# Description: OSPI logo for white bground

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| **Course: Game Design and Programming 2** | | **Total Framework Hours up to: 90** |
| **CIP Code:** 110803 | **Exploratory  Preparatory** | **Date Last Modified: 29 July 2018** |
| **Career Cluster:** Information Technology | | **Cluster Pathway:** Programming & Software Development |

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| **Unit 0: Introduction – The Impact of Games on the World** | |
| **COMPONENTS AND ASSESSMENTS** | |
| **Performance Assessments:**   * Designer’s notebook   + Sources   + Summaries   + Reflection * Wiki entry * Poster * Presentation | |
| **Leadership Alignment:**  **Skills USA**   * Local Program Resource Guide (Current Edition) * Connecting Career Development Event (Local, State, and National Level) * Attendance at leadership specific conferences: Made for Excellence * Advanced Leadership Development   Students will **collaborate** as they **access and evaluate information** while they **manage goals and time** to **produce results.** Students will **communicate clearly** as they present their research. | |
| **Standards and Competencies** | |
| **Standard/Unit:** Games, and other computing artifacts, impact the world in positive – and negative – ways. | |
| Working in a small team (target four, at least three, and up to five, people) research a current topic/issue in the field, choosing from a teacher provided list, or proposing a new topic for approval. Prepare presentation with one group from the team taking the positive side of the topic and the other the negative. The presentation consists of a summary on the class wiki, and a 4-6-minute poster talk.  **Competencies:**   * Research * Managing information * Evaluate information * Present information * Manage a project * Evaluate results | **Total Learning Hours for Unit: 5** |
| **Computer Science:**   * **WSCSLS-3A-I-2-22**: Debate the social and economic implications associated with ethical and unethical computing practices (e.g., intellectual property rights, hacktivism, software piracy, diesel emissions testing scandal, new computers shipped with malware). * **WACSLS 3A-I-1-26**: Compare and debate the positive and negative impacts of computing on behavior and culture. * **WACSLS 3A-I-1-27**: Demonstrate how computing enables new forms of experience, expression, communication, and collaborating.   **Literacy:**   * **CCSS.ELA-Literacy.CCRA.R.2**: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. * **CCSS.ELA-Literacy.CCRA.W.6**: Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. | |

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| **Unit 1: Thinking Like a Machine** | |
| **COMPONENTS AND ASSESSMENTS** | |
| **Performance Assessments:**  Working from a paper prototype or problem description develop a computational model and abstractions to emulate “real-world” phenomena or to solve a problem. Express the model in C# like pseudocode using the building blocks of sequence, selection, and iteration. Verify the pseudocode in pair-programming teams by translating it into a running program in Code.org’s Code Studio or a similar tool – optionally write the programs in C#. Assess using:   * Designer’s notebook – including reflection on code & pair-programming process * Knowledge and vocabulary tests * Parsons problems (rearrange out of order code) * Pseudocode | |
| **Leadership Alignment:**  **Skills USA**   * Local Program Resource Guide (Current Edition) * Connecting Career Development Event (Local, State, and National Level) * Attendance at leadership specific conferences: Made for Excellence * Advanced Leadership Development   Students will **think creatively** and **reason effectively** to **solve problems**, **accessing and evaluating information** as needed to **be self-directed learners** while employing computational thinking skills as they develop algorithms and abstractions. They will **communicate clearly** and **interact effectively** as they **collaborate with** and **guide and lead others** while pair programming. | |
| **Standards and Competencies** | |
| **Standard/Unit: Developing computational models** | |
| In this unit we explore how computers “think” – we start by creating algorithms in pseudocode and then with the building blocks of algorithms. The emphasis of the unit is an planning and testing.  **Competencies:**   * Explaining abstraction and the building blocks of algorithms. * Presenting (and debating) algorithms and abstractions and their application to solving a particular problem or modeling phenomena in the “real-world.” * Writing pseudocode to express and test algorithms. * Translating pseudocode into runnable code. | **Total Learning Hours for Unit: 10** |
| **Computer Science:**   * **WSCSLS-3A-D-5-17**: Create computational models that simulate real-world systems (e.g., ecosystems, epidemics, spread of ideas). * **WSCSLS-3A-A-2-1**: Design and develop a software artifact working in a team. * **WSCSLS-3A-A-2-2**: Demonstrate how diverse collaborating impacts the design and development of software products (e.g., discussing real-world examples of products that have been improved through having a diverse design team or reflecting on their own team's development experience). * **WSCSLS-3A-A-4-8**: Deconstruct a complex problem into simpler parts using predefined constructs (e.g., functions and parameters and/or classes). * **WSCSLS-3A-A-3-11**: Explain and demonstrate how modeling and simulation can be used to explore natural phenomena (e.g., flocking behaviors, queueing, life cycles). * **WSCSLS-3A-C-5-14**: Create, extend, or modify existing programs to add new features and behaviors using different forms of inputs and outputs (e.g., inputs such as sensors, mouse clicks, data sets; outputs such as text, graphics, sounds). * **WSCSLS-3A-I-1-27**: Demonstrate how computing enables new forms of experience, expression, communication, and collaborating.   **Literacy:**   * **CCSS.ELA-Literacy.CCRA.L.6**: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression. * **CCSS.ELA-Literacy.CCRA.R.2**: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. * **CCSS.ELA-Literacy.CCRA.W.6**: Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. | |

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| **Unit 2: Implementing Game Mechanics in Unity** | |
| **COMPONENTS AND ASSESSMENTS** | |
| **Performance Assessments:**   * Test on core Unity concepts * Short research problem * Designer’s notebook | |
| **Leadership Alignment:**  **Skills USA**   * Local Program Resource Guide (Current Edition) * Connecting Career Development Event (Local, State, and National Level) * Attendance at leadership specific conferences: Made for Excellence * Advanced Leadership Development   Students will **use and manage information** and be **self-directed learners** while utilizing a variety of resources to learn about Unity and how to translate game mechanics into code for a digital game. Students will **produce results** and **manage projects** while using the design process to complete the projects in this unit. | |
| **Standards and Competencies** | |
| **Standard/Unit: Writing and testing Unity scripts in C#** | |
| In this unit students will analyze “typical” game mechanics as well as mechanics from their own designs and develop plans for implementing them in C# scripts using the Unity API. In the course of this unit students will become familiar with Unity’s abstractions, its scripting API, and their documentation. The focus will be on developing an understanding of the core concepts and how to explore them.  **Competencies:**   * Applying the design process to a problem * Creating algorithms & abstractions to simplify problems | **Total Learning Hours for Unit: 14** |
| **Computer Science:**   * **WSCSLS-3A-D-5-17**: Create computational models that simulate real-world systems (e.g., ecosystems, epidemics, spread of ideas). * **WSCSLS-3A-A-2-1**: Design and develop a software artifact working in a team. * **WSCSLS-3A-A-2-2**: Demonstrate how diverse collaborating impacts the design and development of software products (e.g., discussing real-world examples of products that have been improved through having a diverse design team or reflecting on their own team's development experience). * **WSCSLS-3A-A-4-8**: Deconstruct a complex problem into simpler parts using predefined constructs (e.g., functions and parameters and/or classes). * **WSCSLS-3A-A-3-11**: Explain and demonstrate how modeling and simulation can be used to explore natural phenomena (e.g., flocking behaviors, queueing, life cycles). * **WSCSLS-3A-C-5-14**: Create, extend, or modify existing programs to add new features and behaviors using different forms of inputs and outputs (e.g., inputs such as sensors, mouse clicks, data sets; outputs such as text, graphics, sounds). * **WSCSLS-3A-I-1-27**: Demonstrate how computing enables new forms of experience, expression, communication, and collaborating.   **Literacy:**   * **CCSS.ELA-Literacy.CCRA.L.6**: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression. * **CCSS.ELA-Literacy.CCRA.R.2**: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. * **CCSS.ELA-Literacy.CCRA.W.6**: Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. | |

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| **Unit 3: From Game Prototype to First Release** | |
| **COMPONENTS AND ASSESSMENTS** | |
| **Performance Assessments:**  In this unit a team of students will design, document, and implement a reusable component of a “complete” game, such as a player health stats.   * Component design notes in designer’s notebook * Documentation of component * Individual task identification * Contributed code | |
| **Leadership Alignment:**  **Skills USA**   * Local Program Resource Guide (Current Edition) * Connecting Career Development Event (Local, State, and National Level) * Attendance at leadership specific conferences: Made for Excellence * Advanced Leadership Development   Students will **use and manage information** and be **self-directed learners** while utilizing a variety of resources as they continue to learn about Unity and the techniques for developing digital games. Students will **produce results** and **manage projects** while using the design process to complete the projects in this unit. | |
| **Standards and Competencies** | |
| **Standard/Unit: Identifying the elements of a releasable game.** | |
| In this unit we will look at the “stuff” needed to create a “finished” game: the UI, game management, persistent storage, customization, etc. Our focus will be on developing reusable code/components – each group will work on one component and will co-ordinate with the other groups as they try to design, document, and implement a reusable component.  **Competencies:**   * Applying abstractions to help create reusable code * Documenting the design of an API * Collaborating on a common code base | **Total Learning Hours for Unit: 7** |
| **Computer Science:**   * **WSCSLS-3A-D-5-17**: Create computational models that simulate real-world systems (e.g., ecosystems, epidemics, spread of ideas). * **WSCSLS-3A-A-2-1**: Design and develop a software artifact working in a team. * **WSCSLS-3A-A-2-2**: Demonstrate how diverse collaborating impacts the design and development of software products (e.g., discussing real-world examples of products that have been improved through having a diverse design team or reflecting on their own team's development experience). * **WSCSLS-3A-A-4-8**: Deconstruct a complex problem into simpler parts using predefined constructs (e.g., functions and parameters and/or classes). * **WSCSLS-3A-A-3-11**: Explain and demonstrate how modeling and simulation can be used to explore natural phenomena (e.g., flocking behaviors, queueing, life cycles). * **WSCSLS-3A-C-5-14**: Create, extend, or modify existing programs to add new features and behaviors using different forms of inputs and outputs (e.g., inputs such as sensors, mouse clicks, data sets; outputs such as text, graphics, sounds). * **WSCSLS-3A-I-1-27**: Demonstrate how computing enables new forms of experience, expression, communication, and collaborating.   **Literacy:**   * **CCSS.ELA-Literacy.CCRA.L.6**: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression. * **CCSS.ELA-Literacy.CCRA.R.2**: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. * **CCSS.ELA-Literacy.CCRA.W.6**: Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. | |

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| **Unit 4: Game Jam 2.0** | |
| **COMPONENTS AND ASSESSMENTS** | |
| **Performance Assessments:**  Working on a team create a complete first release of a game (playable with a UI and multiple levels or the equivalent) using an iterative design process that includes the use of rapid prototyping techniques and intentional playtesting. The assessed elements of the project are:   * Project management:   + Managing scope   + Task breakdown   + Roles & responsibilities   + Managing workload   + Maintaining an accurate schedule (burn down list, velocity). * Project documentation:   + Game design document   + Code documentation (comments)   + Test plan   + Asset credits   + Issue tracking * Source management   + Code is in a revision control system (Git/GitHub)   + Code reviews   + Changes are tracked and merged * Game state at deadline   + Relative to project requirements   + Relative to the team’s project plan   The elements will be assessed on an ongoing basis during the project. | |
| **Leadership Alignment:**  **Skills USA**   * Local Program Resource Guide (Current Edition) * Connecting Career Development Event (Local, State, and National Level) * Attendance at leadership specific conferences: Made for Excellence * Advanced Leadership Development   Students will **collaborate** on a **diverse team** to **solve problems** they encounter while attempting to create a releasable game. This will require them to **be flexible** and **adapt to change** as they **manage goals and time** to **produce results** in the form of a complete game. They will need to **work independently** and **be self-directed learners** who can help to **guide and lead** the team and who **are responsible to others.** | |
| **Standards and Competencies** | |
| **Standard/Unit: Working on a team to produce a finished game in a limited timeframe.** | |
| In this unit student teams collaborate to turn a game design into a complete game. This unit offers students opportunities to practice leadership and project management skills – it can be a challenge to keep the project scope small enough to complete it in the allocated time and to coordinate the team members to enable everyone to make significant contributions.  **Competencies:**   * Using an iterative design process * Setting goals and develop schedules * Creating rapid prototypes to efficiently test ideas * Developing computational models of real life processes and phenomenon * Designing and implement algorithms and abstractions * Conducting code reviews * Using a revision control system to manage source code. * Working collaboratively on a team | **Total Learning Hours for Unit: 20** |
| **Computer Science:**   * **WSCSLS-3A-A-2-1**: Design and develop a software artifact working in a team. * **WSCSLS-3A-A-2-2**: Demonstrate how diverse collaborating impacts the design and development of software products (e.g., discussing real-world examples of products that have been improved through having a diverse design team or reflecting on their own team's development experience). * **WSCSLS-3A-A-5-5**: Use user-centered research and design techniques (e.g., surveys, interviews) to create software solutions * **WSCSLS-3A-A-4-8**: Deconstruct a complex problem into simpler parts using predefined constructs (e.g., functions and parameters and/or classes). * **WSCSLS-3A-A-3-11**: Explain and demonstrate how modeling and simulation can be used to explore natural phenomena (e.g., flocking behaviors, queueing, life cycles). * **WSCSLS-3A-C-5-14**: Create, extend, or modify existing programs to add new features and behaviors using different forms of inputs and outputs (e.g., inputs such as sensors, mouse clicks, data sets; outputs such as text, graphics, sounds). * **WSCSLS-3A-D-5-17**: Create computational models that simulate real-world systems (e.g., ecosystems, epidemics, spread of ideas)   **Literacy:**   * **CCSS.ELA-Literacy.CCRA.L.6**: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression. * **CCSS.ELA-Literacy.CCRA.R.2**: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. * **CCSS.ELA-Literacy.CCRA.W.6**: Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. | |

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| Unit 5: Project Presentations & Evaluation | |
| **COMPONENTS AND ASSESSMENTS** | |
| **Performance Assessments:**  After completing the digital game, the team will present their project and an assessment of their process to the class. The assessed items for this unit are:   * Presentation:   + Demo of game   + Description of team roles & project plan   + Description of individual contributions   + Lessons learned about group process – advice for the future * Individual reflection * Constructive feedback to peers * Group proposal and rationale for allocating of scores | |
| **Leadership Alignment:**  **Skills USA**   * Local Program Resource Guide (Current Edition) * Connecting Career Development Event (Local, State, and National Level) * Attendance at leadership specific conferences: Made for Excellence * Advanced Leadership Development   Students will **reason effectively** and **make judgements and decisions** as they reflect individually and as a group on their ability to **be flexible** and **adapt to change**, to **manage a project** to **produce results** as they **manage goals and time** while helping to **guide** and be **responsible to others** as they **work in diverse teams**. | |
| **Standards and Competencies** | |
| **Standard/Unit:** Evaluating the work of a project team | |
| **Competencies:**   * Reflect on and assess the success of a project in terms of its initial goals. * Reflect on and assess one’s individual contributions to a team effort. * Constructively critique the group process and make suggestions for improvement. | **Total Learning Hours for Unit: 5** |
| • **Computer Science:**   * **WSCSLS-3A-A-5-5**: Use user-centered research and design techniques (e.g., surveys, interviews) to create software solutions * **WSCSLS-3A-I-7-25**: Describe how computation shares features with art and music by translating human intention into an artifact. * **WSCSLS-3A-I-1-26**: Compare and debate the positive and negative impacts of computing on behavior and culture (e.g., evolution from hitchhiking to ridesharing apps, online accommodation rental services). * **WSCSLS-3A-I-1-27**: Demonstrate how computing enables new forms of experience, expression, communication, and collaborating.   **Literacy:**   * **CCSS.ELA-Literacy.CCRA.W.6**: Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. | |

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| **Aligned Washington State Standards** | |
| **Arts** |  |
| **Computer Science** | WSCSLS-3A-A-2-1, WSCSLS-3A-A-2-2, WSCSLS-3A-A-5-4, WSCSLS-3A-A-5-5, WSCSLS-3A-A-4-8, WSCSLS-3A-A-3-11, WSCSLS-3A-C-5-14  WSCSLS-3A-D-5-17, WSCSLS-3A-I-2-22, WSCSLS-3A-I-7-25, WSCSLS-3A-I-1-26, WSCSLS-3A-I-1-27, WSCSLS-3A-I-1-28 |
| **Educational Technology** | WSETS-1-EL  WSETS-2-DC  WSETS-3-KC  WSETS-4-ID  WSETS-5-CT  WSETS-6-CC  WSETS-7-GC |
| **Health and Fitness** |  |
| **Language** | CCSS.ELA-Literacy.CCRA.L.6 |
| **Math** |  |
| **Reading** | CCSS.ELA-Literacy.CCRA.R.2 |
| **Science** |  |
| **Social Studies** |  |
| **Speaking and Listening** | CCSS.ELA-Literacy.CCRA.SL.2 |
| **Writing** | CCSS.ELA-Literacy.CCRA.W.6, CCSS.ELA-Literacy.CCRA.W.7, CCSS.ELA-Literacy.CCRA.W.8, CCSS.ELA-Literacy.CCRA.W.10 |

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| **21st Century Skills** | | |
| Check those that students will demonstrate in this course: | | |
| **LEARNING & INNOVATION**  **Creativity and Innovation**  Think Creatively  Work Creatively with Others  Implement Innovations  **Critical Thinking and Problem Solving**  Reason Effectively  Use Systems Thinking  Make Judgments and Decisions  Solve Problems  **Communication and Collaboration**  Communicate Clearly  Collaborate with Others | **INFORMATION, MEDIA & TECHNOLOGY SKILLS**  **Information Literacy**  Access and Evaluate Information  Use and Manage Information  **Media Literacy**  Analyze Media  Create Media Products  **Information, Communications and Technology (ICT Literacy)**  Apply Technology Effectively | **LIFE & CAREER SKILLS**  **Flexibility and Adaptability**  Adapt to Change  Be Flexible  **Initiative and Self-Direction**  Manage Goals and Time  Work Independently  Be Self-Directed Learners  **Social and Cross-Cultural**  Interact Effectively with Others  Work Effectively in Diverse Teams  **Productivity and Accountability**  Manage Projects  Produce Results  **Leadership and Responsibility**  Guide and Lead Others  Be Responsible to Others |