San Jose State University
Department of Computer Science
CS134, Computer Game DESIGN

Fall Semester - 2022

Course and Contact Information

Instructor:	Kevin Smith
Office Location:	Online Office Hours for Fall 2022 (See Canvas for Links)
Email:	kevin.smith@sjsu.edu
Office Hours:	Monday 6:00-7:00 PM or by appointment
Class Days/Time:	MW 3:00-4:15PM
Classroom:	Clark Building 226
Prerequisites:	Prerequisite: CS 146 and either CS 151 or CMPE 135 (with a grade of "C-" or better in each); or instructor consent.

Catalogue Description

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.

Course Description

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.

Course Learning Outcomes (CLO)

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

1: Understand 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 the 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.

Required Texts/Readings

Textbook

There is no textbook required for CS134. All material will be provided in class with supplemental readings.

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 (an i7 processor or equivalent highly recommened). It is preferable to have a machine with a GPU. 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 (PC) or Xcode (MAC)
2. Adobe Photoshop CC or equivalent open software package such as GIMP
3. Camtasia or SnagIt Video Capture Software (or equivalent)
4. Autodesk Maya (free student version available)
5. OpenFrameworks 0.11.X C++ Library (Open Source)

Adobe Photoshop will be used in the class for creating game content, such as sprites, background images and textures.

Autodesk Maya will be used for generating 3D content.

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

Course Requirements and Assignments

It is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

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. Engagement (5%)

Students are expected to attend every class and be engaged. This component of the grade will be determined by quiz results and participation in the class.

3. Labs (5%)

There will be 4-5 labs which are designed to be completed in class that you will be assigned.

3. Mid-Term Exam (10%)

The student will be required to take a closed book mid-term exam or a take-home exam which will cover material presented in class and the reading material assigned. The mid-term may also include programming problems to be solved.

4. Final Project (30%)

The student project will be comprehensive game 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 Gallery Page. Instructions for posting will be provided on Canvas.

Final Project

Students will be required to submit a final project (a 3D game) which demonstrates comprehensive knowledge learned in the class.

Gallery

A Google Gallery will be provided for the course where students will be required post a movie demonstration of their assignments.

Academic Honesty

Students are expected to produce their own original work for the class. Academic integrity will be enforced via the University Academic Integrity Policy. https://www.sjsu.edu/studentconduct/conduct-processes/academic-integrity.php. Plagiarism, which includes copying of code solutions from other students or internet sources is strictly forbidden and any assignment or project found to be plagiarized (in whole or part) will receive a grade of a "0" and the case formally reported to the University committee.

Grading Policy

No make-up tests (exams and quizzes) will be given and *no* **late work will be accepted**. This includes: homework, projects, videos, in-class exercises or any other work related to the class. If an exam or work is missed or late, it will be graded as a "0". If you are in doubt about the submission time for an assignment, it is better to submit it early.

At least	Grade
97%	A+
93%	A
90%	A-
87%	B+
83%	B
80%	B-
77%	C+
73%	C
70%	C-
67%	D+
63%	D
60%	D-
<60%	F

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

NOTE that University policy F69-24 at http://www.sjsu.edu/senate/docs/F69-24.pdf states that "Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading."

Classroom Protocol

Class attendance is required to gain maximum benefit from the presented materials, labs, student presentations and discussions.

Cell phones are generally not permitted to be used in class (including text messaging) except when used for *iClicker* interactive content such as quizzes and attendance.

Please attend class on time. If for any reason you are late, please enter the classroom preferably at the rear of the class if there is an exit as to not disrupt the class.

Please stay focused for the entire class. If you must leave and re-enter the class during class time, please also do so at the rear of the class (if there is an exit) as to not disrupt the class.

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.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at http://www.sjsu.edu/gup/syllabusinfo/

CS134, Computer Game Design, Course Schedule

This schedule is tentative and is subject to change. Due dates for assignments will be posted in Canvas and are generally due the following week after are assigned.

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
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 8/31 – **Last Day to Drop**
3	9/5, 9/7	**Labor Day – No Class** 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 Introduction Exercise in 3D
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 (Take Home)**
9	10/17, 10/19	3D Computer Graphics for Games - I
10	10/24, 10/26	3D Computer Graphics for Games - II

Week	Date	Topics, Readings, Assignments, Deadlines
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	Open Topic
16	12/5	**Final Project Due (Last Day of Instruction)**