



# **Game Development I**

## **Course Description**

This course provides an introduction to 2D video game history, design, theory, development, and programming. Emphasis is placed on understanding the history of video games and analyzing industry roles, 2D game genres, 2D gameplay, 2D art design, playability, storytelling, rule dynamics and what makes a quality game. In this course, students will be responsible for every aspect of creating a 2D game. This will entail preplanning, 2D art creation, 2D animation creation, programming, creating music and sound effects, creating rules and balance for the game, and testing the game for bugs and playability.

# Game Development I

## Pacing Guide

Unit	Topic	Suggested Timing
Unit 1	Video Game History & Theory, and Understanding and Creating 2D Graphics	approx. 7 weeks
Unit 2	2D Game Graphics	approx. 9 weeks
Unit 3	Concept and Preproduction Stages of Creating a 2D Game	approx. 10 weeks
Unit 4	Production, Postproduction, and Distribution Stages of Creating a 2D Game	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.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.  
**Example from unit:** students will use the game salad online community to work with other game designers from around the world.
- 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.  
**Example from unit:** In this unit students will create marketing materials for their video game.

### ➤ Creativity and Innovation

- Apply previous content knowledge by creating and piloting a digital learning game or tutorial.  
**Example from unit:** as students move on to the post -production stage of video game creation they will be using many tutorials from online to help in the publication and distribution of their game.

### ➤ Digital Citizenship

- Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.  
**Example from unit:** students are allowed to use graphics and audio from free online sources but must follow all copy write laws.

### ➤ 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.  
**Example from unit:** Students must make choices for distribution that best exposes their game to the public.

## 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.

**Example from unit:** In this unit students will be assuming many job roles and responsibilities as they publish, market, and distribute their game.

### **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.

**Example from unit:** Game distribution requires both technical and academic skills as they will be taking an abstract idea from their imagination and making it a real word application.

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

**Example from unit:** Students will run in to many problems during the publication of their game and will need to communicate the problems with the teacher and online forums as they search for solutions.

## Career Ready Practices

### **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.

**Example from unit:** Students will spend most of this unit finding creative and original ways market their game.

### **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.

**Example from unit:** Students will need to search online forums, sites, and learning communities for help and content for their marketing campaign.

### **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.

**Example from unit:** Students will need to fix bugs and glitches in their video game.

### **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.

**Example from unit:** Students will use computers and graphic design software to create promotional materials.

## Differentiated Instruction

### Strategies to Accommodate Students Based on Individual Needs

<u>Time/General</u>	<u>Processing</u>	<u>Comprehension</u>	<u>Recall</u>
<ul style="list-style-type: none"> <li>• Extra time for assigned tasks</li> <li>• Adjust length of assignment</li> <li>• Timeline with due dates for reports and projects</li> <li>• Communication system between home and school</li> <li>• Provide lecture notes/assignments, and tutorials outline</li> </ul>	<ul style="list-style-type: none"> <li>• Extra Response time</li> <li>• Have students verbalize steps</li> <li>• Repeat, clarify or reword directions</li> <li>• Mini-breaks between tasks</li> <li>• Provide a warning for transitions</li> <li>• Video lessons online</li> </ul>	<ul style="list-style-type: none"> <li>• Precise step-by-step directions</li> <li>• Short manageable tasks</li> <li>• Brief and concrete directions</li> <li>• Provide immediate feedback</li> <li>• Small group instruction</li> <li>• Emphasize multi-sensory learning</li> </ul>	<ul style="list-style-type: none"> <li>• Teacher-made checklist</li> <li>• Use visual graphic organizers</li> <li>• Reference resources to promote independence</li> <li>• Visual and verbal reminders</li> <li>• Graphic organizers</li> </ul>
<u>Assistive Technology</u>	<u>Tests/Quizzes/Grading</u>	<u>Behavior/Attention</u>	<u>Organization</u>
<ul style="list-style-type: none"> <li>• Computer/whiteboard</li> <li>• Video lesson</li> <li>• Spell-checker</li> <li>• Text speech software</li> </ul>	<ul style="list-style-type: none"> <li>• Adjusted rubrics for projects</li> <li>• Study guides</li> <li>• Shortened tests</li> <li>• Read directions aloud</li> </ul>	<ul style="list-style-type: none"> <li>• Consistent daily structured routine</li> <li>• Simple and clear classroom rules</li> <li>• Frequent feedback</li> </ul>	<ul style="list-style-type: none"> <li>• Individual daily planner</li> <li>• Display a written agenda</li> <li>• Note-taking assistance</li> <li>• Color code materials</li> </ul>

## **Differentiated Instruction**

### **Strategies to Accommodate Students Based on Content-Specific Needs**

- Extra time for assigned tasks
- Adjust length of assignment
- Timeline with due dates for reports and projects
- Communication system between home and school
- Small group instruction
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## 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

## 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

- Close reading of the music industry-related content. (NJSLSA.R1)
- Keep a running word wall vocabulary used in coding. (WHST.11-12.2)

### Social Studies

- Research the history of music in video games. (6.1.12)
- Research the impact of music on the game industry. (6.3.12)

### World Language

- Translate video game industry-content (7.1.ILA)
- Create a translated index of java script terms and phrases (7.1.ILA)

### Math

- Create objects and shapes using X and Y coordinates and pixels for lengthen and width (G-CO)
- Assign variables and values for the variables to use in java script. (G-CO)

### Fine & Performing Arts

- Create music for use in game. (1.3.12)
- Design sound effects for use in a 2D game. (1.3.12)

### Science

- Research latest developments in audio industry technology (HS-ETS1-4)
- Investigate applicable-careers in java script coding. 9.2.12)

## 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)

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### 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.2: Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.
- 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 06.2 – Analyze the technological systems that are apparent within the various pathways in this cluster.

AR AV 4 - Design an audio, video and/or film production.

- AR AV4.2. Identify the basic functions and resources for editing an audio/video production.

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 03.1 – Analyze art elements and principles of two-dimensional works of visual art in various media, including drawing, printmaking and computer software.
- 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 1.2 Identify and implement new products/services.

IT 06 - Describe trends in emerging and evolving computer technologies and their influence on IT practices.

- IT 06. - 1. Identify new IT technologies.

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

- IT 07.1 – Explain the need for regular backup procedures.
- 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 06.4. Explain basic software systems implementation.
- 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 06.1. Produce a digital communication product as member of a development team.
- IT WD 06.2. List and employ functional design terms and criteria.
- 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.

<p><b>Course:</b> Game Development I</p> <p><b>Unit: 4 – 2D Game Production and Postproduction stages.</b></p> <p><b>Grade Level:</b> 9-12</p>	<p><b>Unit Overview:</b></p> <p>Students will understand the production, postproduction, and distribution stages of creating a 2D game and be responsible achieving completion of those stages for their own 2D game.</p>
<p><b>New Jersey Student Learning Standards (NJSLS):</b> 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.ARR.6, 9.3.12.AR.AV4.2, 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, 9.3.ST.ET.4</p>	
<p><b>Common Career Technical Core (CCTC):</b> AR 1.1, AR 01.4, AR 03.3-3, AR 06.1, AR 06.2, AR VIS 01.5, AR VIS 03.1, AR VIS 03.3, AR VIS 03.5, IT 1.1, IT 1.2, IT 06.1, IT 07.1, 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, IT WD 04.1, IT WD 06.1, IT WD 06.2, IT WD 06.3, IT WD 06.4, IT WD 06.7</p>	
<p><b>Common Core State Standards (CCSS):</b> CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.4, CSS.MATH.CONTENT.HSS.G.MG.1, CSS.MATH.CONTENT.HSS.G.MG.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5</p>	

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>Understand how technology is used in the production audio for use in a video game and create audio files for their own 2D video game.</p> <p><b>NJSLS:</b> 8.2.12.E.4, 9.3.12.AR.1,</p>	<p>What role does audio play in a video game?</p> <p>How does audio function as a reward in a video game?</p> <p>How can audio be used to add depth to a visual element?</p>	<ul style="list-style-type: none"> <li>▪ Identify and use audio loops.</li> <li>▪ Identify different audio file types.</li> <li>▪ Operate loop based sequencing software.</li> <li>▪ Create measure/beat based patterns.</li> <li>▪ Record/import audio</li> </ul>	<p><b>Create a Song Using Only Free Loops.</b> Students use loops based audio mixing software to create an original track to use in their game.</p> <p><b>Sound Effects Studio</b></p>	<p><b>How to Make Beats</b> <a href="https://www.platinumloops.com/how-to-make-beats-the-beginners-guide/">https://www.platinumloops.com/how-to-make-beats-the-beginners-guide/</a></p> <p><b>How Movie Sound Effects are Made</b> <a href="https://www.youtube.com">https://www.youtube.com</a></p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>9.3.12.AR.3,            9.3.12.AR.4, 9.3.IT.6,            9.3.IT.SUP.2,            9.3.IT.SUP.3, 9.3.ST.6,            9.3.ST.ET.3,            9.3.ST.ER.4,</p> <p><b>CCTC:</b> AR 1.1, AR 01.4,            AR 03.3-3, AR 06.1, AR            06.2, IT 06.1, IT 07.1, IT            07.2, IT WD 04.1, IT WD            06.4 – 4, IT WD 06.2, IT            WD 06.4</p> <p><b>CCSS:</b> CCSS.ELA-            LITERACY.RI.12.4,            CCEE.ELA-            LITERACY.W.12.9b</p>	<p>How can go or bad audio            add or take away from a            games playability?</p> <p>Do video games have            their own genre of            music?</p>	<p>into music production            software.</p> <ul style="list-style-type: none"> <li>▪ Edit audio within the              digital domain.</li> <li>▪ Mix multiple tracks to              one stereo master</li> </ul>	<p>Students research how            professionals sound            effect artist replicate            sound effects in a            studio. Students then            think of ways to do the            same and record their            own sound effects for            their game.</p> <p><b><u>Emotion through            Audio</u></b>            Assign each student 2            emotions and task them            to create songs that will            evoke those emotions in            the listener. Students            can present the songs            and have the            classmates guess the            emotion.</p>	<p><a href="https://www.youtube.com/watch?v=iV7XiOMTvdY">/watch?v=iV7XiOMTvdY</a></p> <p><b>Acid Planet Music            Creation Software</b>  <a href="http://www.acidplanet.com/downloads/xpress/">http://www.acidplanet.co            m/downloads/xpress/</a></p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>Understanding how to program a computer using one of the many programming languages in the world, either to solve math and science problems or to create interactive apps, games, and experiences.</p> <p><b>NJSLS:</b> 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.ARR.6, 9.3.12.AR.AV4.2, 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,</p>	<p>Why is it important to have other people play your game while it is in development?</p> <p>What is the importance of having simple, attainable goals for the player?</p> <p>How is testing a game different then playing a game?</p>	<ul style="list-style-type: none"> <li>▪ Create drawings with programming language.</li> <li>▪ Create colors with programming language.</li> <li>▪ Use Variables to hold values with programming language.</li> <li>▪ Animate drawings using programming language.</li> <li>▪ Make programs that draw shapes based in the mouse location</li> <li>▪ Use variable expressions to resize parts of your drawing relative to other part.</li> <li>▪ Learn how to display text on the canvas, resize it, color it, and animate it.</li> </ul>	<p><b>Game Swap</b>            Students spend a day playing each other's games looking for bugs/glitches and keeping a detailed long of what actions caused the issues.</p> <p><b>Video game Development.</b>            Students import their graphics and audio into a game making engine and use those elements to make a 2D video game.</p> <p><b>Game Design Document rewrite</b>            After spending sometime working on their game, students review and modify their game design document to reflect any changes to the game that have been made since</p>	<p><b>Making drawings with code</b>  <a href="https://www.khanacademy.org/computing/computer-programming/programming/drawing-basics/p/making-drawings-with-code">https://www.khanacademy.org/computing/computer-programming/programming/drawing-basics/p/making-drawings-with-code</a></p> <p><b>Coloring</b>  <a href="https://www.khanacademy.org/computing/computer-programming/programming/coloring/p/coloring-with-code">https://www.khanacademy.org/computing/computer-programming/programming/coloring/p/coloring-with-code</a>  <b>Simple Color Game Build</b></p> <p><b>Variables</b>  <a href="https://www.khanacademy.org/computing/computer-programming/programming/variables/p/intro-to-variables">https://www.khanacademy.org/computing/computer-programming/programming/variables/p/intro-to-variables</a></p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>9.3.ST.ET.3, .3.ST.ET.4</p> <p><b>CCTC:</b> AR 01.4, AR 03.3-3, AR 06.1, AR 06.2, AR VIS 03.3, AR VIS 03.5, IT 06.1, IT 07.1, IT 07.2, 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, IT WD 04.1, IT WD 06.2, IT WD 06.7</p> <p><b>CCSS:</b> CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.4, CSS.MATH.CONTENT.HSS.G.MG.1, CSS.MATH.CONTENT.HSS.G..MG.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5</p>			production started.	

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<p>Gaining a deep understanding of the science and engineering of computers, both on the hardware side (electrical engineering) and the software (algorithms).</p> <p><b>NJSLS:</b> 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.ARR.6, 9.3.12.AR.AV4.2, 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</p>	<p>How is learning a programming language similar to learning another spoken language?</p> <p>How is programming similar to elements learned in your math classes?</p> <p>Why are there multiple programming languages, is this a good or a bad thing?</p>	<ul style="list-style-type: none"> <li>▪ Create functions with a programming language.</li> <li>▪ Debug programs.</li> <li>▪ Create loops in programming language.</li> <li>▪ Design Arrays in a programming language.</li> <li>▪ Learn how to store complex data in objects.</li> <li>▪ Understand how to use a loop function.</li> <li>▪ Create code that is easy to read and understand.</li> </ul>	<p><b><u>Khan Academy Intro to JS: Functions</u></b></p> <p><b><u>Khan Academy Intro to JS: Logic and if Statements</u></b></p> <p><b><u>Khan Academy Intro to JS: Looping</u></b></p>	<p><b><u>Khan Academy Intro to JS: Functions</u></b>  <a href="https://www.khanacademy.org/computing/computer-programming/programming/functions/p/functions">https://www.khanacademy.org/computing/computer-programming/programming/functions/p/functions</a></p> <p><b><u>Khan Academy Intro to JS: Logic and if Statements</u></b>  <a href="https://www.khanacademy.org/computing/computer-programming/programming/logic-if-statements/p/if-statements">https://www.khanacademy.org/computing/computer-programming/programming/logic-if-statements/p/if-statements</a></p> <p><b><u>Khan Academy Intro to JS: Looping</u></b>  <a href="https://www.khanacademy.org/computing/computer-programming/programming/looping/p/intro-to-while-loops">https://www.khanacademy.org/computing/computer-programming/programming/looping/p/intro-to-while-loops</a></p>

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<p><b>CCTC:</b> AR 01.4, AR 03.3-3, AR 06.1, AR 06.2, AR VIS 03.3, AR VIS 03.5, IT 06.1, IT 07.1, IT 07.2, 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, IT WD 04.1, IT WD 06.2, IT WD 06.7</p> <p><b>CCSS:</b> CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.4, CSS.MATH.CONTENT.HSS.G.MG.1, CSS.MATH.CONTENT.HSS.G.MG.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5</p>				



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<p>Understand the basics of computer coding and create interactive software using block bases programing.</p> <p><b>NJSLS:</b> 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.ARR.6, 9.3.12.AR.AV4.2, 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</p> <p><b>CCTC:</b> AR 01.4, AR 03.3-3, AR 06.1, AR</p>	<p>What is programming?</p> <p>What are the fundamentals of computer programming?</p> <p>How do you create a program?</p> <p>How can you use computer programming to complete a task?</p> <p>How is computer programming useful in real life?</p> <p>How might you use computer programming in your future career?</p> <p>Why should you use comments?</p>	<ul style="list-style-type: none"> <li>▪ Understand and utilize top down design in coding.</li> <li>▪ Understand and Identify “If” statements.</li> <li>▪ Create interactivity between a user and a software program.</li> <li>▪ Create an animation using code.</li> <li>▪ Relate the active screen to a coordinate plane and you X and Y points to arrange objects.</li> <li>▪ Create an object using coding software.</li> <li>▪ Display Text through coding.</li> <li>▪ Play audio in a student created software.</li> </ul>	<p><b><u>Kahn Academy Intro to Java Script</u></b> Students will complete the online course</p> <p><b><u>Recreate Flappy Bird on Hour of Code</u></b> Students will follow and complete the online tutorial</p> <p><b><u>Reverse Engineer a Concept Map</u></b> Student groups choose a popular game and assume the role of its developers. They are to create the concept map as if they where in the preproduction stage of creating the chosen game.</p>	<p><b><u>Hour of Code Make your own Flappy Bird</u></b> <a href="https://studio.code.org/flappy/2">https://studio.code.org/flappy/2</a></p> <p><b><u>Khan Academy Computing</u></b> <a href="https://www.khanacademy.org/computing">https://www.khanacademy.org/computing</a></p> <p><b><u>Brain POP Video Game Concept Map Creation</u></b> <a href="https://www.brainpop.com/technology/computerscience/videogames/">https://www.brainpop.com/technology/computerscience/videogames/</a></p>

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<p>06.2, AR VIS 03.3, AR VIS 03.5, IT 06.1, IT 07.1, IT 07.2, 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, IT WD 04.1, IT WD 06.2, IT WD 06.7</p> <p><b>CCSS:</b> CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.4, CSS.MATH.CONTENT.HSS.G.MG.1, CSS.MATH.CONTENT.HSS.G.MG.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5</p>				
<p>Combine all previous knowledge to create a multileveled 2D video game.</p>	<p>What is the main objective of your game?</p> <p>What is the visual style of your game?</p>	<ul style="list-style-type: none"> <li>▪ Import original graphics to in to student created game.</li> <li>▪ Create a navigation system for the player</li> </ul>	<p><b><u>Test Classmate's Game for bugs</u></b>            Students play another student's game and take notes as they play</p>	<p><b><u>2D ROGUELIKE TUTORIAL</u></b>  <a href="https://unity3d.com/learn/tutorials/projects/2d-roguelike-tutorial">https://unity3d.com/learn/tutorials/projects/2d-roguelike-tutorial</a></p>

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<p><b>NJSLS:</b> 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, 9.3.IT.SUP.3, 9.3.ST.6, 9.3.ST.ET.3, .3.ST.ET.4</p> <p><b>CCTC:</b> AR 01.4, AR 03.3-3, AR 06.1, AR 06.2, AR VIS 03.1, AR VIS 03.3, AR VIS 03.5, IT 1.1. IT 1.2, IT 06.1, IT 07.1, 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</p>	<p>What past games influence your game design?</p>	<p>to move in and out of menus and playing field.</p> <ul style="list-style-type: none"> <li>▪ Import original audio into student created game</li> <li>▪ Create a control system for player to interact with the game.</li> <li>▪ Translate preproduction materials (concept map. Rules, rewards, story boards etc.) into playable video game.</li> <li>▪ Upload video game onto a game distribution site for people around the word to play.</li> <li>▪ Create interactive animations.</li> </ul>	<p>looking for bugs, or other issues.</p> <p><b><u>Whole Group Trouble Shoot</u></b>            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 problem.</p> <p><b><u>Build your game</u></b>            Students assume the role of developer, artist, director, audio engineer, programmer and distributor to create a 3 level game and distribute it to potential players.</p>	<p><b><u>2D MODE</u></b>  <a href="https://unity3d.com/learn/tutorials/topics/2d-game-creation/2d-mode?playlist=17093">https://unity3d.com/learn/tutorials/topics/2d-game-creation/2d-mode?playlist=17093</a></p> <p><b><u>2D PHYSICS OVERVIEW</u></b>  <a href="https://unity3d.com/learn/tutorials/topics/2d-game-creation/2d-physics-overview?playlist=17093">https://unity3d.com/learn/tutorials/topics/2d-game-creation/2d-physics-overview?playlist=17093</a></p>

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<p>PRG 06.4, IT PRG 06, IT WD 04.1, IT WD 06.1, IT WD 06.2, IT WD 06.3, IT WD 06.4, IT WD 06.7</p> <p><b>CCSS:</b> CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.4, CSS.MATH.CONTENT.HSS.G.MG.1, CSS.MATH.CONTENT.HSS.G.MG.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5</p>				
<p>Use the appropriate software development process for the postproduction, and distribution stages stage of the creation of a 2D game.</p> <p><b>NJSLS:</b> 8.2.12B.1, 8.2.12.E.3, 9.1.12E.4,</p>	<p>Who is the target audience for your game?</p> <p>What is the general mood of your game?</p> <p>What genres are represented in you game?</p>	<ul style="list-style-type: none"> <li>▪ Create marketing material for original game.</li> <li>▪ Finalize original game for distribution.</li> <li>▪ Analyze player’s response to original game.</li> <li>▪ Log detailed analysis of game’s reception.</li> </ul>	<p><b>Market Game</b>            Students create marketing material for their game and distribute it around the school. Students will then keep track of how many people play their game and ask for reviews.</p>	<p><b>Apple Publishing</b>  <a href="http://help.gamesalad.com/gamesalad-cookbook/publishing/3-apple-publishing/">http://help.gamesalad.com/gamesalad-cookbook/publishing/3-apple-publishing/</a></p> <p><b>Amazon Publishing</b>  <a href="http://help.gamesalad.com/gamesalad-">http://help.gamesalad-</a></p>

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<p>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,            9.3.IT.SUP.3, 9.3.ST.6,            9.3.ST.ET.3, .3.ST.ET.4</p> <p><b>CCTC:</b> AR 01.4, AR 03.3-3, AR 06.1, AR 06.2, AR VIS 03.1, AR VIS 03.3, AR VIS 03.5, IT 1.1, IT 1.2, IT 06.1, IT 07.1, 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, IT WD 04.1, IT WD 06.1, IT WD 06.2, IT WD 06.3, IT</p>		<ul style="list-style-type: none"> <li>▪ Project how game will do in an open market.</li> <li>▪ Compare and contrast pay for play vs built in advertising as a way to make a profitable game.</li> </ul>	<p><b>Review Peer games</b>            Students are given a detailed review sheet and play each others games. Each student will fill out the review sheet for each game they play and share their reviews with the game's creator.</p> <p><b>Create Final Build of game</b>            Each student creates the final build of their game so that the game can be played anywhere without the need of the original source code or materials.</p>	<p><a href="#">cookbook/publishing/amazon-publishing/</a></p> <p><b>Android Publishing</b>  <a href="http://help.gamesalad.com/gamesalad-cookbook/publishing/4-android-publishing/">http://help.gamesalad.com/gamesalad-cookbook/publishing/4-android-publishing/</a></p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
WD 06.4, IT WD 06.7  <b>CCSS:</b> CCSS.ELA-LITERACY.RI.12.4, CCEE.ELA-LITERACY.W.12.9b, CSS.MATH.CONTENT.HSS.G.GMD.4, CSS.MATH.CONTENT.HSS.G.MG.1, CSS.MATH.CONTENT.HSS.G.MG.14, CCSS.MATH.CONTENT.HSS.G.CO.2, GO.3, G.CO.4, G.CO.5				

## Unit 4 Vocabulary

**Arrays**  
**Basic Arithmetic**  
**Booleans**  
**Ceil**  
**Comment**  
**Comparison**  
**Console**  
**Do While Loops**  
**Else**  
**Else If**  
**Floor**  
**Function**  
**Index**  
**If Statement**

**Isnan**  
**Loop**  
**Numbers**  
**Objects**  
**Prefix**  
**PI**  
**Pow**  
**Prompt**  
**Random**  
**SQRT**  
**Strings**  
**Substring**  
**Synthax**  
**Trimm**  
**While Loops**

## Suggested Unit Projects

*Choose At Least One*

Students are assigned two emotions and are tasked to create audio and an accompanying graphic that will evoke those emotions. This multimedia project will be presented to the class. It will be the audience's job to guess the emotion.

Create a 2D Video game that has 3 Levels. Game should be fully fictional and have original artwork and audio.

## 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 91<sup>st</sup> Street  
 New York, New York 10128  
<http://www.cooperhewitt.org/visit/getting-here/>