CompuScholar, Inc.

Alignment to Arkansas **Game Development and Design** Standards

Arkansas Course Details:

Course Title:	High School Game Development and Design
Course Code(s):	465670 / 465680 / 465690
Grade Level:	9th - 12th Grade
Standards Link:	Computer Science Standards and Courses (2021)

CompuScholar Course Details:

Course Title:	Unity Game Programming
Course ISBN:	978-0-9887070-7-8
Course Year:	2021

Note 1: Citation(s) listed may represent a subset of the instances where objectives are met throughout the course.

Note 2: Citation(s) for a "Lesson" refer to the "Lesson Text" elements and associated "Activities" within the course, unless otherwise noted. The "Instructional Video" components are supplements designed to introduce or re-enforce the main lesson concepts, and the Lesson Text contains full details.

Arkansas Course Description

The Arkansas Computer Science and Computing Initiative standards for high school courses are designed to provide understandings of concepts in computer science that are necessary for students to function in an ever-changing technological world. Through these standards, students will explore, apply, and move toward mastery in skills and concepts related to Computational Thinking and Problem Solving; Data, Information, and Security; Algorithms and Programs; Computers and Communications; and Professionalism and Impacts of Computing. These standards help students learn to accomplish tasks and solve problems independently and collaboratively. These standards give students the tools and skills needed to be successful in college and careers including computer science, computing, and other fields.

Usage Guidance

CompuScholar's **Unity Game Programming** course can be used to meet the Arkansas Game Development and Design standards as listed below. Schools can flexibly apply the course material to a Year 1, Year 2 or Year 3 classroom.

Course Standards

Strand: Computational Thinking and Problem Solving Content Cluster 1: Students will analyze and utilize problem-solving strategies		CITATION(S)
CSGD.Y1.1.1	Leverage problem-solving strategies to solve problems of level-appropriate complexity	Chapters 11, 21
CSGD.Y2.1.1	Leverage problem-solving strategies to solve problems of level-appropriate complexity	
CSGD.Y3.1.1	Leverage problem-solving strategies to solve problems of level-appropriate complexity	
CSGD.Y1.1.2	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity	Chapters 7, 12
CSGD.Y2.1.2	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity	
CSGD.Y3.1.2	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity	
CSGD.Y1.1.3	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity	Chapters 14, 25, 26
CSGD.Y2.1.3	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity	
CSGD.Y3.1.3	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity	
CSGD.Y1.1.4	Analyze and utilize level-appropriate troubleshooting strategies for hardware and software	Chapter 11
CSGD.Y2.1.4	Analyze and utilize level-appropriate troubleshooting strategies for hardware and software	
CSGD.Y3.1.4	Analyze and utilize level-appropriate troubleshooting strategies for hardware and software	
N/A	*This standard does not start until a later year*	Chapters 8, 9
CSGD.Y2.1.5	Decompose problems of level-appropriate complexity	
CSGD.Y3.1.5	Decompose problems of level-appropriate complexity	

Strand: Computational Thinking and Problem Solving **Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**		**CITATION(S)**
CSGD.Y1.2.1	Interpret relational and logical expressions of level-appropriate complexity using comparison and Boolean operators	Chapter 7
CSGD.Y2.2.1	Interpret compound expressions using multiple relational and logical operators	
N/A	*Continuation not specified at this level*	
CSGD.Y1.2.2	Classify the types of information that can be stored as variables and analyze the appropriateness of each (e.g., Booleans, characters, integers, floating points, strings)	Chapter 6
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.2.3	Analyze how computer science concepts relate to the field of mathematics	Chapter 5, 15, 19 Supplemental Chapter 3, Lessons 2, 4
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.2.4	Discuss and apply concepts of abstraction	Chapters 8, 9, 10
CSGD.Y2.2.4	Analyze and utilize concepts of abstraction as modeling and abstraction as encapsulation	
N/A	*Continuation not specified at this level*	
CSGD.Y1.2.5	Perform operations of level-appropriate complexity with binary, decimal, and hexadecimal numbers	Chapter 6 Supplemental Chapter 3, Lesson 2
CSGD.Y2.2.5	Perform operations of level-appropriate complexity with binary, octal, decimal, and hexadecimal numbers	
N/A	*Continuation not specified at this level*	
CSGD.Y1.2.6	Demonstrate operator precedence in expressions and statements	Chapter 6, Lesson 2 Chapter 7, Lesson 1
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	

N/A	*This standard does not start until a later year*	Chapters 5, 15, 19
CSGD.Y2.2.7	Research physics and mathematical principles to adapt to more immersive game mechanics	
CSGD.Y3.2.7	Research and utilize physics and mathematical principles to adapt to more immersive game mechanics	

Strand: Data, Information, and Security **Content Cluster 3: Students will analyze and utilize data through the use of computing devices.**		**CITATION(S)**
CSGD.Y1.3.1	Define, store, access, and manipulate level-appropriate data (e.g., primitive, linear)	Chapter 6, 8, 9, 10, 12
CSGD.Y2.3.1	Create programs to store, access, and manipulate level-appropriate data (e.g., structured data, objects)	
CSGD.Y3.3.1	Utilize data structures (e.g., graphs, linked lists, maps, queues, sets, stacks, trees) based on functionality, performance, and storage tradeoffs to support the creation of larger computational artifacts	
CSGD.Y1.3.2	Define and discuss different examples of level-appropriate quantitative and qualitative data	Chapter 6, 8, 9, 10, 12
CSGD.Y2.3.2	Define and discuss different examples of level-appropriate quantitative and qualitative data	
N/A	*Continuation not specified at this level*	
N/A	*This standard does not start until a later year*	Chapters 5, 15, 19, 21 Supplemental Chapter 3, Lesson 4
CSGD.Y2.3.3	Research, discuss, and create level-appropriate programs to model and simulate probabilistic and real-world scenarios	
CSGD.Y3.3.3	Simulate a system utilizing an abstract model by reproducing its behavior	
CSGD.Y1.3.4	Analyze, utilize, and visually represent level-appropriate data	Chapter 6, 8, 9, 10, 12
CSGD.Y2.3.4	Analyze, utilize, and visually represent level-appropriate static and dynamic data	
N/A	*Continuation not specified at this level*	
CSGD.Y1.3.5	Perform level-appropriate data analysis using computing tools	Supplemental Chapter 3, Lesson 4
CSGD.Y2.3.5	Perform level-appropriate data analysis using computing tools	
N/A	*Continuation not specified at this level*	

N/A	*This standard does not start until a later year*	Chapter 18, Lesson 1 Chapter 23, Lesson 3
CSGD.Y2.3.6	Research and compare media formats (e.g., graphics, sounds) for traits such as compression performance and lossiness	
N/A	*Continuation not specified at this level*	

Strand: Data, Information, and Security **Content Cluster 4: Students will analyze and utilize concepts of cybersecurity.**		**CITATION(S)**
CSGD.Y1.4.1	Identify the five pillars of cybersecurity and evaluate the relevance of each pillar to computer science concepts	Supplemental Chapter 1, Lesson 3
CSGD.Y2.4.1	Apply the five pillars of cybersecurity as applicable to level-appropriate computer science concepts	
N/A	*Continuation not specified at this level*	
CSGD.Y1.4.2	Research and describe different roles within the hacking community (e.g., white hat, black hat, gray hat hacking), including positive and negative motivations, significant impacts, and social stereotypes	Supplemental Chapter 1, Lesson 3
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.4.3	Research and describe the impacts of ransomware, trojans, viruses, and other malware	Supplemental Chapter 1, Lesson 3
CSGD.Y2.4.3	Research and describe common attacks on hardware, software, and networks	
CSGD.Y3.4.3	Research security issues that lead to compromised video games and security measures to mitigate these issues	
CSGD.Y1.4.4	Explain implications related to identification and responsible reporting of a vulnerability versus exploitation	N/A
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	

Strand: Algorithms and Programs **Content Cluster 5: Students will create, evaluate, and modify algorithms**		**CITATION(S)**
CSGD.Y1.5.1	Design and implement level-appropriate algorithms that use iteration, selection, and sequence	Chapters 7, 12, 21
CSGD.Y2.5.1	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence	
CSGD.Y3.5.1	Design and implement algorithms to solve student-identified problems of level-appropriate complexity	
CSGD.Y1.5.2	Illustrate the flow of execution of algorithms in level-appropriate programs including branching and looping	Chapters 7, 12, 21
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.5.3	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms	N/A (see our Java and C# Programming courses)
CSGD.Y2.5.3	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms	
CSGD.Y3.5.3	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms in terms of time and space complexities (e.g., Big O notation)	
CSGD.Y1.5.4	Use a systematic approach to detect and resolve errors in a given algorithm	Chapters 11, 21
CSGD.Y2.5.4	Use a systematic approach to detect and resolve errors in a given algorithm	
N/A	*Continuation not specified at this level*	
N/A	*This standard does not start until a later year*	Chapter 13, Lesson 1
CSGD.Y2.5.5	Analyze game elements of analog games (e.g., board, card, dice) and how those elements can be represented as algorithms for digital games	
N/A	*Continuation not specified at this level*	

Strand: Algorithms and Programs **Content Cluster 6: Students will create programs to solve problems.**		**CITATION(S)**
CSGD.Y1.6.1	Create programs using procedures to solve problems of level-appropriate complexity	Chapters 3, 9 (N/A - Inheritance and Polymorphism, see our Java and C# Programming courses)
CSGD.Y2.6.1	Create programs to solve problems of level-appropriate complexity	
CSGD.Y3.6.1	Create programs to solve problems of level-appropriate complexity utilizing inheritance and polymorphism	
CSGD.Y1.6.2	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)	Chapters 3, 13, 22
CSGD.Y2.6.2	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)	
CSGD.Y3.6.2	Discuss and apply best practices of user experience design for building video games	
CSGD.Y1.6.3	Determine the scope and state of variables declared in procedures and control structures over time	Chapter 6, Lesson 3
CSGD.Y2.6.3	Determine the scope and state of variables defined in classes and their procedures	
CSGD.Y3.6.3	Determine the scope and state of variables defined in classes and class methods involving inheritance and polymorphism	
CSGD.Y1.6.4	Create programs of level-appropriate complexity that read from standard input, write to standard output, read from a file, write to a file, and append to a file	Chapter 3, Lesson 3 (Writing to debug console) Remainder is N/A in a Unity environment, see our Java and C# Programming courses)
CSGD.Y2.6.4	Create programs that read from, write to, and append to a file of level-appropriate complexity that includes structured data	
N/A	*Continuation not specified at this level*	
CSGD.Y1.6.5	Use a systematic approach to detect logic, runtime, and syntax errors within a program	Chapter 11
CSGD.Y2.6.5	Use a systematic approach to detect logic, runtime, and syntax errors within a program	
N/A	*Continuation not specified at this level*	

N/A	*This standard does not start until a later year*	Unity API used throughout the course
N/A	*This standard does not start until a later year*	
CSGD.Y3.6.6	Utilize libraries or application programming interfaces (API) to create programming solutions for level-appropriate problems	
N/A	*This standard does not start until a later year*	Chapter 13 Supplemental Chapter 2
CSGD.Y2.6.7	Research and describe the core areas of digital game design	
N/A	*Continuation not specified at this level*	
N/A	*This standard does not start until a later year*	Chapters 14, 26
CSGD.Y2.6.8	Design and create a game utilizing appropriate core areas of digital game design	
CSGD.Y3.6.8	Design and create a game utilizing appropriate core areas of digital game design	
N/A	*This standard does not start until a later year*	Chapter 17 Supplemental Chapter 3, Lesson 6
CSGD.Y2.6.9	Research and utilize level-appropriate concepts related to updating and rendering game assets	
CSGD.Y3.6.9	Research and utilize level-appropriate concepts related to updating and rendering game assets and their relation to game performance metrics (e.g., frames per second, frame times, render times)	
N/A	*This standard does not start until a later year*	Chapter 13
CSGD.Y2.6.10	Research how the relationship between the subjective and objective mechanics of a game contributes to its overall playability and engagement	
CSGD.Y3.6.10	Describe how the relationship between the subjective and objective mechanics of a game contributes to its overall playability and engagement	

Strand: Computers and Communications **Content Cluster 7: Students will analyze the utilization of computers within industry.**		**CITATION(S)**
CSGD.Y1.7.1	Identify hardware and software specific to carrying out the mission of regional industries	N/A
CSGD.Y2.7.1	Utilize hardware and/or software to solve level-appropriate industry-based problems	
N/A	*Continuation not specified at this level*	
CSGD.Y1.7.2	Research advancing and emerging technologies (e.g., artificially intelligent agents, blockchain, extended reality, Internet of Things (IoT), machine learning, robotics)	Chapter 21, Lesson 1
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
N/A	*This standard does not start until a later year*	Chapters 17, 18, 23
CSGD.Y2.7.3	Discuss common asset creation techniques (e.g., 3D models, images, music, sounds), and create and utilize level-appropriate assets (e.g., 2D/3D models, animations, music, sound effects, textures, visual effects) in a game	
CSGD.Y3.7.3	Create and utilize level-appropriate assets (e.g., 2D/3D models, animations, music, sound effects, textures, visual effects) in a game	

Strand: Computers and Communications **Content Cluster 8: Students will analyze communication methods and systems used to transmit information among computing devices.**		**CITATION(S)**
CSGD.Y1.8.1	Utilize the command line to accomplish common network troubleshooting tasks at an introductory level	N/A (see our Digital Savvy course)
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.8.2	Research and describe common networking concepts at an introductory level	N/A (see our Digital Savvy course)
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	

CSGD.Y1.8.3	Research and describe modems, network interface cards, routers (e.g., consumer, industrial), switches, and wireless access points, and identify their purposes within a network	N/A (see our Digital Savvy course)
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.8.4	Describe the importance of creating and using common rules for communication and the utilization of common network protocols including the relationship between client and server	N/A (see our Digital Savvy course)
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	

Strand: Computers and Communications		**CITATION(S)**
Content Cluster 9: Students will utilize appropriate hardware and software.		
CSGD.Y1.9.1	Compare and contrast computer programming paradigms (e.g., functional, imperative, object-oriented)	Chapter 9
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.9.2	Research, describe, and utilize at an appropriate level: * Debugging strategies * Integrated development environments (IDE) * Source-code editors	Chapters 2, 3, 11, 14, 26 Supplemental Chapter 3, Lesson 1
CSGD.Y2.9.2	Use collaboration tools and version control systems in a group software project of appropriate complexity	
CSGD.Y3.9.2	Contribute to team collaboration in the development of a computational artifact (e.g, creating and managing repositories)	

CSGD.Y1.9.3	Classify layers of software (e.g., applications, drivers, firmware, operating systems) utilized within various platforms (e.g., Android, ChromeOS, iOS, Linux, macOS, Windows)	N/A (see our Digital Savvy course)
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.9.4	Identify and describe the purpose of hardware components within various personal computing platforms	N/A (see our Digital Savvy course)
CSGD.Y2.9.4	Research various hardware components (e.g., augmented/virtual reality devices, game controllers, input and output devices, robotics components, sensors) and their functionality in modern game design	
CSGD.Y3.9.4	Research and utilize various hardware components (e.g., augmented/virtual reality devices, game controllers, input and output devices, robotics components, sensors) as they relate to student-developed computational artifacts	
N/A	*This standard does not start until a later year*	Chapters 1, 2, 17, 18
CSGD.Y2.9.5	Research a level-appropriate game engine and supporting libraries (e.g., images, sounds, sprites, text effects)	
CSGD.Y3.9.5	Utilize a level-appropriate game engine and supporting libraries (e.g., images, sounds, sprites, text effects)	

Strand: Professionalism and Impacts of Computing **Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**		**CITATION(S)**
CSGD.Y1.10.1	Research and describe the risks and risk mitigation strategies associated with the utilization and implementation of social media and other digital technology implications	N/A (see our Digital Savvy course)
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	

N/A	*This standard does not start until a later year*	N/A (see our Digital Savvy course)
CSGD.Y2.10.2	Research and describe issues related to creating and enforcing cyber-related laws and regulations (e.g., ethical challenges, policy vacuum, privacy versus security, unintended consequences)	
N/A	*Continuation not specified at this level*	
CSGD.Y1.10.3	Research and describe the potential benefits associated with the utilization and implementation of social media and other digital technologies	N/A (see our Digital Savvy course)
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.10.4	Research and describe the relationship between access and security (e.g., active and passive data, convenience, data mining, digital marketing, online wallets, privacy, theft of personal information)	N/A (see our Digital Savvy course)
CSGD.Y2.10.4	Identify the ethical implications encountered in the curation, management, and monetization of data (e.g., harvesting, information overload, knowledge management repositories, sharing, summarizing)	
N/A	*Continuation not specified at this level*	
N/A	*This standard does not start until a later year*	Chapters 14, 25, 26
CSGD.Y2.10.5	Explain advantages and disadvantages of various software life cycle processes (e.g., Agile, spiral, waterfall)	
CSGD.Y3.10.5	Utilize an appropriate development life cycle process (e.g., Agile, spiral, waterfall) while building a project of level-appropriate complexity	
CSGD.Y1.10.6	Research the history of computing devices and their impact on society	Supplemental Chapter 2
CSGD.Y2.10.6	Research the role of play and sport in human culture and how analog games have impacted the development of digital games	
N/A	*Continuation not specified at this level*	

CSGD.Y1.10.7	Research and identify diverse careers and career opportunities (e.g., accessibility, availability, demand) that are influenced by computer science and the technical and soft skills needed for each	Supplemental Chapter 3, Lessons 5, 7
CSGD.Y2.10.7	Demonstrate industry-relevant technical and soft skills	
CSGD.Y3.10.7	Demonstrate industry-relevant technical and soft skills	
N/A	*This standard does not start until a later year*	Chapter 25 Supplemental Chapter 3, Lesson 5
CSGD.Y2.10.8	Classify the roles and responsibilities of each member on a game design team (e.g., animator, artist, designer, producer, programmer, project manager, quality assurance, sound engineer)	
CSGD.Y3.10.8	Utilize team roles in the game development and design process	
N/A	*This standard does not start until a later year*	Supplemental Chapter 3, Lesson 5
CSGD.Y2.10.9	Identify the components of a quality professional digital portfolio	
CSGD.Y3.10.9	Evaluate the quality and impact of a professional digital portfolio	
N/A	*This standard does not start until a later year*	Students will create multiple projects throughout the course
CSGD.Y2.10.10	Create and maintain a digital collection of self-created work	
CSGD.Y3.10.10	Create and maintain a professional digital portfolio comprised of self-created work	
N/A	*This standard does not start until a later year*	Chapter 25
N/A	*This standard does not start until a later year*	
CSGD.Y3.10.11	Utilize and model effective professional project management tools	
N/A	*This standard does not start until a later year*	Supplemental Chapter 3, Lesson 5
CSGD.Y2.10.12	Discuss diverse game development and design career pathways, careers beyond game development and design that utilize similar skills, and the educational requirements for those careers	
N/A	*Continuation not specified at this level*	

Strand: Professionalism and Impacts of Computing **Content Cluster 11: Students will demonstrate understanding of storytelling with data and appropriately communicate about technical**		**CITATION(S)**
CSGD.Y1.11.1	Communicate basic technical information effectively to diverse audiences, including but not limited to, non-technical audience members	Chapters 13, 14, 25, 26
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y2.11.2	Describe and utilize the concepts of storytelling with data	Chapter 13
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.11.3	Describe the following common types of data bias: * Confirmation bias * Confounding variables * Ooutliers * Overfitting/underfitting * Sselection bias	N/A
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.11.4	Compare and contrast causation and correlation	N/A
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	
CSGD.Y1.11.5	Compare and contrast interpreting data, inferring using data, and implicating with data	N/A
N/A	*Continuation not specified at this level*	
N/A	*Continuation not specified at this level*	