

# Game Design

Level 3: Student explored previously; second pathway specific course

Pathway(s): Coding

## Description

Game Design combines problem-solving techniques with computer game design and implementation to introduce the student to basic gaming and computer science concepts. Students design, implement, and test computer games using software that allows for basic game creation through a wide variety of game creation tools.

## Student Learning Outcomes

### Creativity and Innovation

- 1) Understand the basic game design elements, including conceptual ideas, storyline, visualization, storyboard, game effects, sound elements, game play, game controls, and player tutorial.
- 2) Create a design concept document.
- 3) Create a storyboard.
- 4) Demonstrate an understanding of the fundamentals of game art, including the look and feel, graphics coordinate system, basics of color, and color palettes.
- 5) Use bitmap graphics images, including designing, creating, reading, and manipulating images.
- 6) Create backgrounds, including solid, image, and tiled backgrounds.
- 7) Write programs creating images using geometric shapes.
- 8) Create games using sprites by evaluating the roles of sprites, creating sprites, and managing sprites.
- 9) Create programs using sprite sheets.
- 10) Demonstrate an understanding of image rendering, including transparency, refresh rate, hardware acceleration, and animation.
- 11) Find, create, and edit game audio sound effects and music.
- 12) Implement game sound mechanics, including playing, pausing, and looping.

### Communication and Collaboration

- 13) Design and implement procedures to set timelines for, track the progress of, and evaluate a game product.
- 14) Seek and respond to input from peers and professionals in evaluating a game project.
- 15) Demonstrate knowledge and appropriate use of operating systems, program development tools, and networking resources.
- 16) Use network resources to acquire, organize, maintain, and evaluate information.
- 17) Collaborate to research the business of games, including the roles of developer, marketing, publisher, and retail sales.
- 18) Demonstrate an understanding of and evaluate online technology, including online interaction and massive multiplayer games.

## Research and Information Fluency

- 19) Play various (board, video, etc.) games to research and collect game play data.
- 20) Evaluate, analyze, and document game styles and playability.
- 21) Research the dramatic elements in games, including kinds of fun, player types, and nonlinear storytelling.

## Critical Thinking, Problem Solving, and Decision Making

- 22) Demonstrate an understanding of the game design process, including generating ideas, brainstorming, and paper prototyping.
- 23) Write programs using variables of different data types.
- 24) Evaluate game rules and instructions.
- 25) Demonstrate an understanding of user experience by comparing rules and game-play patterns.
- 26) Write game rules and instructions.
- 27) Develop game software.
- 28) Write computer game code, resolve game defects, and revise existing game code.
- 29) Test a finished game product by implementing sound testing techniques.

## Digital Citizenship

- 30) Explore intellectual property, privacy, sharing of information, copyright laws, and software licensing agreements.
- 31) Model ethical acquisition and use of digital information.
- 32) Demonstrate proper digital etiquette when using networks, responsible use of software, and knowledge of acceptable use policies.
- 33) Model respect of intellectual property, including manipulating graphics, morphing graphics, editing graphics, and editing sound.
- 34) Discuss and evaluate the social issues surrounding gaming.
- 35) Evaluate the cultural aspects of game design fundamentals, including rationale for games and types of games.

## Technology Operations and Concepts

- 36) Identify basic game components including the game engine, game play subsystems, data structures, models, and interfaces.
- 37) Generate random numbers in a program.
- 38) Create a program implementing conditional statements.
- 39) Develop an appropriate data model.
- 40) Demonstrate an understanding of and apply object-oriented game programming.
- 41) Demonstrate an understanding of game programming essentials including event-driven programming, communicating with messages, and device management.
- 42) Demonstrate an understanding of the role of game events, the animation loop, and game timing.
- 43) Demonstrate an understanding of the role of game engines.
- 44) Demonstrate an understanding of video display flicker and double buffering.
- 45) Apply basic game screen design and layout, including visual controls, user interfaces, menus, and options.

- 46) Use game control design to understand, access, and control input devices, such as keyboard, mouse, and joystick.
- 47) Demonstrate an understanding of and apply game animation, including principles of animation and frame-based animation.
- 48) Demonstrate an understanding of decision making and types of decisions.
- 49) Demonstrate an understanding of game events, including listeners, triggers, and timed events.
- 50) Implement collision detection, including bounding boxes and sprite collisions.
- 51) Implement a tile-based game, including loading tile maps, drawing tile maps, rendering a tile map, and layering sprites.
- 52) Develop and implement artificial intelligence.
- 53) Demonstrate an understanding of game balance and tuning.
- 54) Demonstrate an understanding of player progression, including leveling, linear progression, and maintaining high score data.