

GAME DESIGN AND DEVELOPMENT
ACTIVITY COURSE CODE: 5352

COURSE DESCRIPTION: Game Design and Development provides students with the opportunity to design and develop fully-functional video games with product design documentation. This course emphasizes game control and logic, design tools, and the physics of games using computer programming.

OBJECTIVE: Given the necessary equipment, supplies, and appropriate software, the student will be prepared to engage in further game development training.

COURSE CREDIT: 1 Carnegie unit (120 hours)

RECOMMENDED GRADE LEVELS: 10 – 12

PREREQUISITE: Any Computer Programming course and/or Teacher Recommendation

COMPUTERS REQUIRED: See Equipment Listing

A. SAFETY

Proficient professionals know the academic subject matter, including safety as required for proficiency within their area. They will use this knowledge as needed in their positions. The following accountability criteria are considered essential for students in any program of study.

1. Review school safety policies and procedures.
2. Review classroom safety rules and procedures.
3. Review safety procedures for using equipment in the classroom.
4. Identify major causes of work-related accidents in office environments.
5. Demonstrate safety skills in an office/work environment.

B. STUDENT ORGANIZATIONS

Proficient professionals know the academic subject matter, including professional development, required for proficiency within their area. They will use this knowledge as needed in their positions. The following accountability criteria are considered essential for students in any program of study.

1. Identify the purpose and goals of a Career and Technology Student Organization (CTSO).
2. Explain how CTSOs are integral parts of specific clusters, majors, and/or courses.
3. Explain the benefits and responsibilities of being a member of a CTSO.
4. List leadership opportunities that are available to students through participation in CTSO conferences, competitions, community service, philanthropy, and other activities.
5. Explain how participation in CTSOs can promote lifelong benefits in other professional and civic organizations.

C. TECHNOLOGY KNOWLEDGE

Proficient professionals know the academic subject matter, including the ethical use of technology as needed in their positions. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate proficiency and skills associated with the use of technologies that are common to a specific occupation.
2. Identify proper netiquette when using e-mail, social media, and other technologies for communication purposes.
3. Identify potential abuse and unethical uses of laptops, tablets, computers, and/or networks.
4. Explain the consequences of social, illegal, and unethical uses of technology (e.g., piracy; illegal downloading; cyberbullying; licensing infringement; inappropriate uses of software, hardware, and mobile devices in the work environment).
5. Discuss legal issues and the terms of use related to copyright laws, Creative Commons, fair use laws, and ethics pertaining to downloading of images, photographs, Creative Commons, documents, video, sounds, music, trademarks, and other elements for personal use.
6. Describe ethical and legal practices of safeguarding the confidentiality of business-related information.
7. Describe possible threats to a laptop, tablet, computer, and/or network and methods of avoiding attacks.

D. PERSONAL QUALITIES AND INTERPERSONAL SKILLS

Proficient professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their positions. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate creativity and innovation.
2. Demonstrate critical thinking and problem-solving skills.
3. Demonstrate initiative and self-direction.
4. Demonstrate integrity.
5. Demonstrate work ethic.
6. Demonstrate conflict resolution skills.
7. Demonstrate listening and speaking skills.
8. Demonstrate respect for diversity.
9. Demonstrate customer service orientation.
10. Demonstrate teamwork.

E. PROFESSIONAL KNOWLEDGE

Proficient professionals know the academic subject matter, including positive work practices and interpersonal skills, as needed in their positions. The following accountability criteria are considered essential for students in any program of study.

1. Demonstrate global or “big picture” thinking.

2. Demonstrate career and life management skills and goal-making.
3. Demonstrate continuous learning and adaptability skills to changing job requirements.
4. Demonstrate time and resource management skills.
5. Demonstrates information literacy skills.
6. Demonstrates information security skills.
7. Demonstrates information technology skills.
8. Demonstrates knowledge and use of job-specific tools and technologies.
9. Demonstrate job-specific mathematics skills.
10. Demonstrates professionalism in the workplace.
11. Demonstrates reading and writing skills.
12. Demonstrates workplace safety.

F. INTRODUCTION TO GAME DESIGN AND DEVELOPMENT

Game designers demonstrate knowledge of game design and development, as needed in their role. The following accountability criteria are considered essential for students in the Information Technology programs of study.

1. Identify game design and development terminology.
2. Compare and contrast different gaming genres (e.g., action, simulation, role-playing, strategy, sports, puzzle, etc.).
3. Analyze the advancement of gaming history (e.g., mainframe, arcade, home computers, online gaming, handheld games, mobile gaming, consoles, etc.).

G. GAME DESIGN

Game designers demonstrate knowledge of the game design process. The following accountability criteria are considered essential for students in the Information Technology programs of study.

GAME PLANNING (INTEGRATED THROUGHOUT GAME DEVELOPMENT)

1. Identify the primary steps in the design process (e.g., conceptualize, prototype, test, analyze).
2. Create flowcharts and/or pseudocode to express a problem or idea as an algorithm.
3. Plan and develop programs for a variety of audiences using a process that incorporates development, feedback, and revision (including bias and accessibility issues).
4. Collect game assets (e.g., sprites/characters, visual components, stage/environment, etc.) for future implementation.
5. Identify basic game mechanics for future implementation.
6. Compare and contrast narratives/stories in gameplay and explain how and when the storyline could pertain to game design.
7. Develop objectives and outcomes of a game (e.g., scoring, win/loss scenario, goal attainment, etc.).
8. Create technical documentation using appropriate industry terminology.

GAME ASSETS

1. Create game characters (e.g., players, avatars, non-players).
2. Create the game world/environment.

3. Create Splash pages (e.g., Intro, Credits, Tutorial, etc.).
4. Select, edit, and incorporate appropriate music and sound effects.
5. Select, edit, and incorporate components for visual input and output elements.

H. GAME DEVELOPMENT

Game designers demonstrate effective knowledge and skills for game development. The following accountability criteria are considered essential for students in the Information Technology programs of study.

1. Develop variables, fields, and methods as needed to construct the game world/environment.
2. Code, implement, and instantiate objects.
3. Implement object-oriented programming to manipulate objects.
4. Use collections (e.g., arrays, arraylists, etc.) to simplify coding on multiple instances of objects (e.g., enemies, stars, particles systems, ammunition, snow/rain/sleet, etc.).
5. Develop code to animate player controlled characters to respond to different control devices (e.g., keyboard, mouse, controllers, etc.).
6. Develop code to animate non-player controlled characters as needed (e.g., enemies, helpers, etc.).
7. Code decision structures (e.g., IF, CASE, etc.) to execute different operations based on varying results (e.g., collision detection, win/loss scenarios, boundary detection, etc.).
8. Code results of collision detection to produce intended reaction(s) (e.g., cause/effect, action/reaction).
9. Code looping structures (e.g., FOR, WHILE, DO, etc.) as necessary to traverse collections of objects and other repetitive actions.
10. Use mathematical formulas and functions to
 - simulate gravity, velocity, acceleration, and friction to affect objects including the use of limits (e.g., addition, subtraction, increment, decrement, etc.)
 - enhance game play (e.g., random, absolute value, square root, etc.)
 - code direction and rotation (e.g., sine, cosine, tangent, etc.)
11. Prepare a game for beta testing.
12. Fix errors and make improvements based on feedback from a quality assurance report.
13. Prepare a game for distribution.

I. QUALITY ASSURANCE

Game designers demonstrate effective knowledge and skills for quality assurance testing. The following accountability criteria are considered essential for students in the Information Technology programs of study.

1. Develop a test plan for beta testing a game.
2. Collect data on game play and develop a usability and error report detailing positive (e.g., character interactions/reactions, sound usage, etc.) and negative (e.g., out of bounds play, loss of multiple lives, etc.) results of game play.

J. CAREER DEVELOPMENT

Game designers prepare for careers in the Game Design industry. The following accountability criteria are considered essential for students in Information Technology programs of study.

1. Research various career options, educational requirements, and employment outlook available in the game design industry.
2. Analyze game design skills that can be used throughout business and industry.
3. Research roles and responsibilities of a game design team's members.
4. Develop an electronic portfolio to include games, planning documentation and quality assurance reports that demonstrate game design, development, and testing skills.

[Additional Course Materials and Resources](#)

[Course Academic Standards and Indicators](#)

[Computer Science Academic Standards and Indicators](#)