

Course Title: **Video Gaming 1/Computer Programming and Game Design**

Department: Business/Computers/Technology

Course #: **7553**

Grade Level/s: 9-12

Length of Course: Year

Prerequisite/s: **Pass Integrated Math (algebra with a C)**

UC/CSU (A-G) Req: **VPA STANDARDS**

Brief Course Description:

This course introduces students to video game design and creation through computer hardware and software. Fundamentals of computer programming will be introduced that allows students to write and design computer programs for video games. This course material is an introductory level course that engages students with project-based learning. Students will learn programming through object orientated software, easy-to-follow material will take students from simple “drag-n-drop” programming to actually writing code and developing original computer games! Students will begin to build real working games. They see results right away and along the way, they learn the math and physics concepts used in game development, how the engineering cycle is used to design games, the components of a good game, color theory used in game design, how to create sprites and animation, and so much more. Plus. They will have a "hands on" opportunity to use other computer application programs such as word processing, audio editing and development, presentation software and animation software.

I. GOALS

Computer Programming and Game Design Outcomes:

1. Acquire and apply appropriate game programming concepts and skills to develop a playable video game.

- a. Implement common programming concepts including logic operators, conditional statements, loops, variables, events, actions, and handling user input.
- b. Understand the basics of game physics including collision and motion.
- c. Examine the use of math and physics (such as gravity and friction) in game development.
- d. Implement a small video game utilizing mathematics and physics, which features at least one moving object (such as a space ship) which rotates along an axis and moves in whichever direction it is facing after rotation. The game must include collision physics.

- 2. Understand the general requirements of game design projects.**
 - a. Identify processes of design and development from concept to production including content creation, filling team roles, design documentation, communication, and scheduling for video game design teams.
 - b. Discuss the nature of game and design.
 - c. Develop design plans, character sketches, and storyboards for games.
 - d. Individuals will be given tasks of a project; use basic time management skills to complete each task and track its completion.
 - e. Create a set of original design documents and build a small game.

- 3. Demonstrate an understanding of testing techniques used to evaluate, rate, and review of student's video games.**
 - a. Test and analyze games to determine the quality of rules, navigation, performance, and gameplay.
 - b. Demonstrate technical reading and writing skills.
 - c. Test a classmate's game project and create a bug report for the game. For each error submitted and artistic game flaw with writing steps in sufficient detail so it is identifiable and reproducible to the developer.

- 4. Understand the impact of games and the role of play in human culture.**
 - a. Investigate and discuss how play can help humans acquire knowledge and social skills.
 - b. Compare and contrast the different opinions on the effects of games on behavior, cognitive development, and motor skills.
 - c. Design a game you believe will have positive impact on classmates and the school

- 5. Students will build a game that describes the game play, outcomes, controls, rewards, interface and artistic style of a video game.**
 - a. Use design documents to create a game design production plan.
 - b. Use computer tools to create game programming, art, and audio.
 - c. Create and use animated objects in a game.
 - d. Create sound and music to enhance the game experience.
 - e. Test and debug the completed game.
 - f. Apply listening, speaking and collaborative communication skills to convey information. Demonstrate a professional level of written and oral communication as necessary in the game industry.

- 6. Identify career goals and develop a career plan.**
 - a. Demonstrate personal and interpersonal skills appropriate for the workplace such as responsibility, dependability, punctuality, positive attitude, initiative, respect for self and others and professional dress.
 - b. Analyze job and career requirements as related to career interests and opportunities in the game industry.

II. OUTLINE OF CONTENT FOR MAJOR AREAS OF STUDY

Areas of Study for Video Gaming Concepts:

1. Introduction to Gaming Industry, Game Theory, Game Design and Careers
2. Teaching Object oriented programming in a Game Engine or program
3. Create Student Portfolio

III. ACCOUNTABILITY DETERMINANTS

SEMESTER ONE

Unit 1 Introduction to Video Gaming Basics from Game Development Essentials

Part I: Setup building the foundation (*VPA STANDARDS 1.0, 1.1, 2.1 - 2.6, 4.4 - 4.6, 5.0*) (CTE Standards:D1.1, D1.2, D1.3 D8.1, D8.2)

- “Principle of Game Design”

Part II: Scenarios: creating compelling content

- “Principle of Game Design” and “Board Game” (*VPA STANDARDS 1.0, 1.1, 2.1 - 2.6, 4.4 - 4.6, 5.0*) (CTE Standards D2.2, D2.4, D2.5, D6.3, D6.7)

Part III: Strategy: theory, team, Process, and community

– “The Gaming Effect – Cognitive effects of game theory and play.” CTE Standards (D2.2, D2.4, D2.5, D6)

Unit 2 – Digital Media Design as Art and the History of Video Games:

1. Application of Game Design Principles (CTE Standards D2.2, D2.4, D2.5, D6.3, D6.7)
 - a. Formal elements of games and Mechanics/dynamics
 - b. Rules and gameplay
 - c. Game balancing and Level Design
 - d. Flow and player psychology
2. Team Dynamics(CTE Standards:D2.6, D2.7, D2.8, D6.7, 10.8)
 - a. Life Cycle Documents
 - b. History of Video Games
 - c. Team Management including communication, milestones/deadlines and responsiveness
3. Digital Game Making Techniques (CTE Standards:D2.1, D2.2, D2.4, D2.5, D2.6, D2.7, D6.3, D6.7)
 - a. Creating, editing Art Assets
 - b. Creating, editing and importing Audio Assets
 - c. Scripting basics, adding logic to your game
 - d. Debugging techniques
 - e. Testing and iterative refinement
 - f. Version Control and File management

Unit 3 Game Elements/Interface and Design with a Game Engine

1. **Mouse Oriented Games** – (VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2) (CTE Standards:D3.1, D6.1, D6.3, D6.4, D6.7, 10.1, 10.2, 10.3, 10.4, 10.6,10.7, 10.8)
Students are introduced to game engine and learn to create interaction with the mouse. This tutorial is a simple clicking with the mouse game where a IMAGE icon bounces around inside an arena and players ‘catch’ it by clicking on it, thus increasing their score. This becomes more challenging as the IMAGES’s speed increases over time. The playing time is approximately 5 minutes.
2. **Action Games** – (VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2) (CTE Standards:D3.1, D6.1, D6.3, D6.4, D6.7, 10.1, 10.2, 10.3, 10.4, 10.6, 10.7, 10.8)
Students learn to use keyboard controls to interact with the game, input to the game also includes the mouse. In the game, their characters' will be set up with keyboard movesets from the beginning. Students are determined to discover how to use the tools they have through level design and enemy placement. This forces them to master their movements and attacks. This is the fun parts of a game when is all comes together – game play art and design.

SEMESTER TWO

3. **Strategy Games** – (VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2) (CTE Standards:D2.3, D3.1, D3.4, D4.1, D4.5, D5.1, D5.2, D5.3, D5.6, D6. D8.4, D6, D10)
Students learn “if-then” statements which take conditions and evaluate whether they are true or not; uses proofs to create game structure. Students will learn how important the grid is. The grid is the basis for most strategy oriented games. First create a global array for each value in the game. Students will create the size of the arrays which comes from calculating room size and each resolution vs. cell size.
4. **Arcade Games** – (VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2) (CTE Standards: (D2.3, D3.1, D3.4, D4.1, D4.5, D5.1, D5.2, D5.3, D5.6, D6. D8.4, D6, D10)
Students learn to use multiple moving sprites which can be interacted with. This style is a maze game. A Maze is a simple yet stimulating game that requires simple movement and rewards each level of play getting harder. The levels begin easily, but the difficulty gradually increases. Typically, there are three rounds, which hold a few levels each, and there are also points to collect and avoiding the enemies. Then progressing to learning timelines, room scrolling, enemy programming and numerous stages of rewards are also used end a harder programming game like shooting style of arcade game.
5. **Adventure Games** – (VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2) (CTE Standards: (D2.3, D3.1, D3.4, D4.1, D4.5, D5.1, D5.2, D5.3, D5.6, D6. D8.4, D6, D10)
The basic idea is that you are a character or avatar in a game and at each event you choose. Student will work through the tutorial and then create their own modified game then what will their character do next, where will they go in the room what enemy shows up, which will change, what happens next. Usually there are a few different choices. Students use static sprites, and create enemy objects to challenge the player. Sprites can be drawn by the students in game engine. The programming principle will be taught through the lesson
6. **Games in 2D format** (VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2) CTE Standards: (D2.3, D3.1, D3.4, D4.1, D4.5, D5.1, D5.2, D5.3, D5.6, D6. D8.4, D6, D10)

How do we take a 2D image on a flat screen and make your brain accept that it's a 3 image? There are many elements that come into play when creating this illusion. The key is the scripting of the y variable of setting the spirit at a different depth. This series, there are four different tutorials. They cover the 2D games using Sprites for the visuals and 3D objects making them 3D for the Game Objects and the complex spirits created for collision.

7. Scripting – learning code (VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2)
CTE Standards: (D2.3, D3.1, D3.4, D4.1, D4.5, D5.1, D5.2, D5.3, D5.6, D6. D8.4, D6, D10)

Students will learn create scripting through lines of text call code that uses functions of actions. These functions give you more control than the 150 actions that the software allows. The scripting language is similar to C++ or Java. Students will execute 8 different scripting pattern to make game

8. Other – Projects: Halloween Game, Educational, & Super Hero Game

(VPA STANDARDS 1.0, 1.1, 1.3, 1.4, 1.6, 2.1 - 2.6, 4.4 - 4.6, 5.2) CTE Standards: (D2.3, D3.1, D3.4, D4.1, D4.5, D5.1, D5.2, D5.3, D5.6, D6. D8.4, D6, D10: 10.1, 10.2, 10.3, 10.4, 10.6, 10.7, 10.8)

Students are allowed to express their full creativity and designing skills while using all of the techniques they have learned in previous lessons. Students will develop a themed video game in a process steaming from planning stage of game play with artistic rewards, production, schedule, testing and debugging, and the final stage of production and promotion.

4 Unit Career Planning/Exploration

Unit 1 (VPA STANDARDS 1.0, 1.1, 5.2) CTE Standards: (D1.1, D1.2, D1.3 D8.1, D6.4, D8.2)

1. Creating portfolios communicate accomplishments, works in progress, or personal history.
2. Students will research career areas in design and/or game design
3. Students identify personal qualifications, interests, aptitudes, information and skills, and post-secondary options

IV. INSTRUCTIONAL MATERIALS & METHODOLOGIES

A) METHODOLOGIES

- Teacher lecture for course work with direct instruction. Individual tests, student warm up log, and class assignments
- Teacher will demonstrate Game Engine which are industry standard and educational software for learning object orientated gaming. In use of the software, different programming technique will be learned through step by step lectures of coding, drag n drop methods and various other elements need to complete game fundamentals.
- Student will showcase their video games through debugging processing and peer grading
- Student will produce and create actual videogames- cover-page, programming language of code, files of sound and sprites, name of game then executable game with icon, zip drive all material

- Create Student Portfolio that will be hard copy, webpage and electronic versions (flash drive, OneNote and Haiku – on line learn system)

B) Software

- GameMaker: Studio. YoYo Games Ltd., 2014. <http://www.yoyogames.com/studio>
- Construct2 from Scirra <https://www.scirra.com/>
- Gamesalad :<http://gamesalad.com/>

Other Software Utilized:

- Adobe Professional Suite
- Microsoft Office Suite
- Icon Maker <http://www.towofu.net/soft/e-aicon.php>
- x-icon editor <http://ie.microsoft.com/testdrive/Browser/IconEditor/Default.html>
- Paint.net <http://www.getpaint.net/>
- GIMP= <http://www.gimp.org/>
- Audacity and the lame extension

C) Books

- GameMaker Studio Book - A Beginner's Guide To GameMaker Studio
Paperback – March 19, 2014 ISBN-10: 1497393833 CreateSpace Independent
Publishing Ben G Tyers <http://gamemakerbook.com/>
- GameMaker Studio Book - Tips & Tricks: 99 Coding Ideas & Shortcuts
Paperback – September 19, 2014 ISBN-10: 1502441233 CreateSpace Independent
Publishing Ben G Tyers <http://gamemakerbook.com/>
- Making a Game Salad For Teens 2014 Cengage Learning PTR, Michael Duggan ISBN: 978-1-285-44011-8
http://www.cengage.com/search/productOverview.do?N=15+4294967028&Ntk=P_EPI&Ntt=64675116438755543920330514421712488419&Ntx=mode%2Bmatchallpartial
- Game Development Essentials, Third Ed. Aug 17, 2011 Delmar Cengage Learning, Jeannie Novak ISBN: 978-1-1113-0765-3
http://www.delmarlearning.com/browse_product_detail.aspx?catid=28206&isbn=1418042080
- Challenges for Game Designers, 1st Edition, 2009 Course Technology, Brenda Brathwaite and Ian Schreiber ISBN 158450580X <http://ircg.ir/Lib/challenges-for-game-designers.pdf>

D) Equipment

- High Tech industry standard Computers with memory and graphic cards
- Xbox with controller

- TV flat screen
- Tablets to test game for mobile version
- Legos for designs
- Video Game Controller
- Headphones

E) Websites

- http://www.ted.com/talks/jane_mcgonigal_gaming_can_make_a_better_world
- Sololearn for python
- Codehs for python
- <http://www.gold-online-games.com/games/racing/pole-position-play.html>
- http://www.gamasutra.com/view/news/175561/5_tips_for_making_great_16bitstyle_action_games.php
- <http://www.rocket5studios.com/>
- http://gamasutra.com/blogs/TomBoot/20150319/239223/Previsualisations_in_game_development.php
- <http://gamemakerblog.com/2013/08/27/how-i-make-a-living-using-gamemaker-part-i/>
- http://www.sciencebuddies.org/science-fair-projects/project_ideas/Games_GameMaker_Guide.shtml
- <http://howtonotsuckatgamedesign.com/2014/11/color-theory-game-design-1-fundamentals/>
- <http://www.colormatters.com/color-and-design/basic-color-theory>
- http://www.gamasutra.com/view/feature/131581/lessons_in_color_theory_for_spyro_.php