

San José State University
Department of Computer Science
CS134, Computer Game DESIGN, Section 2

Spring Semester, 2018

Course and Contact Information

Instructor:	Kevin Smith
Office Location:	DH 282
Email:	kevin.smith@sjsu.edu
Office Hours:	TR 1300-1400 or by appointment
Class Days/Time:	TR 1630-1745
Classroom:	MH 222
Prerequisites:	CS 130 or CS 116A, 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.

Prerequisite: CS 146 and either CS 151 or CMPE 135 (with a grade of "C-" or better in each); or instructor consent.

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++.
- 3: Learn the techniques and design patterns used to develop high-performance game engines.
- 4: Gain an understanding of the current state-of-the art in game technology through use-cases.

Required Texts/Readings

Textbook

The following textbook is required for the class:

Jason Gregory, *Game Engine Architecture (Second Edition)*.

Recommended Books

Although not required, the following books are recommended:

David H. Eberly, *3D Game Engine Design*

Robert Nystrom, *Game Programming Patterns*

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. 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 track pad on the laptop is not sufficient for this purpose. 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)

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](http://www.sjsu.edu/senate/docs/S12-3.pdf) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

1. Development Projects and Assignments (80%)

Assignments will be given in the form of (1) readings or research where student is required to provide a review or answer questions on a research paper or article. (2) short-term implementation projects or problems where the student will be required to solve a problem on the computer and hand-in the results (3) informal presentations reporting on results from (1) and (2). The assignments will be posted on Canvas when they are assigned.

2. Mid-Term Exam (10%)

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

3. Final Exam (10%)

The student will be required to take a closed book final exam which will cover material presented in class and the reading material assigned. The exam will cover material covered in the entire course. The final may also include problems to be solved. The instructor has the option to make the final exam a “take-home” exam.

Projects

For “Development Projects” specified in (1) above, students will complete a series of approximately six (6) 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. One of the projects will be a “team” project where students can work together and present their results.

Gallery

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

Engagement

This is an interactive class and students are expected to be fully engaged and participating in class discussions and Q/A sessions.

Grading Policy

No make-up tests will be given and no late homework (or other work) will be accepted. 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+
72%	C
70%	C-
67%	D+
62%	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](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) 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, presentations and discussion.

Laptop or tablet use is encouraged for taking notes during the class. Students should practice common courtesy and refrain from using laptops for email, messaging or social media during class.

Cell phones are generally not permitted to be used in class (including text messaging). For extenuating circumstances, please let the instructor know before class.

Since the material presented in class is copyrighted, there is no photography (including phone cameras) is allowed.

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	Jan 25	Introduction – Syllabus and Development System/Libraries
2	Jan 30, Feb 1	Game Loop and Parts of a Game Engine Points, vectors and transformations
3	Feb 6, 8	Drawing – Level representation, 2D, top-down, isometric, 3D
4	Feb 13,15	Drawing – Optimizations, animation, game cameras

Week	Date	Topics, Readings, Assignments, Deadlines
5	Feb 20,22	Physics – Collision detection, collision resolution
6	Feb 27, Mar 1	Physics – Collision detection, collision resolution
7	Mar 6, 8	Physics – Collision detection, collision resolution
8	Mar 13,15	AI – Decision making, finite state machines, behavior trees
9	Mar 20,22	Midterm Exam (Thursday, March 22) AI – Decision making, finite state machines, behavior trees
10	Mar 26-30	Spring Recess
11	April 3,5	AI – Pathfinding Text drawing, sound
12	April 10,12	Review, data driven architecture
13	April 17,19	3D viewing and transformations Scene, cameras and navigation
14	April 24,26	Spatial partitioning, selection/picking 3D game design/case study
15	May 1, 3	3D game design/case study
15	May 8, 10	Flexible Topic or Guest Speaker Course Review
16/17	May 16-22	Final Exam (Final will be given at normal University-scheduled time)