Course Information

Course Overview Welcome to CS103! CS103 is a first course in discrete math, computability theory, and complexity theory. In this course, we'll find the limits of what problems can be solved by computers, explore why some problems are harder to solve than others, and see how to reason with mathematical certainty. We'll start off at square one by seeing how to write a mathematical proof and will end at the frontiers of theoretical computer science. By the time you've completed the course, you'll be comfortable writing mathematical proofs, working with discrete structures, designing finite automata and regular expressions, writing context-free grammars, reducing problems to one another, proving problems are impossible to solve with computers, and exploring $\mathbf{P} \stackrel{?}{=} \mathbf{NP}$.

Instructor

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TAs

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Website The course website is cs103.stanford.edu and it's loaded with resources for this course. There, you'll find all the handouts for this course, lecture slides, and additional links that you may find useful. I would suggest periodically polling the website to stay abreast of any important developments in the course.

Email The course staff can be reached at cs103-aut1314-staff@lists.stanford.edu. Please don't hesitate to send us emails! We're here because we genuinely love this material and want to share it with you. If you have any questions on the material, or if you're interested in exploring more advanced content, please get in touch with us. We'd be happy to help out.

Lectures Mondays, Wednesdays, and Fridays, 2:15PM – 3:30PM in Gates B01. Unfortunately, enrollment is currently much, much larger than the room capacity and we cannot guarantee everyone a seat. We will try to find a resolution to this as soon as possible.

Lectures will also be recored and posted online at the SCPD website, which is accessible to anyone with a Stanford ID. We'll have a link to the videos up on the course website.

Units If you are an undergraduate, you should be enrolled for five units. If you are a graduate student, you may enroll for anywhere between three and five units, depending on what best fits into your schedule. Regardless of how many units you are enrolled for, the course content and requirements will be the same. The unit flexibility is simply to make it easier for graduate students to enroll without exceeding unit caps.

Prerequisites

This course has CS106A formally listed as a prerequisite because we want you to have at least a basic familiarity with computer programming before taking the course; many of the results we'll explore will be intimately connected to computers, computing, and programming. That said, there will be no actual programming assignments in this course and we will not directly reference any material from CS106A in this course. If you have any programming background at all, you're in the right place! If you haven't programmed before, I would suggest dropping by office hours so that we can chat about whether the course is a good fit for you.

Office Hours

The TAs and I each hold four hours of office hours each week, so there will be 52 hours of office hours each week. We'll announce the office hours schedule later this week. Feel free to stop by office hours any time with questions about material from the course, the problem sets, life, etc.

Some of the office hours we will offer will be marked as "recitation sections." Each week, we will distribute a handout containing a small number of problems similar to those on the problem sets. At the recitation sections, the TA will help everyone work through those problems so that you can get a better feel for how to solve them.

Readings

There are online course notes for the first few weeks of material. This online course reader has been expanded since previous quarters, so we hope that it will provide more in-depth coverage of the content from lecture. Since it's is still a work in progress, we will award extra credit for finding typos or other mistakes in the course reader. Please feel free to contact us with corrections of all sorts – logic errors, grammatical issues, formatting problems, etc.

We *recommend* that you pick up a copy of ***Introduction to the Theory of Computation*** by Michael Sipser. Sipser's excellent introduction to computation, computability, and automata theory stands as one of the best textbooks on the subject. You might find this book useful in the second half of the quarter. Some of the readings in the syllabus are taken from this book, but we will not directly test you on any material in Sipser that is not covered as well in lecture or the problem sets. You can use either the Second or Third editions of the book.

Problem Sets

CS103 is designed to teach you the mathematical foundations of computing, along with the techniques necessary to reason about structures that appear throughout computer science. Accordingly, the assignments in this course are designed to give you the chance to play around with the material and sharpen your skills with mathematical proofs, computability theory, and complexity theory. There will be **nine** homework assignments this quarter, each of which is weighted roughly evenly (the first and last assignments will be weighted slightly less.)

We will split some of the problem sets into two pieces – a set of "checkpoint" problems and a set of graded problems. You will submit the checkpoint portion of the problem set earlier than the rest of the problem set, and it will be graded on whether or not you have made a good honest effort to solve the problems, rather than on correctness. The TAs will then comment on the structure of the proofs in your checkpoint submission (looking at clarity, correctness, etc.) and return your solutions within a few days. We hope that this feedback will enable you to write better proofs for the remainder of the problem set, which will be graded on correctness.

Grading

In addition to the problem sets, there will be a midterm and a final exam. The midterm exam will be held on **Tuesday, October 29** from **7:00PM – 10:00PM**, location TBA. The final exam will be held on **Monday, December 9** from **12:15PM – 3:15PM**, location TBA. (We're really sorry about the final exam date – it's set by the registrar and we don't have any control over it.) If you have a conflict that will prevent you from taking an exam, we'd be happy to try to find an alternate time, but you must let us know no later than **one week** in advance so that we have time to reserve additional rooms. As a policy, all alternate exam times will be scheduled for earlier than the normal exam time.

Overall, your grade for this course will be determined as

Problem Sets:	**60%**
Midterm:	**15%**
Final Exam:	**25%**

Your grade in this course is determined purely by the above formula, though we do curve final grades in the course. Unlike some other courses, we don't drop the lowest problem set score, since the work in this course builds off of itself. We do not offer "make-up" work that you can use to increase your grade if you perform poorly on the problem sets or exams, though we will have extra credit problems on each of the problem sets.

Late Policy

Every student in CS103 has **three** free "late periods." Each late period grants one class period extension on a problem set, and you can use at most one late period per problem set. More details are available in the forthcoming "Problem Set Policies" handout. Because the final exam occurs the first Monday after classes end, the last assignment must be turned in at the stated due date and no late submissions will be accepted. This will allow us to release solutions so that you can consult them before the final exam.

Regrades

If we've made an error grading your problem set, you're welcome to ask us to regrade it. Details about our procedures for regrades are available in the forthcoming "Problem Set Policies" handout.

Honor Code

In past offerings of CS103 there have been an unfortunately large number of cases of plagiarism on problem sets. We take the Stanford Honor Code very seriously in this course and will pursue any infractions. Details about our Honor Code procedures are described in the upcoming handout "CS103 and the Stanford Honor Code," which we'll release along with the first problem set.

Incomplete Policy

If you have a serious medical or family emergency and cannot complete the work in this course, you may contact Keith to arrange for an incomplete. Our policy is to reserve incompletes only for emergencies, so we do not grant incomplete grades for poor performance on the assignments or exams, nor do we offer incompletes for busy work schedules.