CS 3: Introduction to Software Design — Spring 2025

Course Syllabus

Instructor	
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Course Website
https://sof.tware.design
Visit early. Visit often.

Instructor	
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Lecture
ANB 105 TR
01:00 PM – 01:55 PM

Course Overview

This course covers large program design in the C programming language. Prerequisite: CS 2. CS 3 is a practical introduction to designing large programs in a low level language. Heavy emphasis is placed on documentation, testing, and software architecture. Students will work in teams on two 5-week long projects. In the first half of the course, teams will focus on testing and extensibility. In the second half of the course, teams will use POSIX APIs, as well as their own code from the first five weeks, to develop a large software deliverable. Software engineering topics covered include code reviews, testing and testability, code readability, API design, refactoring, and documentation.

Course Components

In this course, there are several types of assessments: quizzes, physics engine projects, a webserver project, and a game project throughout the term.

Quizzes

There will be two written in-person quizzes (one in approximately week 4, and the other in approximately week 8). **Approximately 60% of the questions on these quizzes will be pulled directly from in-class exercises.** These quizzes might involve code. The goal of the quizzes is mostly to assess non-programming skills (e.g., code analysis or choosing the right data structure for a problem) that cannot be tested on the projects.

Physics Engine Project

The physics engine project is made of three components: a physics engine, a demo, and a framework of the game. Each week, we will provide a compiled reference solution for two out of the three components and you will implement the third yourself.

The projects are the heart and soul of this course. We prefer the term *project* to *set* because all the individual parts of the assignment will come together to create a single finished product that we hope you will be proud of. The projects will be exclusively programming assignments. Some parts will be auto-graded via sets of unit and integration tests we have designed to catch most of the common mistakes. Your final grade on each project will be determined based on correctness and code quality. All code for these projects will be due at *11:30 PM on Fridays*.

Game Group Project

For the last several weeks of the term, we will transition from the physics engine project to an open-ended game project. We will give more details on this when it's closer to the release date.

Webserver Project

Throughout the term, you will iterate on a code base for a web server. These parts will be completely solo with absolutely no collaboration of any kind. In the first week, you will write some code to orient yourself to C; in the second week onwards, you will add features weekly to a codebase we've started for you.

Late Policy

We've designed a late policy that is very intentional in providing flexibility while also making sure students do not fall so far behind that they might not be able to pass. Please see below for details.

To handle our policy, we have written a tool that will tell you what options are available to you at any given point:

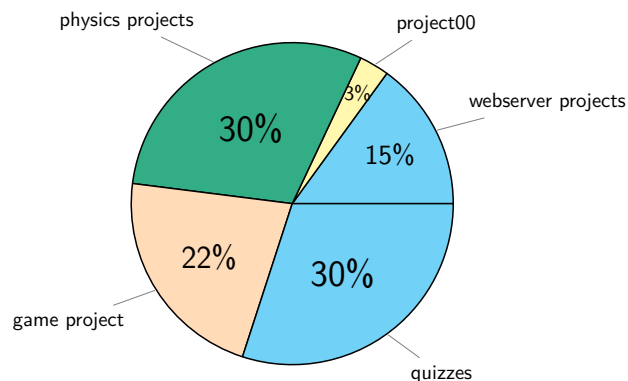https://extensions.caltech.codes/

Please do not e-mail us asking for an extension. You must use the website form. There are limits and restrictions on extensions which the form outlines. Please read these **before** you need an extension!

This flowchart outlines common scenarios in which a student may need an extension:
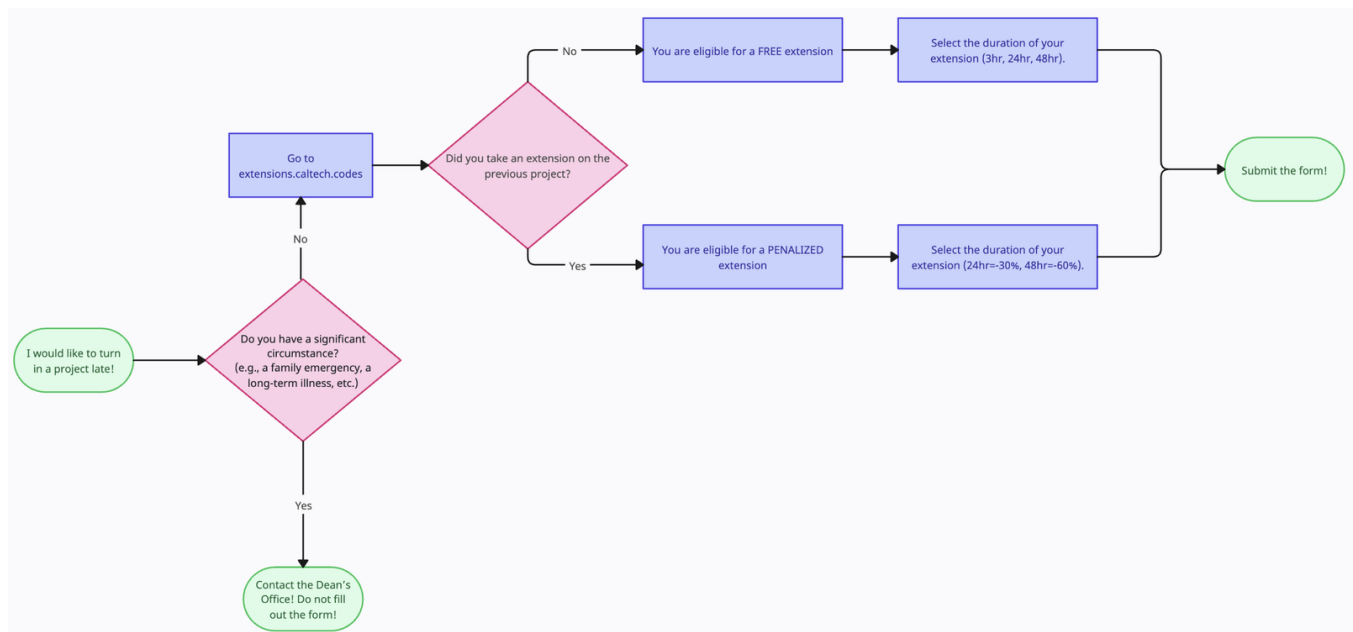
Grading Scheme
Grade Percentages

Collaboration & Academic Integrity

See our "collaboration table" on the website. We reserve the right to modify or clarify this policy as needed. Notably, you may not, under any circumstances, look at another student's/group's code or write pseudocode with another group.

Contacting Course Staff

For all course-related questions, please email cs003@caltech.edu. If there is something particularly sensitive that you would rather only the instructors see, you can email Adam and Jedi directly.