2. General Information

Date
11/16/2016

Department
Computing Sciences

Course Prefix:
CSC

Course Number:
246

Course Title:
Game Programming Algorithms and Techniques

3. Course Information

Credit Hours
3

Lecture Contact Hours
3

Laboratory Contact Hours

Other Contact Hours

Catalog Description
This course presents a detailed overview of many of the important algorithms and techniques used in video game development. Coursework will build on students' current knowledge of programming and game design and will focus on many concepts used in the game industry today. Fundamental techniques in 2D and 3D graphics, lighting, input, sound, physics, and AI will be covered. There is a strong emphasis on manipulating vectors using vector math, as well as studying key transformation matrices and their functioning. These techniques will be used to develop sample games and simulations.

New Analysis Question

Prerequisites
CSC 190.
PHY 118 strongly recommended.

Co-requisites

Grading Scheme
This course can be taken more than once for credit

This course is designated as satisfying a requirement in the following SUNY Gen Ed category:

First Year Experience

Capstone

4. FLCC Values

College Learning Outcomes Addressed by the Course

- Inquiry
- Interconnectedness
- Perseverance

5. Course Learning Outcomes

Course Learning Outcomes

1. Design and construct simulations and games in 2D/3D environments manipulating elements of the game (e.g. light, sound, game objects, physics, collision detection, AI, pathfinding, animations, and camera).
2. Create appropriate user interface designs and controls to handle input from a variety of sources.
3. Study and analyze the graphic pipeline used to display virtual environments from coordinate space to a 2D screen using the transform matrix and projection space.

6. Program Affiliation

This course is required as a core program course in the following program(s):

AS Game Programming and Design

8. Outline of Topics Covered

Outline of Topics Covered in Course

New Analysis Question

Outline of Topics Covered

1) Basic differences of game programming and application programming.
   - Evolutions of Game Programming
   - The Game Loop
   - Time
   - Game Objects

2) The benefits and tradeoffs of scripting languages.
   - Scripting Languages
   - Other options for programming besides a scripting language
3) Models in 2D and 3D graphics and basic manipulate of them.
   o The coordinate system used.
   o Sprites and Models
   o Tile Maps and Environments
   o Attaching functionality to game objects.

4) How to implement movement, gravity, and collisions in a game.
   o Constant velocity.
   o Adding acceleration, drag, and gravity.
   o Parabolic motion.
   o Collision of game objects
   o Collision triggers

5) Manipulating camera and lighting in an environment.
   o Different camera positioning for different genre games.
   o Moving camera based on game object.
   o Moving camera based on user input.
   o Adding different lighting in an environment.
   o Manipulating the lighting during gameplay.

6) Manipulating different inputs from the user.
   o Input devices
     • Keyboard
     • Mouse
     • Game controller
     • Mobile devices

7) Implementing different systems of user interface.
   o Menu System
   o HUD
   o Transitioning between different Shells and game modes

8) Choosing and working with different data formats for development.

9) Basic artificial intelligence and path finding algorithms.
   o Real AI versus Game AI
   o Pathfinding algorithms

10) Game Development
    o Side-Scroller
    o Tower Defense