SJSU SAN JOSÉ STATE UNIVERSITY

College of Science · Computer Science

Computer Game Design and Programming Section 01

CS 134

Fall 2023   3 Unit(s)   08/21/2023 to 12/06/2023   Modified 08/22/2023

👤 Contact Information

Instructor: Kevin M. Smith
Office Location: DH282
Email: kevin.smith@sjsu.edu
Office Hours: Tuesdays 10:30-11:30 (CS116A) Thursdays 10:30-11:30 (CS134)
Class Days/Time: Tues/Thurs 3-4:15
Classroom: Duncan Hall 450
Prerequisite: CS 146 and either CS 151 or CMPE 135 (with a
grade of "C-" or better in each); or instructor consent. C++ experience recommended, but not required)

Course Overview
In this course, you will learn the critical elements in the design and implementation of a computer games from the ground up. This will include some of core components required to implement a modern high-performance game engine. The course will initially focus on 2D games and then we will extend our knowledge to include 3D. You will implement required functionality in your own game engine to support navigation, animation, physics, path-finding, audio and user-input through designing and building an actual game. We will augment our knowledge with case studies of existing games and current commercially available game engines.

The description below is the catalog description..

🖥 Course Description and Requisites

Architectures and object-oriented patterns for computer game design. Animation, simulation, user interfaces, graphics, and intelligent behaviors. Team projects using an existing game engine framework.

Prerequisite: CS 146 and either CS 151 or CMPE 135 (with a grade of "C-" or better in each); Computer Science or Software Engineering majors only, or instructor consent.

Letter Graded

✱ Classroom Protocols

Laptops are permitted in class only for notetaking, viewing lecture slides and labs only.

Cellphones are not permitted to be used in class unless for SJSU system authentication.

If you come late or are required to leave during the lecture, please enter at rear of classoom and use the seats in back.

▤ Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together.

We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

📊 Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

1: Describe how modern video games (2D and 3D) are designed and implemented.

2: Design and create a game from scratch in C++ (using a C++ graphics).

3: Learn several techniques and design patterns used to develop high-performance game engines.

4: Develop a physics-based animation system for player motion and visual effects

5: Gain an understanding of the current state-of-the art in game technology through use-cases

📘 Course Materials

Textbook
There is no textbook required for the class.

Software and Computer
Students will be required to have access to a modern capable laptop or desktop computer running recent version of Windows or macOS. In addition to a computer, a three-button mouse is required for the programming assignments. The development projects for this class will be done in C++. Students will be required to download and install a development framework for their particular operating system including Visual Studio (Windows) or Xcode (macOS) and a C++ graphics development library (instructions will be provided on first day of class).

Software Packages
Students are required to use the following software packages for this course:

1. Visual Studio 2019 Free Community Version (PC) or Xcode (MAC)
2. Camtasia or SnagIt Video Capture Software (or equivalent)
3. Autodesk Maya (for creating your own 3D content) (free student version available)
4. OpenFrameworks 0.11.X C++ Library (Open Source)

Camtasia or SnagIt will be used for creating videos of your assignments and projects.

5. Adobe Photoshop for editing 2D game assets.

The class materials (including any lecture slides, notes, videos and PDF files) are protected by copyright. It is illegal to copy or distribute the class materials without permission from the instructor There is no photography allowed (including mobile phone cameras) or recording of the lectures permitted.

☰ Course Requirements and Assignments

1. Development Projects (50%)
Students will complete a series of development projects involving the use of C++ and/or production tools covered in the class. The projects will be specified on Canvas.

2. Labs (10%)
There will be a series of labs which are designed to be mostly completed in class that you will be assigned

3. Mid-Term Exam (10%)
The mid-term exam with be either a closed-book exam and/or a take-home problem.

4. Final Project (30%)
The student project will be comprehensive prototype that will leverage concepts learned and components from pervious assignments.

Projects
For "Development Projects"" specified in (1) above, students will complete a series of sequential programming projects that will be

assigned during the semester. Most of the projects will be dependent on the previous and the final project will be the culmination of the previous projects, therefore, it is required that all projects be completed to be successful in the course. Students will post either a still frame or video of the project on the Google Class Community Page. Instructions for posting will be provided on Canvas.

Final Project
There is no final exam. The student will be required to submit a final game project which demonstrates comprehensive knowledge learned in the class. This will included a recorded presentation and prototype.

Gallery
A Google Gallery will be provided for the course where students will be required post a movie of their assignments (or still images, depending on the assignment) in a web Gallery.

✔ Grading Information

Criteria

The grading criteria for development projects is based on:

1) completion of required functionality

2) robustness of required functionality

3) quality of deliverables which includes quality of code any an required documentation or assets that to be included with the project.

Breakdown

94% or above A

90%   A-

87%   B+

83%   B

80%   B-

77%   C+

73%   C

70%   C-

67%   D+

63%   D

60%   D-

< 60% F

Note: there is no "rounding" of numercial grades to letter grades. For example, if your final grade in Canvas is 93.9%, you will receive an A-.

🏛 University Policies

Per University Policy S16-9 (PDF) (http://www.sjsu.edu/senate/docs/S16-9.pdf), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the Syllabus Information (https://www.sjsu.edu/curriculum/courses/syllabus-info.php) web page. Make sure to visit this page to review and be aware of these university policies and resources.

📅 Course Schedule

1 8/22, 8/24 Introduction and Development Environment, Game Engine Dev Vector Math Review

2 8/29, 8/31 Vector Math Review Basic 2D Vintage Arcade Game Project

3 9/5, 9/7 Basic 2D game interactivity - Rendering/Drawing and Input

4 9/12, 9/14 Physics – Physics Engine Basics

5 9/19, 9/21 Physics – Trajectory, Ballistic Motion and Integrators

6 9/26, 9/28 Physics – Particles Systems Architecture and Forces

7 10/3, 10/5 Physics – Collision Detection

8 10/10, 10/12 Review, **Midterm Exam (10/12)**

9 10/17, 10/19 3D Computer Graphics for Games - I

10 10/24, 10/26 3D Computer Graphics for Games - II

11 10/31, 11/2 3D Game Design

12 11/7, 11/9 3D Game Design

13 11/14, 11/16 3D Game Design

14 11/21, 11/23 Open Topic, Non-Instructional day (no class)

15 11/28, 11/30 Final Project Presentations.

16 12/5 **Final Project Due** (Last Day of Instruction