards* to literary nonfiction

CCSS - Mathematics

Extending to Three Dimensions:

- CCSS.MATH.CONTENT.HSS.G.GMD.4 Identify the shape of a two-dimensional cross-section of a three-dimensional figure and identify three-dimensional objects created by the rotation of two-dimensional objects.
- CCSS.MATH.CONTENT.HSS.G.MG.1 Use geometric shapes, their measures, and their properties to describe objects
- CCSS.MATH.CONTENT.HSS.G.MG.14 Solve design problems using geometric methods.

Congruence, Proof, and Construction:

- CCSS.MATH.CONTENT.HSS. G.CO.2, G.CO.3, G.CO.4, G.CO.5 Develop and perform rigid transformations that include reflections, rotations, translations and dilations using geometric software, graph paper, tracing paper, and geometric tools and compare them to non-rigid transformations.

Course: Game Development 2D/3D Modeling Unit: 4 – Elements of 3D game production including game conceptualization, story development, designing the interface, character creation, sound track, and level design. Grade Level: 9-12	Unit Overview: Students will understand the process of 3D video game production and be responsible for all the elements of the production of an original 3D game, from inception to distribution.
New Jersey Student Learning Standards (NJSLS): 8.2.12B.1, 8.2.12.E.3, 8.2.12.E.4, 9.1.12E.4, 9.3.12.AR.1, 9.3.12.AR.3, 9.3.12.AR.4, 9.3.12.AR.6, 9.3.12.AR.VIS.2, 9.3.12.AR.VIS.3, 9.3.IT.2, 9.3.IT.3, 9.3.IT.6, 9.3.IT.PRG.4, 9.3.IT.PRG.5, 9.3.IT.PRG.5, 9.3.IT.PRG.6, 9.3.IT.PRG.7, 9.3.IT.PRG.10, 9.3.IT.SUP.2, 9.3.IT.SUP.3, 9.3.ST.6, 9.3.ST.ET.3, .3.ST.ET.4	
Common Career Technical Core (CCTC: AR 1.1, AR 01.4, AR 03.3-3, AR 06.1, AR VIS 01.5, AR VIS 03.3, AR VIS 03.5, IT 1.1. IT 1.2, IT 07.2, IT PRG 02.3, IT PRG 04.1, IT PRG 04.2, IT PRG 04.3, IT PRG 05.1, IT PRG 06.1, IT PRG 06.3, IT PRG 06.4, IT PRG 06.5, IT WD 04.1, IT WD 06.1, IT WD 06.2, IT WD 06.3, IT WD 06.4, IT WD 06.7	
Common Core State Standards (CCSS): CCSS.ELA-LITERACY. RI.12.4, CCSS.ELA-LITERACY. W.12.9b, CCSS.MATH.CONTENT.HSS.G.GMD.4, CCSS.MATH.CONTENT.HSS.G.MG.1, CCSS.MATH.CONTENT.HSS.G.MG.14, CCSS.MATH.CONTENT.HSS. G.CO.2, G.CO.3, G.CO.4, G.CO.5	

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
Dissect, critique, and reflect on all elements of a 3D Game **NJSLS:** 8.2.12.B.1, 8.2.12.E.4, 9.1.12.E.4,	Why is it important to consider what platform the player will be playing a 3D game on? What makes a quality	▪ Identify and describe 3D video game genres. ▪ Compare and contrast the different	**Teachers for a Day** Student pairs are assigned a genre of 3D game. Students will do research on the genre	**Writing Your First Freelance Video Game Review** http://www.freelancewriting.com/articles/FF-writing-a-video-game-

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
9.3.12.AR.4, 9.3.12.AR.6, 9.3.IT.3, 9.3.IT.6, **CCTC:** AR1.1, AR 1.4, AR 06.1, AR06.2, AR VIS 03.3, **CCSS:** CCSS.ELA.LITERACY.RI.12.4, CCSS.ELA-LITERACY.W.12.9B	3D game? What elements might affect a player's emotional reaction to a 3D game? As a designer, what different things do you have to consider when making a 3D game as oppose to a 2D game? Does a 3D game's genre affect the games objective/reward system?	platforms available for 3D games. ▪ Critically analyze a 3D game for playability. ▪ Break down a 3D game into its core elements. ▪ Identify different ways to let the player know where their character is in a 3D world. ▪ Compare and contrast 2D and 3D games. ▪ Understand the concept of 3D physics.	(where it started, its popularity, its target audience, popular games etc.). Then turn key the information to the rest of the classroom. **Game Review** Students read game reviews written for 3D games by professional and discuss the style of writing and content. Students then write a review of their own on a 3D game of their choice. **Think Pair Share** What happens when a game's world isn't easy to navigate? Have you ever stopped playing a game because it was too confusion? **Card Sort** Student pairs sort cards with characteristics of 3D	review.php **3D Physics Engine Tutorial** https://www.youtube.com/watch?v=3Oay1YxkP5c **2D or 3d Projects** http://docs.unity3d.com/Manual/2Dor3D.html

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
			gaming platforms in to the correct platform.	
Use the appropriate software development process to preplan for the creation of a 3D game. **NJSLS:** 8.2.12B.1, 8.2.12.E.4, 9.1.12E.4, 9.3.12.AR.1, 9.3.12.AR.3, 9.3.12.AR.4, 9.3.12.AR.6, 9.3.IT.AR.VIS.2, 9.3.IT.3, 9.3.IT PRG.5 **CCTC:** AR 1.1, AR 01.4, AR 03.3-3, AR 06.1, IT 1.1, IT.PRG.02.3, IT.PRG.05.1, IT.PRG.06.01, **CCSS:** CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b	Should multiple genres be mixed into one game? What are some things to look for when a player is playing your game that let you know the game is too hard, too easy, fun or boring? What are the qualities of good rules? How do different combinations of level parameters give rise to different kinds of games? How does a games physics affect game play? How does a levels size	▪ Brainstorm a 3D video game with 3 small levels or one large one. ▪ Create a graphic organizer. ▪ Create a story map for a 3D game. ▪ Design a visual style for a 3D video game. ▪ Design a storyboard for a 3D video game. ▪ Create a balanced set of rules for a 3D video game. ▪ Create a rewards system for a 3D game. ▪ Conceptualize the physics for a 3D game. ▪ Present 2D video game concept in mock sales pitch.	**Display Board** Students create a display board for their 3D game. The board should include explanation of game play physics, samples of the visual style of the game, and rough drafts of characters and levels. **Web Graphic Organizer** Students create a web graphic organizer as a way to visually represent their video game's rules, rewards, objectives, power ups, and story progression. **Mock Sale Pitch** Once students have completed the preplanning process they will present their game idea to the class as if	**How to Plan Level Designs and Game Environments** http://www.worldofleveldesign.com/categories/level_design_tutorials/how-to-plan-level-designs-game-environments-workflow.php Pre-Production Planning #1 **https://dmg.tenderapp.com/help/kb/game-design/pre-production-planning-1-articulating-your-game-idea** **Creatley Graphic Organizer Software** http://creately.com/Free-K12-Education-Templates **Creating a Roadmap:**

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
	affect game play and the way a game feels for the player. How do core mechanics create patterns of action within a game?		they are trying to gain funding for the game. The rest of the class will review the presentation and provide feedback to the presenter.	**Storyboarding as an Element of Game Design** https://gamestarmechanic.com/teachers/sample_lesson_hodgson
Expand knowledge of computer coding and create interactive software using traditional and block base programing. **NJSLS:** 8.2.12B.1, 8.2.12.E.3, 8.2.12.E.4, 9.1.12E.4, 9.3.12.AR.1, 9.3.12.AR.3, 9.3.12.AR.6, 9.3.12.AR.VIS.2, 9.3.12.AR.VIS.3, 9.3.IT.2, 9.3.IT.3, 9.3.IT.PRG.4, 9.3.IT.PRG.5, 9.3.IT.PRG.6, 9.3.IT.PRG.7, 9.3.IT.SUP.3, 9.3.ST.6, 9.3.ST.ET.3, .3.ST.ET.4	In what order does a computer execute the lines of code in a computer program? How can a programmer use loops, if statements, and counters to solve problems in programming? What is a controller? What is a sensor? What is an actuator?	▪ Understand, describe, and utilize, logic bricks. ▪ Create interactivity between a user and a 3D program. ▪ Create a 3D animation using code. ▪ Create interactive software button. ▪ Create interactivity between a 3D game and the computer mouse movement. ▪ Create interactivity between a 3D game and keyboard inputs. ▪ Create multiple scenes and switch	**First Person Maze** Create a game where the player has to navigate a maze in first person view. **Code/Logic Race** Start with a basic scene that has no code. Teacher gives a direction to the students (i.e. Make a sphere that jumps up and falls back down when the "U" key is pressed) students then race to see who can execute the code/logic 1st.	**TechAtAGlance - What is a Game Engine?** https://www.youtube.com/watch?v=Ba9Ci0gB8kM **Blender Game Engine Basics Tutorial #1** https://www.youtube.com/watch?v=23m9nz575Ag **Blender Game Engine Basics Tutorial #2** https://www.youtube.com/watch?v=QMr4zSgq_4Q **Blender Game Engine Basics Tutorial #3** https://www.youtube.com/watch?v=Ww3qOUB5oy

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CCTC: AR1.1, AR 01.4, AR 03.3-3, AR VIS 03.1, AR VIS 03.3, AR VIS 03.5, IT 06.1, IT 07.2, IT PRG 04.1, IT PRG 04.2, IT PRG 04.3, IT PRG 06.1, IT PRG 06.3, IT PRG 06 IT WD 06.3, IT WD 06.4, IT WD 06.7 **CCSS:** CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5	What is a game engine? How does a game engine differ form the game as a whole? What is involved in making a game engine?	between them in game play.	**Test and Repair** Students test a game that has glitches then attempt to repair the glitches using logic bricks.	[M] **Blender Game Engine Basics Tutorial #4** https://www.youtube.com/watch?v=-LmM4Snnsao **Display Text using Python Code.** https://www.youtube.com/watch?v=IRGg2VSlBI4
Create and edit 3D video game physics. **NJSLS:** 8.2.12B.1, 8.2.12.E.3, 8.2.12.E.4, 9.1.12E.4, 9.3.12.AR.1, 9.3.12.AR.3, 9.3.12.AR.6,	What is a static object and how are they useful in video games? What are the differences between dynamic and rigid objects?	▪ Understand and utilize collision bounds. ▪ Understand and utilize dynamic objects. ▪ Understand and utilize rigid shapes.	**Simple Table Hokey 3D** Student pairs create a 2-player pong style game using collisions and one keyboard. **Teacher for the Day** Student groups watch	**Creating a Variable/Property in Blender.** https://www.youtube.com/watch?v=0EHnqfGpSbU **Modify Object's Origins** https://www.youtube.com

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
9.3.IT.2, 9.3.IT.3, 9.3.IT.PRG.5, , 9.3.IT.SUP.3, 9.3.ST.6, 9.3.ST.ET.3, .3.ST.ET.4 **CCTC:** AR1.1, AR 01.4, AR 03.3-3, AR VIS 03.1, AR VIS 03.5, IT 06.1, IT 07.2, IT PRG 04.1, IT PRG 04.2, IT PRG 04.3, IT PRG 06.1, IT PRG 06.3, IT PRG 06, IT WD 06.3, IT WD 06.4, IT WD 06.7 **CCSS:** CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5	How does changing an object's collision bound affect its behavior in game render? How do you have the game check for collision and why would you use this function? What is an objects origin and why is it an important thing to keep in mind when creating a non-static object? How are properties used in game design?	▪ Affect the mass of an object and observe how objects of different mass behave differently in game render. ▪ Edit and object's origin. ▪ Edit an object's radius attribute. ▪ Assign a variable/property to an object. ▪ Activate an animation in blender game via user input.	tutorials on one aspect of creating video game physics in Blender. Each group then takes turns turn-keying the information to the rest of the class. **Interactive Create walk cycle.** Create a walk cycle that only plays when a keyboard button is pressed.	/watch?v=uW7Nbrv4fcY **Collision Detection** https://www.youtube.com/watch?v=fwDylmeJ5WA **Camera Follow Blender** https://www.youtube.com/watch?v=RwO3LXkFoRI **Blender Game Engine Basic** https://www.youtube.com/watch?v=XMl1eBOm8Xg **Using Animations in Blender Game Engine** https://www.youtube.com/watch?v=ddA062X7Aus

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
Create objects and characters for use in a video as well as rich environments to serve as the setting for your video game. All meshes should be complete with ambient sounds or sound effects, textures, and lighting) **NJSLS:** 8.2.12B.1, 8.2.12.E.4, 9.1.12E.4, 9.3.12.AR.1, 9.3.12.AR.3, 9.3.12.AR VIS.2, 9.3.12AR VIS.3, 9.3.12.AR.6, 9.3.IT.2, 9.3.IT.3, 9.3.IT.PRG.5, 9.3.IT.SUP.3, 9.3.ST.6, 9.3.ST.ET.3, .3.ST.ET.4 **CCTC:** AR1.1, AR 01.4, AR 03.3-3, AR VIS 03.1, AR VIS 03.5, IT 06.1, IT 07.2, IT PRG 04.1, IT PRG 04.2, IT PRG 04.3, IT PRG 06.1, IT PRG 06,	How can audio function as a reward in a 3D video game? How can audio be used to add depth to a visual element in a 3D game? Why is it important that a game's visual style remain constant through all objects? What makes a good 3D game map? How does lighting affect a 3D game?	▪ Play music in a 3D game. ▪ Play a sound effect as a response to user input. ▪ Create lighting for a 3D game. ▪ Utilize textures on objects in a 3D game. ▪ Create a 3D game map. ▪ Create a main character for a 3D game. ▪ Create an NPC for a 3D game. ▪ Create multiple static objects for a 3D game. ▪ Create multiple Dynamic objects for a 3D game. ▪ Create multiple rigid objects for a 3D game.	**Working Software Music keyboard.** Create a mini game that takes keyboard presses and plays the appropriate corresponding musical note. (I.E. C key plays a C note, A key plays an A note) **Mood Lighting** Start with a completed map that has no lights. Students are given a mood and attempt to create that mood by adding lighting to the map. **Map Creation** Students create a 3D model that will serve as the in game map for their game.	**6 Tips for better lighting in Blender** https://www.blenderguru. com/articles/6-tips-for-better-lighting/ **Light setup in Blender Game Engine** https://www.youtube.com /watch?v=br0_PK6XDik **How to add sound to games in blender game engine** https://www.youtube.com /watch?v=YW2jzYCzmPI **How to add background music in blender GE** https://www.youtube.com /watch?v=K4WN5iLnT_U **Atmospheric Lighting in the Blender Game Engine**

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
IT WD 04.1, IT WD 06.3, IT WD 06.4, IT WD 06.7 **CCSS:** CSS.MATH.CONTENT.HSS.G.GMD.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5				https://www.youtube.com/watch?v=KG1uhZRFUko **Making a Terrain with ANT Landscape** https://www.youtube.com/watch?v=sbDoQzsdwtQ
Combine all previous knowledge to create a multileveled 3D video game. **NJSLS:** 8.2.12B.1, 8.2.12.E.3, 9.1.12E.4, 9.3.12.AR.1, 9.3.12.AR.3, 9.3.12.AR.4, 9.3.12.ARR.6, 9.3.12.AR.AV4.2, 9.3.IT.2, 9.3.IT.PRG.4, 9.3.IT.PRG.5, 9.3.IT.PRG.5, 9.3.IT.PRG.6, 9.3.IT.PRG.7, 9.3.IT.PRG.10, 9.3.IT.SUP.2,	Who is the target audience for your game? What is the main objective of your game? What is the visual style of your game? What past games influence your game design? What genres are represented in you game?	- Create a main menu for a 3D game. - Create a user interface for a 3D game. - Create a playable 3D game free of bugs. - Combine objects and maps to create a interactive environment. - Test programming for bugs. - Repair bugs in programing. - Import character models into game world. - Import music into 3D	**Test Classmate's Game for bugs** Students play another student's game and take notes as they play looking for bugs, or other issues. **Whole Group Trouble Shoot** A student presents an issue they are having in creating their game. They must present what is happening or not happening as well as the desired result. The whole group then brainstorms ideas that can rectify the	**Blender Game Engine Basics Tutorial #5** https://www.youtube.com/watch?v=QnEzrQqeP50 **Blender Game Engine Basics Tutorial #6** https://www.youtube.com/watch?v=sASXktj3Dz0 **Blender Game Engine Basics Tutorial #7** https://www.youtube.com/watch?v=SXPg_5bGn4Q **Blender Game Engine**

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CCSS.MATH.CONTENT. HSS.G.CO.2, GO.3, G.CO.4, G.CO.5				

Unit 1 Vocabulary	
3D Camera Active window Actuator Add-on Collision bound Controller Digital Empty Dynamic FPS Field Function Game Engine Game Map Game Scene Landscape	Logic Brick Mass Mood Lighting Mouse movement Node Object Origin Particles Physics Play Input Property/Variable Rigid Sensor Static Terrain Walk Cycle

Suggested Unit Projects	
Choose At Least One	
Student groups preplan and create a fully detailed 3D map. Each student contributes different elements to the map. The group will present the map to the rest of the class.	Create a 3D Video game that has 3 Levels small levels or 1 Large one. Game should be fully fictional and have original models, audio, lighting, and multiple scenes.

Suggested Structured Learning Experiences	
Museum of Play- 1 Manhattan Square Rochester, NY 14607 http://www.museumofplay.org/about/icheg Nintendo NY 10 Rockefeller Plaza New York, New York 10020 http://nintendonyc.com/faq/	Cooper Hewitt 2 East 91st Street New your, New York 10128 http://www.cooperhewitt.org/visit/getting-here/