Subject: §126 Technology Applications
Course Title: §126.38 Game Programming and Design (One-Half to One Credit), Beginning with School Year 2012-2013

(a) General Requirements.
Students shall be awarded one-half to one credit for successful completion of this course. The required prerequisite for this course is Algebra (I). This course is recommended for students in Grades 9-12.

(b) Introduction.
(1) The technology applications curriculum has six strands based on the National Educational Technology Standards for Students (NETS•S) and performance indicators developed by the International Society for Technology in Education (ISTE): creativity and innovation; Communication and collaboration; research and information fluency; critical thinking, problem solving, and decision making; digital citizenship; and technology operations and concepts.
(2) Game Programming and Design will foster student creativity and innovation by presenting students with opportunities to design, implement, and present meaningful programs through a variety of media. Students will collaborate with one another, their instructor, and various electronic communities to solve gaming problems. Through data analysis, students will include the identification of task requirements, plan search strategies, and use programming concepts to access, analyze, and evaluate information needed to design games. By acquiring programming knowledge and skills that support the work of individuals and groups in solving problems, students will select the technology appropriate for the task, synthesize knowledge, create solutions, and evaluate the results. Students will learn digital citizenship by researching current laws and regulations and by practicing integrity and respect. Students will create a computer game that is presented to an evaluation panel.
(3) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(c) Knowledge and Skills.
(1) Creativity and innovation. The student develops products and generates new understanding by extending existing knowledge. The student is expected to:
(A) understand the basic game design elements, including conceptual ideas, storyline, visualization, storyboard, game effects, sound elements, gameplay, game controls, and player tutorial
(ii) understand the basic game design elements, including conceptual ideas

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(ii) understand the basic game design elements, including storyline
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**TEKS (Knowledge and Skills)**

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<td>(E) use bitmap graphics images, including designing, creating, reading, and manipulating images</td>
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<td>(F) create backgrounds, including solid, image, and tiled backgrounds</td>
<td>(i) create backgrounds, including solid backgrounds</td>
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<td>(G) write programs creating images using geometric shapes</td>
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<td>(H) create games using sprites by evaluating the role of sprites, creating sprites, and managing sprites</td>
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<td>(I) create programs using sprite sheets</td>
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<td>(J) demonstrate an understanding of image rendering, including transparency, refresh rate, hardware acceleration, and animation</td>
<td>(i) demonstrate an understanding of image rendering, including transparency</td>
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<td>(2) Communication and collaboration. The student communicates and collaborates with peers to contribute to his or her own learning and the learning of others. The student is expected to:</td>
<td>(D) use network resources to acquire, organize, maintain, and evaluate information</td>
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### §126. Game Programming and Design (One-Half to One Credit), Beginning with School Year 2012-2013

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<td>(3) Research and information fluency. The student locates, analyzes, processes, and organizes data. The student is expected to</td>
<td>(A) play board games to research and collect game play data</td>
<td>(i) play board games to research game play data</td>
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<td>(3) Research and information fluency. The student locates, analyzes, processes, and organizes data. The student is expected to</td>
<td>(B) evaluate, analyze, and document game styles and playability</td>
<td>(i) evaluate game styles</td>
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<td>(3) Research and information fluency. The student locates, analyzes, processes, and organizes data. The student is expected to</td>
<td>(C) research the dramatic elements in games, including kinds of fun, player types, and nonlinear storytelling</td>
<td>(i) research the dramatic elements in games, including kinds of fun</td>
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<td>(4) Critical thinking, problem solving, and decision making. The student uses appropriate strategies to analyze problems and design algorithms. The student is expected to</td>
<td>(A) demonstrate an understanding of the game design process, including generating ideas, brainstorming, and paper prototyping</td>
<td>(i) demonstrate an understanding of the game design process, including generating ideas</td>
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<td>(A) demonstrate an understanding of the game design process, including generating ideas, brainstorming, and paper prototyping</td>
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<td>(B) write programs using variables of different data types</td>
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<td>(C) evaluate game rules and instructions</td>
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<td>(D) demonstrate an understanding of the user experience by comparing rules and game-play patterns</td>
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<td>(4) Critical thinking, problem solving, and decision making. The student uses appropriate strategies to analyze problems and design algorithms. The student is expected to</td>
<td>(F) develop game software</td>
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<td>(4) Critical thinking, problem solving, and decision making. The student uses appropriate strategies to analyze problems and design algorithms. The student is expected to</td>
<td>(G) write computer game code, resolve game defects, and revise existing game code</td>
<td>(i) write computer game code</td>
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<td>(4) Critical thinking, problem solving, and decision making. The student uses appropriate strategies to analyze problems and design algorithms. The student is expected to</td>
<td>(H) test a finished game product by implementing sound testing techniques</td>
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<td>(5) Digital citizenship. The student explores and understands safety, legal, cultural, and societal issues relating to the use of technology and information. The student is expected to</td>
<td>(A) explore intellectual property, privacy, sharing of information, copyright laws, and software licensing agreements</td>
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<td>(F) evaluate the cultural aspects of game design fundamentals, including rationale for games and types of games</td>
<td>(i) evaluate the cultural aspects of game design fundamentals, including rationale for games</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to</td>
<td>(A) identify basic game components, including the game engine, game play subsystems, data structures, models, and interfaces</td>
<td>(i) identify basic game components, including the game engine</td>
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<td>(ii) identify basic game components, including game play subsystems</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to</td>
<td>(B) generate random numbers in a program</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to</td>
<td>(C) create a program implementing conditional statements</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to</td>
<td>(D) develop an appropriate data model</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to</td>
<td>(E) demonstrate an understanding of and apply object-oriented game programming</td>
<td>(i) demonstrate an understanding of object-oriented game programming</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to</td>
<td>(F) demonstrate an understanding of game programming essentials, including event-driven programming, communicating with messages, and device management</td>
<td>(i) demonstrate an understanding of game programming essentials, including event-driven programming</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to</td>
<td>(G) demonstrate an understanding of the role of game events, the animation loop, and game timing</td>
<td>(i) demonstrate an understanding of the role of game events</td>
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<td>(G) demonstrate an understanding of the role of game events, the animation loop, and game timing</td>
<td>(iii) demonstrate an understanding of the role of game timing</td>
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<td>(H) demonstrate an understanding of the role of game engines</td>
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<td>(I) demonstrate an understanding of video display flicker and double buffering;</td>
<td>(i) demonstrate an understanding of video display flicker</td>
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<td></td>
<td>(I) demonstrate an understanding of video display flicker and double buffering;</td>
<td>(ii) demonstrate an understanding of double buffering</td>
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<td>(K) use game control design to understand, access, and control input devices, including keyboard, mouse, and joystick</td>
<td>(i) use game control design to understand input devices, including keyboard</td>
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<td>(K) use game control design to understand, access, and control input devices, including keyboard, mouse, and joystick</td>
<td>(ix) use game control design to control input devices, including joystick</td>
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<td>(L) demonstrate an understanding of and apply game animation, including the principles of animation and frame-based animation</td>
<td>(i) demonstrate an understanding of game animation, including the principles of animation</td>
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<td>(L) demonstrate an understanding of and apply game animation, including the principles of animation and frame-based animation</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to demonstrate an understanding of decision making and types of decisions</td>
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<td>(i) demonstrate an understanding of decision making</td>
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<td>(N) demonstrate an understanding of game events, including listeners, triggers, and timed events</td>
<td>(i) demonstrate an understanding of game events, including listeners</td>
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<td>(O) demonstrate an understanding of and implement collision detection, including bounding boxes and sprite collisions</td>
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<td>(P) implement a tile-based game, including loading tile maps, drawing tile maps, rendering a tile map, and layering sprites</td>
<td>(i) implement a tile-based game, including loading tile maps</td>
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<td>(Q) demonstrate an understanding of artificial intelligence and develop and implement artificial intelligence</td>
<td>(i) demonstrate an understanding of artificial intelligence</td>
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<td>(R) demonstrate an understanding of game balance and tuning.</td>
<td>(i) demonstrate an understanding of game balance.</td>
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<td>(ii) demonstrate an understanding of game tuning.</td>
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<td>(6) Technology operations and concepts: The student understands technology concepts, systems, and operations as they apply to game programming. The student is expected to demonstrate an understanding of player progression, including leveling, linear progression, and maintaining high score data.</td>
<td>(S) demonstrate an understanding of player progression, including leveling, linear progression, and maintaining high score data.</td>
<td>(i) demonstrate an understanding of player progression, including leveling.</td>
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<td>TEKS (Knowledge and Skills)</td>
<td>Student Expectation</td>
<td>Breakout</td>
<td>Element</td>
<td>Subelement</td>
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