

CHS 2D Game Programming

Course Overview: Learn the concepts taught in a college –level “programming 101” course, but all of the projects are games! You will receive an introduction to basic programming by building 2 dimensional (2D) games. GameMaker, the 2D game engine you will use, is based on a scripting language that builds techniques that can be transferred to any other programming language such as Python, Java and C++. You will finish complete stand-alone executable games that can be played with friends and added to your digital portfolio.



Students who enroll in this course are eligible to earn 3 college credits at CCAC. Students will pay a nominal course fee and must earn a C or higher to receive the 3 college credits.

Learning Outcomes: By the end of the GameMaker™ Programming course, students will demonstrate proficiency with:

- navigating GameMaker™ Studio Standard v1.3 software;
- using GML scripting language;
- designing a completely executable 2D game;
- exploring the games programming career field.

Course Number: 66C3

Length of Course: 1.0 credit (year-long course)

Grades: 11, 12

Recommended: Mobile Game Design



Students who complete this course will be more well prepared for careers such as:

- | | | |
|---|--|--|
| <ul style="list-style-type: none"> • Anthropologist • Architect • Cartographer • Corporate Trainer • Entrepreneur • Game Publisher, Designer, Developer | <ul style="list-style-type: none"> • Geospatial Information Scientist and Technologist • Graphic Designer • Logistician • Media-Related Career • Meeting, Convention, and Event Planner | <ul style="list-style-type: none"> • Producer/Director • Project Manager • Sociologist • Urban Planner • Video Game Tester • Web Developer • Writer, Author, Editor |
|---|--|--|

During semester 1, students will learn the basic principles of computer science, game design, and programming concepts such as variables, conditionals, loops, and arrays. Students analyze the impact of computers on our world and are introduced to programming by completing fun yet rigorous game design projects. Students learn to plan, design, code, and test software by building two dimensional (2D) games using the scripting language GML in GameMaker: Studio™.

Module	Lesson	Assignments
1 Overview of Game Design and Computer Science Principles	1 Game Design 2 Data and Computational Thinking 3 The Internet and Global Impact	<ul style="list-style-type: none"> Using Data for Information and Knowledge Discussion Tell Time Using Binary Clocks Webquest - The Impact of Games Internet Usage Discussion CS Vocabulary Word Art Ethical Use of Computers Discussion Bringing Equity
2 Using GameMaker	4 Setting Up GameMaker Projects 5 GameMaker Studio Interface 6 Game Assets and GameMaker	<ul style="list-style-type: none"> Webquest - Storing, Securing, and Compressing Data
3 Zulama Pinball	7 Game Design Documents 8 Parts of a GameMaker Game 9 Backgrounds and Rooms 10 Adding Code	<ul style="list-style-type: none"> Game Document Scavenger Hunt Designing New Playing Pieces Part 3 Designing New Playing Pieces Module 3 Guided Lessons Completed
4 Making the Game Work	12 Controlling the Paddle 13 Using Mouse Input 14 Collision with Ball 15 Adding	<ul style="list-style-type: none"> Practice with If Statements GameMaker Tips Discussion Debugging Exercise Module 4 Guided Lessons Completed
5 Finishing Zulama Pinball	16 Add Game Balance 17 Add Rewards 18 Player 19 Feedback	<ul style="list-style-type: none"> Add More Balance Module 5 Guided Lessons Completed Designing a Level Workshop New Level GMZ Workshop
6 Ball Bouncer	21 Rooms and Backgrounds 22 Ball and Wall Objects 23 Adding the Goal 24 Create Playing Pieces Workshop	<ul style="list-style-type: none"> Ball Bouncer Room Navigation Module 6 Guided Lessons Completed Create Playing Pieces Workshop
7 Ball Bouncer Game Mechanics	25 Placing the Playing Pieces 26 Taking a Closer Look 27 User Interface 28 Global Variables	<ul style="list-style-type: none"> The Rest of the Pieces Variables and Conditionals Practice Instances and Variables Progress Check
8 Matching Game	31 Matching Game Setup 32 Card Sprites 33 Controller Object	<ul style="list-style-type: none"> Module 8 Guided Lessons Completed
9 Finding Matches	34 Managing Variables 35 Game Timing 36 Randomizing the Game 37 Game Improvements	<ul style="list-style-type: none"> Module 9 Guided Lessons Completed Finish the Basic Game Workshop Edit Sprites Workshop
10 31 Game Setup	39 Set up Playing Board 40 For Loop 41 Arrays 42 Managing the Deck 43 More Scripts	<ul style="list-style-type: none"> Playing 31 Discussion Manipulating Arrays Module 10 Guided Lessons Completed Deal the Hand Workshop
11 Build 31	45 The Player's Turn 46 The Computer's Turn 47 End the Hand Finish the Game	<ul style="list-style-type: none"> Build Plan 31 Game Project Reflecting on your Build Plan

During semester 2, students use animated sprites, create timelines, build complex game objects, and apply object-oriented design to continue their study of designing digital games using GameMaker: Studio™. They deepen their knowledge in game design principles including game balance, player feedback, and randomness, and broaden their application of computer game design skills and coding in a 2D game design environment. By the end of the course, they will have worked in design teams to create original and fully playable 2D digital games.

Modules	Lessons	Assignments
1 Sky is Falling Cut Scene	1 Evolution of Transmedia World 2 Begin the Cut Scene 3 Construct the Timeline 4 Finish the Cut Scene 5 Cut Scene Workshop	Activity: Sky is Falling Room Navigation Activity: Make Lightning Move with Cloud Discussion: Timelines vs. Alarms Activity: Module 1 Guided Lessons Completed Quiz: Module 1 Quiz Workshop: Refine the Cut Scene
2 Sky is Falling Game	6 Animals Fall 7 Saving the Animals 8 Game Timers and UI 9 Restarting the Game	Discussion: Capture Animal Activity: Module 2 Guided Lessons Completed Quiz: Module 2 Quiz Workshop: Play Again
3 Sky is Falling Enhancements	10 Lives and Capacity Bar 11 Boat Control 12 Creating Paths 13 High Scores 14 Sound 15 Create an Original Cut Scene	Activity: Improving Boat Control Webquest: Game Sound Discussion: Sounds in Games You Play Activity: Module 3 - The Sky Is Falling Game - Completed Quiz: Module 3 Quiz Activity: Original Cut Scene Design Document Activity: Create Original Cut Scene
4 Side Scroller Player	16 Player Ship 17 Build an Enemy 18 Add Parts to Player Ship 19 Player Weapons 20 Player Bases	Activity: Exploding Player Ship Discussion: Layering Effects Discussion: Benefits of Object-Oriented Design Activity: Module 4 Guided Lessons Completed Quiz: Module 4 Quiz Activity: Implement Player Bases
5 Side Scroller Enemy	21 The Enemy Ship 22 Enemy Weapons Workshop 23 Add Instructions 24 Design Enemy Waves 25 Balance the Game	Activity: Adding Instructions Workshop: Design Enemy Waves Activity: Module 5 Guided Lessons Completed Quiz: Module 5 Quiz Activity: Balanced Side Scroller Game
6 Independent Project	27 Become a Game Designer! 28 The Player Experience	Activity: Game Design Document (GDD) Discussion: Fun and the Player Experience
7 Prototyping	29 Build a Playable Game	Discussion: Building a Computer Game Project: Prototype Project: Status Reports
8 Playtesting and Iterating	30 Playtest Your Game 31 Planned Improvements 32 Digital Portfolio	Activity: Playtest Plan Project: Final Prototype Discussion: Reflection Project: My Digital Portfolio