Teaching Tomorrow's Technology.
CompuScholar

Unity Game Programming

Course Syllabus and Planner

Updated July, 2019

Course Overview

The *Unity Game Programming* curriculum is a one-year (two-semester) course covering topics typically found in **Video Game Design** or similar courses. This course has been aligned to specific course standards in a number of states.

Other introductory programming courses are not required; students merely need to have typical computer usage skills prior to starting this course.

Teaching Strategies

The course material is designed to appeal to a variety of students, from traditional learners who thrive on written text to audio-visual students who enjoy a multi-media format. All content is delivered through an online system that allows students to work seamlessly both in the classroom and at home.

Labs and Programming Environment

Every chapter contains one or more hands-on programming labs where students will design or implement programs to demonstrate understanding of the lesson topics. Students will get the opportunity to work on individual and group projects and will experience all phases of a project lifecycle, including requirements, design, implementation, and testing.

The chosen gaming framework is Unity (https://unity3d.com/). The course contains detailed download, installation and usage instructions for the Unity IDE.

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Course Planner

A typical school year consists of approximately 36 calendar weeks or 180 days of school. The course plan covers approximately 170 school days, with additional time allocated for review, make-up work, or individual projects. Each "day" listed below represents one typical class period of 45 – 60 minutes, so students will typically work 3-5 hours per week. Some classes may move faster or slower than the suggested pace.

Each chapter contains multiple lesson quizzes and a chapter test in addition to the listed Lab assignments. Teachers may choose to add Supplemental Lessons as desired to meet state standards or student interest. Mid-term and final project timelines are flexible and may be scaled "up" or "down" to match the available class-time.

Days	Reading and Objectives	Labs
5	Chapter One: Game Engines • Engine Concepts • Development Tools • Introducing Unity	**Install Unity Software**
5	Chapter Two: Unity Development Environment • IDE Basics • Unity Concepts • Sprites	**Your First Sprite**
7	Chapter Three: Introduction to Scripting • C# Language Concepts • Creating Scripts • C# Coding Fundamentals • Game Loops and Functions	**Reporting for Duty**

Days	Reading and Objectives	Labs
5	Chapter Four: Simple Movement and Input • Simple Movement • Simple Rotation and Scaling • Easy Input Handling in Unity	**Alien Dance Squad**
7	Chapter Five: 2D Physics Concepts • Rigidbody Components • Unity Colliders • Physics Materials • Scripting Collision Events	**Simple Pinball**
6	Chapter Six: Primitive Data and Math • Data Types and Variables • Mathematical Operations • Variable Scope and Access • Displaying Data	**Pinball Scoring**
5	Chapter Seven: Decisions and Flow Control • Logical Expressions • "if/else" Statements • "switch" Statements	**Thunder Road**
7	Chapter Eight: Organizing Game Objects • Parent-Child Objects • Sorting Layers • Tagging Game Objects • Collision Layers	**Mower Dodgeball**

Days	Reading and Objectives	Labs
10	Chapter Nine: Object-Oriented Concepts • Defining Classes • Creating and Using Classes • Defining Functions • Accessing Game Objects • Constructor and Property Functions	**Deep Space**
7	Chapter Ten: Managing Game Objects • Prefabs • Creating and Destroying Objects • Activating and Deactivating Objects • Controlling Object Lifespans with Invoke	**Deep Space 2**
5	Chapter Eleven: Exceptions and Debugging • Run-Time Exceptions • Finding Run-time Errors • Using the Debugger	**Bug Hunt**
5	Chapter Twelve: Loops and Arrays • Arrays • for() and foreach() Loops • while() Loops	**Banana Breakout**

Days	Reading and Objectives	Labs
6	Chapter Thirteen: Game Design Strategies • Game Requirements • Game Mechanics • Storytelling and Progression • Design Documents	**Planning Documents**
10	Chapter Fourteen: Mid-Term Project • Kickoff	**Mid-Term Requirements** **Mid-Term Design** **Mid-Term Coding & Testing**
7	Chapter Fifteen: Virtual Worlds • Moving Cameras • Setting Boundaries • Building a Tile World • Mini-Maps	**Treasure Hunt**
6	Chapter Sixteen: Scrolling Games • Wrapping Background • Scrolling Game Mechanics • Parallax Effects	**RoboDash**
7	Chapter Seventeen: Animation • Simple Unity Animation • Animator States • Scripting Animations • Animations and Colliders	**RoboDash Animation**

Days	Reading and Objectives	Labs
6	Chapter Eighteen: Sound Effects • Sound Files • Adding Sounds to Game Objects • Scripting Sounds	**RoboDash Sounds**
6	Chapter Nineteen: Advanced Game Physics • Applying Forces • Unity Physics Joints • Unity 2D Effectors	**Mini-Golf**
6	Chapter Twenty: Multiple Scenes • Creating New Scenes • Scripting Scene Changes • Saving Objects Across Scenes	**Mini-Golf Levels**
6	Chapter Twenty-One: Artificial Intelligence • Artificial Intelligence Concepts • Flowcharts and Algorithms • Scripting AI	**Space Creeps**
6	Chapter Twenty-Two: User Interfaces • Unity Buttons • Other UI Controls • UI Design Concepts	**Space Creeps Settings**

Days	Reading and Objectives	Labs
5	Chapter Twenty-Three: Game Art • Perspectives • Color Theory • Image Editing	**Customized Artwork**
6	Chapter Twenty-Four: Publishing Games • Splash Screens, Credit Scenes and Icons • Publishing to PC, Mac and Linux Computers • Publishing to Smartphones • Publishing to Game Consoles	**Publish Your Game**
5	Chapter Twenty-Five: Software Development Lifecycles and Teamwork • Software Lifecycles • Internal and External Documentation • Software Teams and Tools	**Project Planning**
10	Chapter Twenty-Six: Final Project • Kickoff	**Final Requirements** **Final Design** **Final Coding & Testing**
3	Supplemental Chapter One: Ethics and Society • Computing Ethics • Intellectual Property • Security	**N/A**

Days	Reading and Objectives	Labs
2	Supplemental Chapter Two: Video Game History • Types of Games • The Evolution of Game Consoles	**N/A**
5	Supplemental Chapter Three: Additional Topics • Collaboration and PIM Tools • The Binary Number System • ESRB Ratings • Science Project	**N/A**