

**Florida Department of Education
Curriculum Framework**

Program Title: Game/Simulation/Animation Programming
Program Type: Career Preparatory
Career Cluster: Information Technology

Secondary – Career Preparatory

Program Number	8208300
CIP Number	0550041116
Grade Level	9-12
Standard Length	4 credits
Teacher Certification	Refer to the <u>Program Structure</u> section.
CTSO	FBLA BPA FL-TSA
SOC Codes (all applicable)	15-1199 – Computer Occupations, All Other 15-1131 – Computer Programmers
CTE Program Resources	http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.stml

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers such as a Game/Simulation Designer, Game Programmer, and Game Software Developer in the Information Technology career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the Information Technology career cluster.

The content includes but is not limited to practical experiences in game/simulation conceptualization, design, storyboarding, development methodologies, essential programming techniques, and implementation issues. Specialized programming skills involving advanced mathematical calculations and physics are also integrated into the curriculum.

Additional Information relevant to this Career and Technical Education (CTE) program is provided at the end of this document.

Program Structure

This program is a planned sequence of instruction consisting of four (4) credits.

To teach the courses listed below, instructors must hold at least one of the teacher certifications indicated for that course.

The following table illustrates the secondary program structure:

Course Number	Course Title	Teacher Certification	Length	SOC Code	Level	Graduation Requirement
8207310	Digital Information Technology OR	DIT Teacher Certifications	1 credit	15-1151	2	PA
8208110	Game & Simulation Foundations	BUS ED 1 @2 COMPU SCI 6 COMM ART @7 7G TV PRO TEC @7 7G DIGI MEDIA 7G COMP PROG 7G	1 credit	15-1199	2	PA
8208120	Game & Simulation Design		1 credit		2	PA
8208330	Game & Simulation Programming		1 credit	15-1131	3	
8208340	Multi-User Game & Simulation Programming		1 credit	15-1131	3	PA

(Graduation Requirement Abbreviations- EQ= Equally Rigorous Science, PA= Practical Arts, EC= Economics)

Program Recommendations

This program is project-based and focuses on broad, transferable skills and stresses understanding and demonstration of the following rudiments of the game and simulation industry: production planning, elements of production design, storyboarding, elements of visual design, integration of digital audio and digital video into new game/simulation productions, programming for single and multi-user environments, delivery systems, and collaboration/teamwork.

The Foundations and Design courses should be taken in sequence prior to the Programming and Multi-User Programming courses. The Programming and Multi-User Programming courses may be taken concurrently. It is highly recommended that students complete a programming course prior to taking the last two courses of this program. Digital Information Technology may be taken concurrently with either the Foundations course or the Design course.

The Programming (8208330) and Multiuser Programming (8208340) courses should be offered with a concentration on one programming language to ensure students are prepared for industry certifications.

The Game/Simulation/Animation Advanced Applications program (8208400) is an appropriate follow-on capstone program.

The Game/Simulation/Animation Programming program lends itself to integration of the core academic subjects of language arts, math, science, visual arts, and social studies into project activities. It is through a balanced and integrated curriculum that students attain the attitudes, skills, and knowledge needed to compete successfully in today's work force. To achieve total curriculum integration, academic and career and technical education teachers should be scheduled with common planning times.

Common Career Technical Core – Career Ready Practices

Career Ready Practices describe the career-ready skills that educators should seek to develop in their students. These practices are not exclusive to a Career Pathway, program of study, discipline or level of education. 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.

1. Act as a responsible and contributing citizen and employee.
2. Apply appropriate academic and technical skills.
3. Attend to personal health and financial well-being.
4. Communicate clearly, effectively and with reason.
5. Consider the environmental, social and economic impacts of decisions.
6. Demonstrate creativity and innovation.
7. Employ valid and reliable research strategies.
8. Utilize critical thinking to make sense of problems and persevere in solving them.
9. Model integrity, ethical leadership and effective management.
10. Plan education and career path aligned to personal goals.
11. Use technology to enhance productivity.
12. Work productively in teams while using cultural/global competence.

Standards

Digital Information Technology (8207310) is the first course in this and other programs within the Information Technology Career Cluster. Standards 01.0 – 15.0 are associated with this course.

After successfully completing this program, the student will be able to perform the following:

- 01.0 Demonstrate knowledge, skill, and application of information technology to accomplish job objectives and enhance workplace performance.
- 02.0 Develop an awareness of microcomputers.
- 03.0 Demonstrate an understanding of networks.
- 04.0 Use word processing applications to enhance the effectiveness of various types of documents and communication.
- 05.0 Use presentation applications to enhance communication skills.
- 06.0 Use spreadsheet applications to enhance communication skills.
- 07.0 Use database applications to store and organize data.
- 08.0 Use electronic mail to enhance communication skills.
- 09.0 Investigate individual assessment and job/career exploration and individual career planning that reflect the transition from school to work, lifelong learning, and personal and professional goals.
- 10.0 Incorporate appropriate leadership and supervision techniques, customer service strategies, and standards of personal ethics to accomplish job objectives and enhance workplace performance.
- 11.0 Demonstrate competence using computer networks, internet and online databases to facilitate collaborative or individual learning and communication.
- 12.0 Develop awareness of computer languages, web-based & software applications, and emerging technologies.
- 13.0 Demonstrate an understanding of basic html by creating a simple web page.
- 14.0 Demonstrate comprehension and communication skills.
- 15.0 Use social media to enhance online communication and develop an awareness of a digital footprint.
- 16.0 Identify commonly used art and animation production tools in the game design industry.
- 17.0 Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets.
- 18.0 Explain the importance of employability skill and entrepreneurship skills as it relates to game/simulation development.
- 19.0 Identify tools and software commonly used in game development.
- 20.0 Investigate career opportunities in the game industry.
- 21.0 Demonstrate research and information fluency.
- 22.0 Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design.
- 23.0 Explore the methods used to create and sustain player immersion.
- 24.0 Describe the game development life cycle.
- 25.0 Demonstrate the professional level of written and oral communication required in the game development industry.
- 26.0 Understand the core tasks and challenges that face a video game design team.
- 27.0 Demonstrate leadership and teamwork skills needed, as it relates to game/simulation development, to accomplish team goals and objectives.
- 28.0 Create a working game or simulation as part of a team.
- 29.0 Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game.
- 30.0 Categorize the different gaming genres.

- 31.0 Identify popular games and identify commonality between them.
- 32.0 Understand the general procedure and requirements of game design.
- 33.0 Understand the general principles of storytelling for game design.
- 34.0 Understand character archetypes and character design.
- 35.0 Develop a game design document.
- 36.0 Understand the process of creating and designing player choice and other game designer strategy considerations.
- 37.0 Create and design the game flow as it relates to story and plot.
- 38.0 Assess common principles and procedures in game flow design.
- 39.0 Describe player challenge rule creation elements.
- 40.0 Understand the use of inventory systems in game design.
- 41.0 Identify functions of information processing.
- 42.0 Test programs.
- 43.0 Plan program design.
- 44.0 Code programs.
- 45.0 Perform program maintenance.
- 46.0 Create and maintain documentation.
- 47.0 Evaluate assigned game programming tasks.
- 48.0 Implement enhanced program structures.
- 49.0 Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance.
- 50.0 Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives.
- 51.0 Demonstrate personal money-management concepts, procedures, and strategies.
- 52.0 Identify and describe basic network terminology and network security.
- 53.0 Game configuration.
- 54.0 Test programs.
- 55.0 Plan program design.
- 56.0 Create and maintain documentation.
- 57.0 Code programs.
- 58.0 Demonstrate an understanding of operating systems, environments, and platforms.
- 59.0 Implement enhanced program structures.
- 60.0 Implement multimedia programming.
- 61.0 Develop an understanding of programming techniques and concepts.

**Florida Department of Education
Student Performance Standards**

Course Title: Digital Information Technology
Course Number: 8207310
Course Credit: 1

Course Description:

This core course is designed to provide a basic overview of current business and information systems and trends, and to introduce students to fundamental skills required for today's business and academic environments. Emphasis is placed on developing fundamental computer skills. The intention of this course is to prepare students to be successful both personally and professionally in an information-based society. Digital Information Technology includes the exploration and use of: databases, the internet, spreadsheets, presentation applications, management of personal information and email, word processing and document manipulation, HTML, web page design, and the integration of these programs using software that meets industry standards.

Digital Information Technology (8207310) is part of several programs across the various CTE career clusters. To ensure consistency, the standards and benchmarks for this course (01.0 – 15.0) have been placed in a separate document. To access this document, visit: [Digital Information Technology \(8207310\)](#).

OR

**Florida Department of Education
Student Performance Standards**

Course Title: Game & Simulation Foundations
Course Number: 8208110
Course Credit: 1

Course Description:

This course is designed to provide an introduction to game and simulation concepts and careers, the impact game and simulation has on society and industry, and basic game/simulation design concepts such as rule design, play mechanics, and media integration. This course compares and contrasts games and simulations, key development methodologies and tools, careers, and industry-related information. This course also covers strategies, processes, and methods for conceptualizing a game or simulation application; storyboarding techniques; and development tools.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum.

Game & Simulation Creation

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

CTE Standards and Benchmarks	
01.0	Identify commonly used art and animation production tools in the game design industry. The student will be able to:
01.01	Identify, categorize and discuss art and animation tools commonly used in game design.
02.0	Understand intellectual property rights, copyright laws and plagiarism as it applies to creative assets. The student will be able to:
02.01	Understand the use of “Fair Use and Fair Dealing”.
02.02	Understand the transfer and licensing of creative works.
02.03	Understand the use of “exclusive rights” to intellectual creations.
02.04	Demonstrate the use of digital watermarking.
03.0	Explain the importance of employability skill and entrepreneurship skills as it relates to game/simulation development. The student will be able to:
03.01	Identify and demonstrate positive work behaviors needed to be employable.
03.02	Maintain a career portfolio to document knowledge, skills, and experience.

CTE Standards and Benchmarks	
03.03	Evaluate and compare employment opportunities that match career goals.
03.04	Identify and exhibit traits for retaining employment.
04.0	Identify tools and software commonly used in game development. The student will be able to:
04.01	Identify and discuss the popular game development tools currently used in the industry.
04.02	Identify and discuss popular gaming engines.
04.03	Identify and discuss popular world building tools.
05.0	Investigate career opportunities in the game industry. The student will be able to:
05.01	Describe job requirements for a variety of occupations within the game development industry.
05.02	Identify current employment trends and career opportunities in the game industry.
06.0	Demonstrate research and information fluency. The student will be able to:
06.01	Play games to research and collect game play data.
06.02	Evaluate, analyze and document game styles and playability.
06.03	Determine the dramatic elements in games, including kinds of fun, player types and nonlinear storytelling.
07.0	Demonstrate an understanding of the techniques used to evaluate game mechanics, game play, flow, and game design. The student will be able to:
07.01	Test and analyze games to determine the quality of rules, interfaces, navigation, performance, play, artistry and longevity in design and structure.
07.02	Research and evaluate the game analysis techniques used by the video game industry.
07.03	Identify the key elements in a game and make intelligent judgments about whether the game succeeded or failed in its objectives.
07.04	Evaluate professional reviews and write a critical analysis of a current video game.
08.0	Explore the methods used to create and sustain player immersion. The student will be able to:
08.01	Research and define the term “player immersion”.
08.02	Explore and explain the factors that create player immersion in a game.
08.03	Examine popular games and explain the methods each game uses to increase player immersion.

CTE Standards and Benchmarks	
09.0	Describe the game development life cycle. The student will be able to:
09.01	Identify steps in the pre-production process including the proof of concept and market research.
09.02	Describe the iterative prototyping process – Alpha, Beta, RTM.
09.03	Determine platform, technology and scripting requirements.
09.04	Implement techniques of scenario development, levels, and missions.
09.05	Discuss game testing requirements and methods.
09.06	Identify and describe maintenance, upgrade and sequel issues.
10.0	Demonstrate the professional level of written and oral communication required in the game development industry. The student will be able to:
10.01	Use listening, speaking, telecommunication and nonverbal skills and strategies to communicate effectively with supervisors, co-workers, and customers.
10.02	Organize ideas and communicate oral and written messages appropriate for the game development industry environment.
11.0	Understand the core tasks and challenges that face a video game design team. The student will be able to:
11.01	Identify and define the roles and responsibilities of team members on a video game design team.
11.02	Explore and discuss methods of communications and scheduling for design teams.
12.0	Demonstrate leadership and teamwork skills needed, as it relates to game/simulation development, to accomplish team goals and objectives. The student will be able to:
12.01	Employ leadership skills to accomplish organizational goals and objectives.
12.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
12.03	Conduct and participate in meetings to accomplish work tasks.
12.04	Employ mentoring skills to inspire and teach others.

**Florida Department of Education
Student Performance Standards**

Course Title: Game & Simulation Design
Course Number: 8208120
Course Credit: 1

Course Description:

This course covers fundamental principles of designing a game or a simulation application, rules and strategies of play, conditional branching, design and development constraints, use of sound and animation, design tools, and implementation issues. The content includes market research, product design documentation, storyboarding, proposal development, and presentation of a project report. Emphasis is placed on the techniques needed to develop well-documented, structured game or simulation programs. Extensive use is made of evaluating and analyzing existing games or simulations.

Hands-on activities using an entry-level game development tool should be integrated into the curriculum. **Regardless of topic sequencing, the culminating activity is the creation and presentation of a playable game with design documentation.**

Game/Simulation Project

Instruction relating to the standards in this section should be interspersed throughout the entire course with the other standards taught progressively in the context of game design and development.

CTE Standards and Benchmarks	
13.0	Create a working game or simulation as part of a team. The student will be able to:
13.01	Create a storyboard describing the essential elements, plot, flow, and functions of the game/simulation.
13.02	Create a design specification document to include interface and delivery choices, rules of play, navigation functionality, scoring, media choices, start and end of play, special features, and development team credits.
13.03	Using a simple game development tool, create a game or simulation.
13.04	Present the game or simulation.
14.0	Create a game design production plan that describes the game play, outcomes, controls, interface and artistic style of a video game. The student will be able to:
14.01	Use industry standard game design production documents to create a game design production plan.
15.0	Categorize the different gaming genres. The student will be able to:
15.01	Research, compare and categorize the different gaming genres.

CTE Standards and Benchmarks	
15.02	Analyze examples of different gaming genres.
15.03	Define and use the necessary vocabulary related to gaming and the different genres.
16.0	Identify popular games and identify commonality between them. The student will be able to:
16.01	Analyze and deconstruct game environments and interactions.
16.02	Compare and contrast the top selling video games in terms of player interaction, plot complexity, and reward.
16.03	Categorize gameplay elements by player type (killer, talker, explorer and achiever).
17.0	Understand the general procedure and requirements of game design. The student will be able to:
17.01	Describe the design process from conception to production.
17.02	Explain the iterative nature of game design through the different stages of design iterations including pre-alpha, alpha, beta, release candidate, going gold and support.
17.03	Develop design plans, for example, character sketches, documentation and storyboards for proposed games.
18.0	Understand the general principles of storytelling for game design. The student will be able to:
18.01	Identify the essential elements of a story.
18.02	Describe how creative writing is used as a game design tool.
18.03	Compare and contrast methods of delivering a story in a game.
19.0	Understand character archetypes and character design. The student will be able to:
19.01	Research and identify common character archetypes used in computer games.
19.02	Design character prototypes to physically match archetype.
19.03	Create character backstory and profile.
20.0	Develop a game design document. The student will be able to:
20.01	Create a game strategy overview, character overview, and storyboard overview.
20.02	Define the rules of play and multi-player options.
20.03	Define strategic positioning of game immersion dynamics and psychological effect.

CTE Standards and Benchmarks	
20.04	Describe how game layout charts are used in game design.
20.05	Understand the use of storyboards in the game design industry with regard to environmental illustrations, level designs, character designs, model sheets and GUI designs.
21.0	Understand the process of creating and designing player choice and other game designer strategy considerations. The student will be able to:
21.01	Describe the use of artificial intelligence challenges in game design and the need for giving the player rest time between challenges.
21.02	Evaluate the impact of randomness in game design especially as it pertains to pattern recognition.
21.03	Identify techniques used in the industry to help the player to navigate.
21.04	Discuss the principles of player-centric design.
21.05	Examine and discuss design elements that encourage continuous active engagement both mental and physical.
21.06	Analyze design elements that maintain player interest and vary the degree of challenge.
21.07	Discuss the need for a balance of design elements for the purpose of rewarding and frustrating players.
22.0	Create and design the game flow as it relates to story and plot. The student will be able to:
22.01	Identify techniques of introducing the story plot and beginning play.
22.02	Describe story plot development techniques for the middle of play in game design.
22.03	Analyze and discuss planning techniques for climax and finale of games.
23.0	Assess common principles and procedures in game flow design. The student will be able to:
23.01	Assess missions and scenarios game flow techniques.
23.02	Describe common use of mission design and campaigns.
23.03	Evaluate usage of static versus dynamic campaigns.
24.0	Describe player challenge rule creation elements. The student will be able to:
24.01	Research common design methods for clearing obstacles or series of obstacles.
24.02	Describe common design elements introducing skill, luck and combinations including escalating challenges to games.
24.03	Identify common design elements used to vary weapons, characters and tools.

CTE Standards and Benchmarks

24.04 Discuss the incorporation of risk reward and adaptive challenges (AI).

25.0 Understand the use of inventory systems in game design. The student will be able to:

25.01 Discuss the various methods of describing items in player's inventory in contemporary game design.

25.02 Review and discuss industry methods of communicating how inventory items can have an effect on game play.

**Florida Department of Education
Student Performance Standards**

Course Title: Game & Simulation Programming
Course Number: 8208330
Course Credit: 1

Course Description:

This course is focused on students acquiring the appropriate programming skills for rendering a game or simulation product, including program control, conditional branching, memory management, score-keeping, timed event strategies and methodologies, and implementation issues.

Standards included in this course of instruction have been aligned to the academic courses shown below. This table shows the number of aligned benchmarks, the total number of academic benchmarks, and the percentage of alignment.

CTE Standards and Benchmarks	
26.0	Identify functions of information processing. The student will be able to:
26.01	Identify characteristics of high-level languages.
26.02	Identify characteristics of operating systems.
26.03	Identify characteristics of a network.
26.04	Identify needs for software development in the game/simulation industry.
26.05	Identify causes of software development problems in the game/simulation industry.
26.06	Identify most appropriate languages for solving game/simulation industry problems.
26.07	Manipulate data between numbering systems.
26.08	Identify how numeric and non-numeric data are represented in memory.
26.09	Distinguish among integer, fixed-point, and floating-point calculations.
27.0	Test programs. The student will be able to:
27.01	Develop a plan for testing programs.
27.02	Develop test harnesses for use in program testing.
27.03	Perform debugging activities.
27.04	Distinguish among the different types of program and design errors.

CTE Standards and Benchmarks	
27.05	Evaluate program test results.
27.06	Execute programs and subroutines as they relate to the total application.
27.07	Use trace routines of compilers to assist in program debugging.
27.08	Compile and run programs.
27.09	Create a stable code base.
28.0	Plan program design. The student will be able to:
28.01	Formulate a plan to determine program specifications individually or in groups.
28.02	Use a graphical representation or pseudo code to represent the structure in a program or subroutine.
28.03	Design programs to solve problems using problem-solving strategies.
28.04	Prepare proper input/output layout specifications.
28.05	Examine existing utility programs and subroutines for use with other programs.
28.06	Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
29.0	Code programs. The student will be able to:
29.01	Utilize reference manuals.
29.02	Write programs according to recognized programming standards.
29.03	Write internal documentation statements as needed in the program source code.
29.04	Code programs in high-level languages for game/simulation applications.
29.05	Write code that accesses sequential, random, and direct files.
29.06	Code programs using logical statements (e.g., If-Then-Else, Do...While).
29.07	Enter and modify source code using a program language editor.
29.08	Code routines within programs that validate input data.
29.09	Use the rounding function in calculations within programs.
29.10	Write programs as part of a development team.
29.11	Write event-driven programs.

CTE Standards and Benchmarks	
29.12	Write programs using timed-event strategies and methodologies.
29.13	Write programs that include score keeping.
30.0	Perform program maintenance. The student will be able to:
30.01	Review requested modification of programs and establish a plan of action.
30.02	Design needed modifications in conformance with established standards.
30.03	Code, test, and debug modifications prior to updating production code.
30.04	Update production programs and documentation with changes.
30.05	Analyze output to identify and annotate errors or enhancements.
31.0	Create and maintain documentation. The student will be able to:
31.01	Write documentation to assist operators and end-users.
31.02	Follow established documentation standards.
31.03	Update existing documentation to reflect program changes.
32.0	Evaluate assigned game programming tasks. The student will be able to:
32.01	Estimate the time necessary to write a program.
33.0	Implement enhanced program structures. The student will be able to:
33.01	Write programs that include tables or arrays and routines for data entry and lookup.
33.02	Write programs to import/export data from external sources.
33.03	Write programs that use iteration.
33.04	Write routines that incorporate “help” text.
33.05	Write programs that read and write random files.
33.06	Write interactive programs.
33.07	Design screen layouts for use in interactive programs.
33.08	Write programs using object-oriented languages.
33.09	Write programs that include data structures (e.g., stacks, queues, trees, linked lists).

CTE Standards and Benchmarks	
33.10	Write programs that are event-driven to support player goals and actions.
34.0	Demonstrate the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. The student will be able to:
34.01	Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
34.02	Explain emergency procedures to follow in response to workplace accidents.
34.03	Create a disaster and/or emergency response plan.
35.0	Demonstrate leadership and teamwork skills needed to accomplish team goals and objectives. The student will be able to:
35.01	Employ leadership skills to accomplish organizational goals and objectives.
35.02	Establish and maintain effective working relationships with others in order to accomplish objectives and tasks.
35.03	Examine licensing, certification, and industry credentialing requirements.
35.04	Maintain a career portfolio to document knowledge, skills, and experience.
35.05	Evaluate and compare employment opportunities that match career goals.
35.06	Identify and exhibit traits for retaining employment.
35.07	Identify opportunities and research requirements for career advancement.
35.08	Research the benefits of ongoing professional development.
35.09	Examine and describe entrepreneurship opportunities as a career planning option.
36.0	Demonstrate personal money-management concepts, procedures, and strategies. The student will be able to:
36.01	Identify and describe the services and legal responsibilities of financial institutions.
36.02	Describe the effect of money management on personal and career goals.
36.03	Develop a personal budget and financial goals.
36.04	Complete financial instruments for making deposits and withdrawals.
36.05	Maintain financial records.
36.06	Read and reconcile financial statements.
36.07	Research, compare and contrast investment opportunities.

**Florida Department of Education
Student Performance Standards**

Course Title: Multi-User Game & Simulation Programming
Course Number: 8208340
Course Credit: 1

Course Description:

This course is focused on students acquiring the appropriate programming skills for rendering a game or simulation product, including program control, conditional branching, score-keeping, timed event strategies and methodologies, and implementation issues specific to multi-user game/simulation products.

CTE Standards and Benchmarks	
37.0	Identify and describe basic network terminology and network security. The student will be able to:
37.01	Define networking and describe the purpose of a network.
37.02	Identify the purposes and interrelationships among the major components of networks (e.g., servers, clients, transmission media, network operating system, network boards).
37.03	Describe the various types of network topologies.
37.04	Describe the various types of game protocols
37.05	Demonstrate knowledge of general security concepts.
37.06	Develop an awareness of communication security concepts.
37.07	Develop an awareness of network infrastructure security.
37.08	Describe the various types of multiplayer game architectures.
37.09	Identify networking and server design requirements for multi-player games.
37.10	List and describe performance metrics for networked games.
38.0	Game configuration. The student will be able to:
38.01	Create a window to run a game.
38.02	Describe and use appropriate game libraries to run a windowed game.

CTE Standards and Benchmarks	
38.03	Use reference materials such as on-line help, vendor bulletin boards, tutorials, and manuals available.
38.04	Troubleshoot problems with computer hardware based on different graphic modes of the game.
38.05	Describe ethical issues and problems associated with computer games.
38.06	Read and comprehend technical and non-technical reading assignments related to course content including trade journals, books, magazines and electronic sources.
38.07	Respond to and utilize information derived from multiple sources (e.g., written documents, instructions, e-mail, voice mail) to solve business problems and complete business tasks.
38.08	Explore, design, implement, and evaluate organizational structures and cultures for managing project teams.
38.09	Identify characteristics of operating systems and graphics pipeline.
38.10	Distinguish among integer and floating-point bounding box collision calculations.
38.11	Illustrate various configurations of software libraries.
39.0	Test programs. The student will be able to:
39.01	Develop data for use in program testing.
39.02	Perform debugging activities.
39.03	Distinguish among the different types of program and design errors.
39.04	Evaluate program test results.
39.05	Execute programs and subroutines as they relate to the total application.
39.06	Use trace routines of compilers to assist in program debugging.
39.07	Compile and run programs.
40.0	Plan program design. The student will be able to:
40.01	Formulate a plan to determine program specifications individually or in groups.
40.02	Use a graphical representation or pseudo code to represent the structure in a program or subroutine.
40.03	Design programs to solve problems using problem-solving strategies.

CTE Standards and Benchmarks

40.04	Prepare proper input/output layout specifications.
40.05	Examine existing utility programs and subroutines for use with other programs.
40.06	Manually trace the execution of programs and verify that programs follow the logic of their design as documented.
41.0	Create and maintain documentation. The student will be able to:
41.01	Write documentation to assist operators and end-users.
41.02	Follow established documentation standards.
41.03	Update existing documentation to reflect program changes.
42.0	Code programs. The student will be able to:
42.01	Utilize reference manuals.
42.02	Write programs according to recognized programming standards.
42.03	Write internal documentation statements as needed in the program source code.
42.04	Code programs in high-level languages for gaming and simulation applications.
42.05	Write code that accesses sequential, indexed sequential, random, and direct files.
42.06	Code programs using logical statements (e.g., if-then-else, do...while).
42.07	Enter and modify source code using a program language editor.
42.08	Code routines within programs that validate input data.
42.09	Use the rounding function in calculations within programs.
42.10	Write programs that display text.
42.11	Demonstrate proficiency in drawing lines using graphic primitive functions.
42.12	Demonstrate proficiency in drawing rectangles using graphic primitive functions.
42.13	Demonstrate proficiency in drawing circles using graphic primitive functions.
42.14	Demonstrate proficiency in drawing ellipses using graphic primitive functions.

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42.15	Demonstrate proficiency in drawing polygons using graphic primitive functions.
42.16	Write programs that use composite graphic objects.
42.17	Write programs that load a bitmap for background.
42.18	Write programs that use a sprite handler.
42.19	Write programs that use animation.
42.20	Write programs that use scrolling.
42.21	Write programs that use transparency.
43.0	Demonstrate an understanding of operating systems, environments, and platforms. The student will be able to:
43.01	Identify various types of operating systems/environments for different computer hardware platforms.
43.02	Assess and analyze the functions of different operating systems.
43.03	Distinguish between different types of computer hardware platforms.
44.0	Implement enhanced program structures. The student will be able to:
44.01	Write programs that include tables or arrays and routines for data entry and lookup.
44.02	Write routines to sort arrays.
44.03	Write programs that sort records in files.
44.04	Write programs to process transactions.
44.05	Write programs that use iteration.
44.06	Write programs that read and write sequential files.
44.07	Write programs that read and write random files.
45.0	Implement multimedia programming. The student will be able to:
45.01	Demonstrate proficiency in creating multiple composite objects.
45.02	Demonstrate proficiency in moving composite graphics objects.

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45.03	Demonstrate proficiency in rotating composite graphics objects by hand.
45.04	Distinguish between flock and flee artificial intelligence algorithms.
45.05	Write programs that use blitting.
45.06	Simulate circular game board.
45.07	Demonstrate proficiency in creating a firing simulation.
45.08	Identify the basic constructs used in bounding box collision algorithm.
45.09	Identify the basic constructs used in truer bounding box collision.
45.10	Demonstrate proficiency in creating a creating a bouncing simulation.
45.11	Simulate pattern based movement.
45.12	Simulate multiple sprites movement.
45.13	Identify the basic constructs used in keyboard input.
45.14	Identify the basic constructs used in mouse input.
45.15	Identify the basic constructs used in double buffering.
46.0	Develop an understanding of programming techniques and concepts. The student will be able to:
46.01	Identify the basic constructs used in structured programming.
46.02	Distinguish between top-down and bottom-up design.
46.03	Distinguish between iteration and recursion.
46.04	Evaluate Boolean expressions.
46.05	Distinguish between interpreters and compilers.

Additional Information

Laboratory Activities

Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental, quality, and safety procedures are an integral part of this career and technical program/course. Laboratory investigations benefit all students by developing an understanding of the complexity and ambiguity of empirical work, as well as the skills required to manage, operate, calibrate and troubleshoot equipment/tools used to make observations. Students understand measurement error; and have the skills to aggregate, interpret, and present the resulting data. Equipment and supplies should be provided to enhance hands-on experiences for students.

Academic Alignment

Secondary Career and Technical Education courses are pending alignment to the B.E.S.T. (Benchmarks for Excellent Student Thinking) Standards for English Language Arts (ELA) and Mathematics that were adopted by the State Board of Education in February 2020. Academic alignment is an ongoing, collaborative effort of professional educators that provide clear expectations for progression year-to-year through course alignment. This initiative supports CTE programs by improving student performance through the integration of academic content within CTE courses.

Florida Standards for English Language Development (ELD)

English language learners communicate for social and instructional purposes within the school setting. ELD.K12.SI.1.1

English Language Development (ELD) Standards Special Notes:

Teachers are required to provide listening, speaking, reading and writing instruction that allows English language learners (ELL) to communicate for social and instructional purposes within the school setting. For the given level of English language proficiency and with visual, graphic, or interactive support, students will interact with grade level words, expressions, sentences and discourse to process or produce language necessary for academic success. The ELD standard should specify a relevant content area concept or topic of study chosen by curriculum developers and teachers which maximizes an ELL's need for communication and social skills. To access an ELL supporting document which delineates performance definitions and descriptors, please click on the following link: <http://www.cpalms.org/uploads/docs/standards/eld/SI.pdf>.

For additional information on the development and implementation of the ELD standards, please contact the Bureau of Student Achievement through Language Acquisition at sala@fldoe.org.

Special Notes

The occupational standards and benchmarks outlined in this secondary program correlate to the standards and benchmarks of the postsecondary program with the same Classification of Instructional Programs (CIP) number.

Career and Technical Student Organization (CTSO)

Future Business Leaders of America (FBLA), Business Professionals of America (BPA) and Florida Technology Student Association (FL-TSA) are the intercurricular career and technical student organizations providing leadership training and reinforcing specific career and technical skills for secondary students. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered.

Cooperative Training – OJT

On-the-job training is appropriate but not required for this program. Whenever offered, the rules, guidelines, and requirements specified in the OJT framework apply.

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's Individual Educational Plan (IEP) or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an IEP served in Exceptional Student Education (ESE)) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note: postsecondary curriculum and regulated secondary programs cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular course or a modified course. If needed, a student may enroll in the same career and technical course more than once. Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete a Career and Technical Education (CTE) course. The student should work on different competencies and new applications of competencies each year toward completion of the CTE course. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number for eligible students with disabilities.

Additional Resources

For additional information regarding articulation agreements, Bright Futures Scholarships, Fine Arts/Practical Arts Credit and Equivalent Mathematics and Equally Rigorous Science Courses please refer to:

<http://www.fldoe.org/academics/career-adult-edu/career-tech-edu/program-resources.shtml>