This is CS50

Harvard College (https://www.college.harvard.edu/)

Spring 2022

Syllabus

Instructor

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Description

Introduction to the intellectual enterprises of computer science and the art of programming. This course teaches students how to think algorithmically and solve problems efficiently. Topics include abstraction, algorithms, data structures, encapsulation, resource management, security, software engineering, and web programming. Languages include C, Python, and SQL plus HTML, CSS, and JavaScript. Problem sets inspired by the arts, humanities, social sciences, and sciences. Course culminates in a final project. Designed for concentrators and non-concentrators alike, with or without prior programming experience. Two thirds of CS50 students have never taken CS before. Among the overarching goals of this course are to inspire students to explore unfamiliar waters, without fear of failure, create an intensive, shared experience, accessible to all students, and build community among students.

Notes

This spring version of CS50 is for undergraduate SEAS concentrators who were unable to take the course in Fall 2021. All students, including concentrators and non-concentrators, are encouraged to take CS50 in fall term instead. See cs50.harvard.edu/spring (https://cs50.harvard.edu/spring) for differences between fall term and spring term. Students must register for and attend weekly class meetings either on Tuesdays, 3:45pm–6:30pm in Allston, or Wednesdays, 9am–11:45am in Cambridge. (Not both.) Instructor-led tutorials to be arranged. CS50 is ordinarily graded SAT/UNS, though students whose concentration requires letter grades should change their grading status to letter-graded by the term’s fifth Monday. Students may take CS50 SAT/UNS to fulfill the Science and Engineering and Applied Science distribution requirement or the Quantitative Reasoning with Data requirement, but not both. First years may take both CS50 and a freshman seminar SAT/UNS.

Expectations

You are expected to

- watch eleven lectures,
- attend eleven sections,
- complete eight labs,
- solve ten problem sets,
- take nine quizzes,
- take one test, and
- design and implement a final project.

Learning Objectives

Among the overarching goals for students individually in this course is that they learn something that we haven't taught them, as is manifest at term's end by so many students' final projects that use languages, libraries, tools, and techniques not taught in the course. Along the way will students learn to

- think more methodically;
- program procedurally;
- represent and process information;
- communicate succinctly and precisely;
- solve problems efficiently;
- recognize patterns among problems;
- decompose problems into parts and compose solutions thereto;
- operate at multiple levels of abstraction;
- separate design from implementation details;
- infer from first principles how systems work;
- assess the correctness, design, and style of code;
- teach themselves new languages;
- identify threats to privacy and security;
- read documentation, drawing conclusions from specifications;
- test solutions to problems, find faults, and identify corner cases;
- describe symptoms of problems precisely and ask questions clearly; and
- identify and quantify tradeoffs among resources, particularly time and space.

Ultimately, the course provides students with a foundation for further studies in computer science and empowers students to apply computer science to problems in other domains.

Grades

CS50 is ordinarily graded Satisfactory/Unsatisfactory (SAT/UNS), much like freshman seminars and some tutorials, though students whose (potential) concentration requires letter grades should change their grading status to letter-graded via my.harvard (https://my.harvard.edu/) by the term's fifth Monday. Even though first years may not ordinarily enroll in both a Freshman Seminar and another non-letter-graded course in any one term, they may take both CS50 and a Freshman Seminar SAT/UNS.

Whether taking the course SAT/UNS or for a letter grade, you must still meet all expectations in order to be eligible for a satisfactory grade unless granted an exception in writing by the course's heads.

Final grades are determined using the following weights:

Problem Sets	40%
Quizzes	10%
Labs	10%
Test	20%

Final Project	10%
Attendance*	10%

* At sections.

Problem sets and the final project are evaluated along axes of correctness, design, and style, with scores ordinarily computed as 3 × correctness + 2 × design + 1 × style. Scores are normalized across teaching fellows and comfort levels at term's end, so mid-semester comparisons among students of scores are not reliable indicators of standing.

Know that CS50 draws quite the spectrum of students, including "those less comfortable," "those more comfortable," and those somewhere in between. However, what ultimately matters in this course is not so much where you end up relative to your classmates but where you end up relative to yourself when you began.

Each student's final grade is individually determined at term's end. Remarkable effort and upward trending are considered, as is input from the teaching fellows. The course does not have pre-determined cutoffs for final grades. The course is not graded on a curve. Those less comfortable and somewhere in between are not at a disadvantage vis-à-vis those more comfortable.

Books

No books are required or recommended for this course.

Lectures

This spring version of CS50 does not have live lectures. Rather, you are expected to watch each week's lecture, produced in Fall 2021, on video before each week's class. Lectures, other than the first, are typically posted around noon ET on Fridays.

Week	**Week 0**
Lecture	Scratch
Date	Tue, Jan 25, 1:00 AM (https://time.cs50.io/2022-01-24T12:00:00-05:00)
Week	**Week 1**
Lecture	C
Date	Sat, Jan 29, 1:00 AM (https://time.cs50.io/2022-01-28T12:00:00-05:00)
Week	**Week 2**
Lecture	Arrays
Date	Sat, Feb 5, 1:00 AM (https://time.cs50.io/2022-02-04T12:00:00-05:00)
Week	**Week 3**
Lecture	Algorithms
Date	Sat, Feb 12, 1:00 AM (https://time.cs50.io/2022-02-11T12:00:00-05:00)
Week	**Week 4**
Lecture	Memory
Date	Sat, Feb 19, 1:00 AM (https://time.cs50.io/2022-02-18T12:00:00-05:00)
Week	**Week 5**
Lecture	Data Structures
Date	Sat, Feb 26, 1:00 AM (https://time.cs50.io/2022-02-25T12:00:00-05:00)
Week	**Week 6**
Lecture	Python
Date	Sat, Mar 5, 1:00 AM (https://time.cs50.io/2022-03-04T12:00:00-05:00)
Week	**Week 7**
Lecture	SQL
Date	Sat, Mar 19, 12:00 AM (https://time.cs50.io/2022-03-18T12:00:00-04:00)
Week	**Week 8**
Lecture	HTML, CSS, JavaScript
Date	Sat, Mar 26, 12:00 AM (https://time.cs50.io/2022-03-25T12:00:00-04:00)

Week	**Week 9**
Lecture	Flask
Date	Sat, Apr 2, 12:00 AM (https://time.cs50.io/2022-04-01T12:00:00-04:00)
Week	**Week 10**
Lecture	Emoji
Date	Sat, Apr 9, 12:00 AM (https://time.cs50.io/2022-04-08T12:00:00-04:00)

Classes

Lectures are supplemented by weekly, 2-hour classes led by the course's preceptor. Attendance at one of the two weekly classes is expected each week. Classes on Tuesdays are in **SEC LL2.229** at 150 Western Ave (https://goo.gl/maps/9kDayCjp37EZ9Y2p7). Classes on Wednesdays are in **Pierce Hall 301** at 29 Oxford St (https://goo.gl/maps/KWnUCLVq4ypMb5mW7).

Week	**Week 0**
Topic	Scratch
Date	Wed, Jan 26, 4:45 AM – 7:30 AM (https://time.cs50.io/2022-01-25T15:45:00-05:00/2022-01-25T18:30:00-05:00) Wed, Jan 26, 10:00 PM – Thu, Jan 27, 12:45 AM (https://time.cs50.io/2022-01-26T09:00:00-05:00/2022-01-26T11:45:00-05:00)
Week	**Week 1**
Topic	C
Date	Wed, Feb 2, 4:45 AM – 7:30 AM (https://time.cs50.io/2022-02-01T15:45:00-05:00/2022-02-01T18:30:00-05:00) Wed, Feb 2, 10:00 PM – Thu, Feb 3, 12:45 AM (https://time.cs50.io/2022-02-02T09:00:00-05:00/2022-02-02T11:45:00-05:00)
Week	**Week 2**
Topic	Arrays
Date	Wed, Feb 9, 4:45 AM – 7:30 AM (https://time.cs50.io/2022-02-08T15:45:00-05:00/2022-02-08T18:30:00-05:00) Wed, Feb 9, 10:00 PM – Thu, Feb 10, 12:45 AM (https://time.cs50.io/2022-02-09T09:00:00-05:00/2022-02-09T11:45:00-05:00)
Week	**Week 3**
Topic	Algorithms
Date	Wed, Feb 16, 4:45 AM – 7:30 AM (https://time.cs50.io/2022-02-15T15:45:00-05:00/2022-02-15T18:30:00-05:00) Wed, Feb 16, 10:00 PM – Thu, Feb 17, 12:45 AM (https://time.cs50.io/2022-02-16T09:00:00-05:00/2022-02-16T11:45:00-05:00)
Week	**Week 4**
Topic	Memory
Date	Wed, Feb 23, 4:45 AM – 7:30 AM (https://time.cs50.io/2022-02-22T15:45:00-05:00/2022-02-22T18:30:00-05:00) Wed, Feb 23, 10:00 PM – Thu, Feb 24, 12:45 AM (https://time.cs50.io/2022-02-23T09:00:00-05:00/2022-02-23T11:45:00-05:00)
Week	**Week 5**
Topic	Data Structures
Date	Wed, Mar 2, 4:45 AM – 7:30 AM (https://time.cs50.io/2022-03-01T15:45:00-05:00/2022-03-01T18:30:00-05:00) Wed, Mar 2, 10:00 PM – Thu, Mar 3, 12:45 AM (https://time.cs50.io/2022-03-02T09:00:00-05:00/2022-03-02T11:45:00-05:00)
Week	**Week 6**
Topic	Python
Date	Wed, Mar 9, 4:45 AM – 7:30 AM (https://time.cs50.io/2022-03-08T15:45:00-05:00/2022-03-08T18:30:00-05:00) Wed, Mar 9, 10:00 PM – Thu, Mar 10, 12:45 AM (https://time.cs50.io/2022-03-09T09:00:00-05:00/2022-03-09T11:45:00-05:00)

Week	**Week 7**
Topic	SQL
Date	Wed, Mar 23, 3:45 AM – 6:30 AM (https://time.cs50.io/2022-03-22T15:45:00-04:00/2022-03-22T18:30:00-04:00) Wed, Mar 23, 9:00 PM – 11:45 PM (https://time.cs50.io/2022-03-23T09:00:00-04:00/2022-03-23T11:45:00-04:00)
Week	**Week 8**
Topic	HTML, CSS, JavaScript
Date	Wed, Mar 30, 3:45 AM – 6:30 AM (https://time.cs50.io/2022-03-29T15:45:00-04:00/2022-03-29T18:30:00-04:00) Wed, Mar 30, 9:00 PM – 11:45 PM (https://time.cs50.io/2022-03-30T09:00:00-04:00/2022-03-30T11:45:00-04:00)
Week	**Week 9**
Topic	Flask
Date	Wed, Apr 6, 3:45 AM – 6:30 AM (https://time.cs50.io/2022-04-05T15:45:00-04:00/2022-04-05T18:30:00-04:00) Wed, Apr 6, 9:00 PM – 11:45 PM (https://time.cs50.io/2022-04-06T09:00:00-04:00/2022-04-06T11:45:00-04:00)
Week	**Week 10**
Topic	Ethics
Date	Wed, Apr 13, 3:45 AM – 6:30 AM (https://time.cs50.io/2022-04-12T15:45:00-04:00/2022-04-12T18:30:00-04:00) Wed, Apr 13, 10:00 PM – 11:45 PM (https://time.cs50.io/2022-04-13T10:00:00-04:00/2022-04-13T11:45:00-04:00)

Labs

Labs are programming exercises in sections that prepare you for the week's problem set.

Lab	**Lab 1**
Release	Tue, Feb 1, 1:00 AM (https://time.cs50.io/2022-01-31T12:00:00-05:00)
Deadline	N/A, practice exercise only
Lab	**Lab 2**
Release	Tue, Feb 8, 1:00 AM (https://time.cs50.io/2022-02-07T12:00:00-05:00)
Deadline	Fri, Feb 11, 12:59 PM (https://time.cs50.io/2022-02-10T23:59:00-05:00)
Lab	**Lab 3**
Release	Tue, Feb 15, 1:00 AM (https://time.cs50.io/2022-02-14T12:00:00-05:00)
Deadline	Fri, Feb 18, 12:59 PM (https://time.cs50.io/2022-02-17T23:59:00-05:00)
Lab	**Lab 4**
Release	Tue, Feb 22, 1:00 AM (https://time.cs50.io/2022-02-21T12:00:00-05:00)
Deadline	Fri, Feb 25, 12:59 PM (https://time.cs50.io/2022-02-24T23:59:00-05:00)
Lab	**Lab 5**
Release	Tue, Mar 1, 1:00 AM (https://time.cs50.io/2022-02-28T12:00:00-05:00)
Deadline	Fri, Mar 4, 12:59 PM (https://time.cs50.io/2022-03-03T23:59:00-05:00)
Lab	**Lab 6**
Release	Tue, Mar 8, 1:00 AM (https://time.cs50.io/2022-03-07T12:00:00-05:00)
Deadline	Fri, Mar 11, 12:59 PM (https://time.cs50.io/2022-03-10T23:59:00-05:00)
Lab	**Lab 7**
Release	Tue, Mar 22, 12:00 AM (https://time.cs50.io/2022-03-21T12:00:00-04:00)
Deadline	Fri, Mar 25, 11:59 AM (https://time.cs50.io/2022-03-24T23:59:00-04:00)
Lab	**Lab 8**
Release	Tue, Mar 29, 12:00 AM (https://time.cs50.io/2022-03-28T12:00:00-04:00)
Deadline	Fri, Apr 1, 11:59 AM (https://time.cs50.io/2022-03-31T23:59:00-04:00)

Lab	**Lab 9**
Release	Tue, Apr 5, 12:00 AM (https://time.cs50.io/2022-04-04T12:00:00-04:00)
Deadline	Fri, Apr 8, 11:59 AM (https://time.cs50.io/2022-04-07T23:59:00-04:00)

Tutorials

Sections are supplemented by tutorials, opportunities for help with problem sets by appointment, an amalgam of tutoring and office hours led by the course's teaching fellows and course assistants.

Attendance at tutorials is optional.

Problem Sets

Problem sets are programming assignments that allow you to implement each week's concepts in code.

Problem Set	**Problem Set 0**
Language	Scratch
Release	Tue, Jan 25, 1:00 AM (https://time.cs50.io/2022-01-24T12:00:00-05:00)
Deadline	Mon, Jan 31, 12:59 PM (https://time.cs50.io/2022-01-30T23:59:00-05:00)
Problem Set	**Problem Set 1**
Language	C
Release	Tue, Feb 1, 1:00 AM (https://time.cs50.io/2022-01-31T12:00:00-05:00)
Deadline	Mon, Feb 7, 12:59 PM (https://time.cs50.io/2022-02-06T23:59:00-05:00)
Problem Set	**Problem Set 2**
Language	C
Release	Tue, Feb 8, 1:00 AM (https://time.cs50.io/2022-02-07T12:00:00-05:00)
Deadline	Mon, Feb 14, 12:59 PM (https://time.cs50.io/2022-02-13T23:59:00-05:00)
Problem Set	**Problem Set 3**
Language	C
Release	Tue, Feb 15, 1:00 AM (https://time.cs50.io/2022-02-14T12:00:00-05:00)
Deadline	Mon, Feb 21, 12:59 PM (https://time.cs50.io/2022-02-20T23:59:00-05:00)
Problem Set	**Problem Set 4**
Language	C
Release	Tue, Feb 22, 1:00 AM (https://time.cs50.io/2022-02-21T12:00:00-05:00)
Deadline	Mon, Feb 28, 12:59 PM (https://time.cs50.io/2022-02-27T23:59:00-05:00)
Problem Set	**Problem Set 5**
Language	C
Release	Tue, Mar 1, 1:00 AM (https://time.cs50.io/2022-02-28T12:00:00-05:00)
Deadline	Mon, Mar 7, 12:59 PM (https://time.cs50.io/2022-03-06T23:59:00-05:00)
Problem Set	**Problem Set 6**
Language	Python
Release	Tue, Mar 8, 1:00 AM (https://time.cs50.io/2022-03-07T12:00:00-05:00)
Deadline	Mon, Mar 14, 11:59 AM (https://time.cs50.io/2022-03-13T23:59:00-04:00)
Problem Set	**Problem Set 7**
Language	SQL
Release	Tue, Mar 22, 12:00 AM (https://time.cs50.io/2022-03-21T12:00:00-04:00)
Deadline	Mon, Mar 28, 11:59 AM (https://time.cs50.io/2022-03-27T23:59:00-04:00)
Problem Set	**Problem Set 8**
Language	HTML, CSS, JavaScript
Release	Tue, Mar 29, 12:00 AM (https://time.cs50.io/2022-03-28T12:00:00-04:00)
Deadline	Mon, Apr 4, 11:59 AM (https://time.cs50.io/2022-04-03T23:59:00-04:00)
Problem Set	**Problem Set 9**
Language	Python, SQL, HTML, CSS, JavaScript
Release	Tue, Apr 5, 12:00 AM (https://time.cs50.io/2022-04-04T12:00:00-04:00)

Deadline	Mon, Apr 11, 11:59 AM (https://time.cs50.io/2022-04-10T23:59:00-04:00)

Quizzes

Quizzes are short checks for understanding due after lectures. The intent of each quiz is to help you apply each week's concepts to new problems. Each quiz is open-book: you may use any and all non-human resources during a quiz, but the only humans to whom you may turn for help or from whom you may receive help are the course's heads. Quizzes are released at the start of lecture so that you can work on them as a concurrent guide to the lecture's concepts and as a reflection on what you've learned from the lecture.

Quiz	**Quiz 1**
Release	Sat, Jan 29, 1:00 AM (https://time.cs50.io/2022-01-28T12:00:00-05:00)
Deadline	Wed, Feb 2, 12:59 PM (https://time.cs50.io/2022-02-01T23:59:00-05:00)
Quiz	**Quiz 2**
Release	Sat, Feb 5, 1:00 AM (https://time.cs50.io/2022-02-04T12:00:00-05:00)
Deadline	Wed, Feb 9, 12:59 PM (https://time.cs50.io/2022-02-08T23:59:00-05:00)
Quiz	**Quiz 3**
Release	Sat, Feb 12, 1:00 AM (https://time.cs50.io/2022-02-11T12:00:00-05:00)
Deadline	Wed, Feb 16, 12:59 PM (https://time.cs50.io/2022-02-15T23:59:00-05:00)
Quiz	**Quiz 4**
Release	Sat, Feb 19, 1:00 AM (https://time.cs50.io/2022-02-18T12:00:00-05:00)
Deadline	Wed, Feb 23, 12:59 PM (https://time.cs50.io/2022-02-22T23:59:00-05:00)
Quiz	**Quiz 5**
Release	Sat, Feb 26, 1:00 AM (https://time.cs50.io/2022-02-25T12:00:00-05:00)
Deadline	Wed, Mar 2, 12:59 PM (https://time.cs50.io/2022-03-01T23:59:00-05:00)
Quiz	**Quiz 6**
Release	Sat, Mar 5, 1:00 AM (https://time.cs50.io/2022-03-04T12:00:00-05:00)
Deadline	Wed, Mar 9, 12:59 AM (https://time.cs50.io/2022-03-08T11:59:00-05:00)
Quiz	**Quiz 7**
Release	Sat, Mar 19, 12:00 AM (https://time.cs50.io/2022-03-18T12:00:00-04:00)
Deadline	Tue, Mar 22, 11:59 PM (https://time.cs50.io/2022-03-22T11:59:00-04:00)
Quiz	**Quiz 8**
Release	Sat, Mar 26, 12:00 AM (https://time.cs50.io/2022-03-25T12:00:00-04:00)
Deadline	Tue, Mar 29, 11:59 PM (https://time.cs50.io/2022-03-29T11:59:00-04:00)
Quiz	**Quiz 9**
Release	Sat, Apr 2, 12:00 AM (https://time.cs50.io/2022-04-01T12:00:00-04:00)
Deadline	Tue, Apr 5, 11:59 PM (https://time.cs50.io/2022-04-05T11:59:00-04:00)

Test

The test is opportunity to synthesize concepts across weeks and solve new problems based on lessons learned. The test is open-book: you may use any and all non-human resources during the test, but the only humans to whom you may turn for help or from whom you may receive help are the course's heads.

Release	**Thu, Apr 14, 12:00 AM (https://time.cs50.io/2022-04-13T12:00:00-04:00)**
Deadline	Mon, Apr 18, 11:59 AM (https://time.cs50.io/2022-04-17T23:59:00-04:00)

Final Project

The climax of this course is its final project. The final project is your opportunity to take your newfound savvy with programming out for a spin and develop your very own piece of software. So long as your project draws upon this course's lessons, the nature of your project is entirely up to you, albeit subject to the staff's approval. You may implement your project in any language(s) as long as the staff approves. You are welcome to utilize any infrastructure, provided the staff ultimately has access to any hardware and software that your project requires. All that we ask is that you build something of interest to you, that you solve an actual problem, that you impact campus, or that you

change the world. Strive to create something that outlives this course.

Inasmuch as software development is rarely a one-person effort, you are allowed an opportunity to collaborate with one or two classmates for this final project. Needless to say, it is expected that every student in any such group contribute equally to the design and implementation of that group's project. Moreover, it is expected that the scope of a two- or three-person group's project be, respectively, twice or thrice that of a typical one-person project. A one-person project, mind you, should entail more time and effort than is required by each of the course's problem sets. Although no more than three students may design and implement a given project, you are welcome to solicit advice from others, so long as you respect the course's policy on academic honesty.

Milestone **Deadline**	**Proposal** Mon, Apr 11, 11:59 AM (https://time.cs50.io/2022-04-10T23:59:00-04:00)
Milestone **Deadline**	**Status Report** Mon, May 2, 11:59 AM (https://time.cs50.io/2022-05-01T23:59:00-04:00)
Milestone **Deadline**	**Implementation** Mon, May 9, 11:59 AM (https://time.cs50.io/2022-05-08T23:59:00-04:00)

Lateness

Late submissions of quizzes and problem sets will be penalized at a rate of 0.1% per minute:

- If you submit 10 minutes late, your score will be penalized 1%. Your score will thus be 99% of what it would have been if submitted on time.
- If you submit 60 minutes late, your score will be penalized 6%. Your score will thus be 94% of what it would have been if submitted on time.
- If you submit 1,000 minutes (16 hours and 40 minutes) late, your score will be penalized 100%. Your score will thus be a zero.

Late submissions of the test incur *double* the regular penalty, 0.2% per minute. Late submissions of any of the final project's milestones are not accepted.

However, you may grant yourself one 3-day (72-hour) extension during the term for any one **problem set**. That extension cannot be apportioned among multiple problem sets or be applied to quizzes, the test, or the final project's milestones. To grant yourself this extension, submit this form (https://forms.cs50.io/79d6b492-6511-46b9-981a-7b956feb0966) by the problem set's deadline.

No exceptions to this policy will be considered unless requested of the course by your resident dean (or if you add the course late).

Mental Health

If you experience significant stress or worry, changes in mood, or problems eating or sleeping this semester, whether because of CS50 or other courses or factors, please do not hesitate to reach out immediately, at any hour, to any of the course's heads to discuss. Everyone can benefit from support during challenging times. Not only are we happy to listen and make accommodations with deadlines as needed, we can also refer you to additional support structures on campus, including, but not limited to, the below.

- Counseling and Mental Health Services (https://camhs.huhs.harvard.edu/), 617-495-2042
- Let's Talk (https://camhs.huhs.harvard.edu/lets-talk)
- Room 13 (https://www.hcs.harvard.edu/~room13), 617-495-4969

Academic Honesty

The course's philosophy on academic honesty is best stated as "be reasonable." The course recognizes that interactions with classmates and others can facilitate mastery of the course's material. However, there remains a line between enlisting the help of another and submitting the work of another. This policy characterizes both sides of that line.

The essence of all work that you submit to this course must be your own. Collaboration on problem sets is not permitted except to the extent that you may ask classmates and others for help so long as that help does not reduce to another doing your work for you. Generally speaking, when asking for help, you may show your code to others, but you may not view theirs, so long as you and they respect this policy's other constraints. Collaboration on the course's quizzes and test is not permitted at all. Collaboration on the course's final project is permitted to the extent prescribed by its specification.

Regret clause. If you commit some act that is not reasonable but bring it to the attention of the course's heads within 72 hours, the course may impose local sanctions that may include an unsatisfactory or failing grade for work submitted, but the course will not refer the matter

for further disciplinary action except in cases of repeated acts.

Below are rules of thumb that (inexhaustively) characterize acts that the course considers reasonable and not reasonable. If in doubt as to whether some act is reasonable, do not commit it until you solicit and receive approval in writing from the course's heads. Acts considered not reasonable by the course are handled harshly.

If the course refers some matter for adjudication and the outcome is punitive, the course reserves the right to impose local sanctions on top of that outcome that may include an unsatisfactory or failing grade for work submitted or for the course itself. The course ordinarily recommends exclusion (i.e., required withdrawal) from the course itself.

Reasonable

- Communicating with classmates about problem sets' problems in English (or some other spoken language), and properly citing those discussions.
- Discussing the course's material with others in order to understand it better.
- Helping a classmate identify a bug in their code at office hours, elsewhere, or even online, as by viewing, compiling, or running their code after you have submitted that portion of the pset yourself. Add a citation to your own code of the help you provided and resubmit.
- Incorporating a few lines of code that you find online or elsewhere into your own code, provided that those lines are not themselves solutions to assigned problems and that you cite the lines' origins.
- Reviewing past semesters' tests and quizzes and solutions thereto.
- Sending or showing code that you've written to someone, possibly a classmate, so that he or she might help you identify and fix a bug, provided you properly cite the help.
- Submitting the same or similar work to this course that you have submitted previously to this course, CS50 AP, or CS50x, so long as you disclose as much in your submission, as via comments in your code.
- Turning to the course's heads for help or receiving help from the course's heads during the quizzes or test.
- Turning to the web or elsewhere for instruction beyond the course's own, for references, and for solutions to technical difficulties, but not for outright solutions to problem set's problems or your own final project.
- Whiteboarding solutions to problem sets with others using diagrams or pseudocode but not actual code.
- Working with (and even paying) a tutor to help you with the course, provided the tutor does not do your work for you.

Not Reasonable

- Accessing a solution to some problem prior to its deadline.
- Accessing or attempting to access, without permission, an account not your own.
- Asking a classmate to see their solution to a problem set's problem before its deadline.
- Discovering but failing to disclose to the course's heads bugs in the course's software that affect scores.
- Decompiling, deobfuscating, or disassembling the staff's solutions to problem sets.
- Failing to cite (as with comments) the origins of code or techniques that you discover outside of the course's own lessons and integrate into your own work, even while respecting this policy's other constraints.
- Giving or showing to a classmate a solution to a problem set's problem when it is he or she, and not you, who is struggling to solve it.
- Looking at another individual's work during the quizzes or test.
- Manipulating or attempting to manipulate scores artificially, as by exploiting bugs or formulas in the course's software.
- Paying or offering to pay an individual for work that you may submit as (part of) your own.
- Providing or making available solutions to problem sets to individuals who might take this course in the future.
- Searching for or soliciting outright solutions to problem sets online or elsewhere.
- Splitting a problem set's workload with another individual and combining your work.
- Submitting (after possibly modifying) the work of another individual beyond the few lines allowed herein.
- Submitting the same or similar work to this course that you have submitted or will submit to another.
- Submitting work to this course that you intend to use outside of the course (e.g., for a job) without prior approval from the course's heads.
- Turning to humans (besides the course's heads) for help or receiving help from humans (besides the course's heads) during the quizzes or test.
- Viewing another's solution to a problem set's problem and basing your own solution on it.
- Viewing the solution to a lab before trying to solve it yourself.

Acknowledgement and Authorization

Harvard plans to record audio, photos, and video of Computer Science 50 (CS50) lectures, sections, office hours, seminars, and other events and activities related to CS50 (the "Recordings"), with the aims of making the content of the course more widely available and contributing to public understanding of innovative learning (the "Projects"). As part of the Projects, the Recordings, or edited versions of them, may be made available to other Harvard students, to students at other educational institutions, and to the broader public via edX, the Internet, television, theatrical distribution, digital media, or other means. One of the ways it is expected that the Recordings, or edited versions of them, will be made publicly available is under a Creative Commons Attribution-NonCommercial-ShareAlike (CC BY-NC-SA) license. Another example is that Harvard may make and disseminate montages of "memories" from the class with images from the Recordings. The Recordings also may be used to make other derivative works in the future. Students may elect not to appear in photos and video used in the Projects and may still participate fully in CS50.

To attend CS50, you will need to sign online an Acknowledgement and Authorization in the following form:

> I understand and agree that, if I do not wish any photos or video of me to be used as part of the Projects:
>
> - If I am participating in CS50 in a classroom or other course location, I should sit in the designated "no-film" zone of the classroom or location, and should not walk in the field of view of the cameras.
> - If I am participating in CS50 online, I should turn off my own camera and should not display a photo of myself. In addition, if I do not wish my real name to be displayed when I speak and my voice is recorded, I should select a pseudonymous user name in Zoom (or other online service). If I select a pseudonymous user name, I will inform the instructor, so the instructor knows who I am.
>
> I understand that I am free not to be included in the Projects' photos and video in this way, and that this will not affect my grade or my ability to participate in course activities.
>
> Unless I exclude myself from the Projects' photos and video as described above and take any other steps outlined by the instructor to avoid being filmed, I authorize Harvard and its designees to make and use Recordings of my participation in CS50 and activities related to CS50. I understand and agree that the Recordings may include my image, name, and voice. I also understand and agree that, even if I opt out of the Projects' photos and video and choose a pseudonymous user name, my voice will be recorded if I am participating online, and may be picked up by microphones outside the "no-film" zone if I am in a CS50 classroom or other location, and my spoken name also may be included in the Recordings. If the class is online, I may participate instead via chat messages, which will not be included in the Recordings.
>
> I understand and agree that Harvard and its designees will have the irrevocable, worldwide right to make, edit, modify, copy, publish, transmit, distribute, sell, publicly display, publicly perform, and otherwise use and make available the Recordings and any other works that may be derived from those Recordings, in any manner or medium now known or later invented, in connection with the Projects, and to authorize others to do so as well. I hereby transfer to Harvard any rights, including copyrights, I may have in the Recordings that Harvard makes. I will remain free to use and disseminate any ideas, remarks, or other material that I may contribute to course discussions.
>
> I acknowledge and agree that I will not be entitled to any payment, now or in the future, in connection with the Recordings or any works derived from them. This Acknowledgment and Authorization is a binding agreement, and is signed as a document under seal governed by the laws of the Commonwealth of Massachusetts.

Unless you exclude yourself as described in the Acknowledgment and Authorization, you are agreeing, by attending CS50, that your participation in CS50 and related activities may be recorded and used by Harvard in connection with the Projects without further obligation or liability to you, even if you do not sign any authorization.

If you have any questions about the above, contact recordings@cs50.harvard.edu.