

# UCSB CMPSC 40 Syllabus, Summer 2024: Foundations of Computer Science

## About CS40

CS 40 introduces the essential mathematical background necessary for computer science, starting with logical reasoning to a number of basic constructs of discrete mathematics required to succeed in more advanced course in the curriculum. It is a 5 unit course instead of the usual 4, and as such requires more study time and commitment. CS40 is a prereq for CS130A, CS138, CS178. Prereqs for this course are: CS16 and Math 4A

## Course Format

The lectures and sections for this course will be in person. The assignments that you will complete in sections are designed for group work. Although you have the option of working alone, we encourage you to work in a group on collaborative assignments. If you are working in a group, section attendance is required. Refer to the weekly pattern posted on Gauchospace for more information on the course components and assignment schedule.

## Textbook

The required textbook for this course is “CMPSC40: Discrete Mathematics”, an online interactive textbook. Instructions for subscribing for the book are posted on the class website in Gauchospace.

The reference textbook is “Discrete Mathematics and its Applications, Kenneth Rosen, McGraw Hill, 7th edition.” You do not need to purchase this book, however, you may see specific sections of this book cited on the slides and handouts

During the synchronous lectures, we will use iclicker cloud. UCSB has a campus license, so this will be a free service. Instructions on creating an account are on the class website in Gauchospace.

## Learning goals

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

- Describe and trace simple algorithms using English and pseudocode.
- Define and use classical algorithms and algorithmic paradigms e.g. Euclidean algorithm and divide and conquer algorithms.
- Understand the logical structure and meaning of a sentence expressing a property, fact, or specification.
- Reason about the truth or falsity of complicated statements using Boolean connectives, quantifiers, and basic definitions.
- Relate propositional logic to solving logic puzzles and other applications
- Prove propositional equivalences and use normal forms.
- Apply proof techniques, including direct proofs and proofs by contradiction.
- Distinguish valid from invalid arguments. Craft proofs and arguments at different levels of formality, including prose and symbolic notation as appropriate.
- Reason about modular arithmetic.
- Use mathematical induction to prove statements about mathematical identities and inequalities.
- Apply structural induction to prove statements about recursively defined objects, e.g. strings and trees.
- Identify and be able to prove basic properties of sets, functions, and relations.
- Distinguish between finite, countable, and uncountable sets.
- Solve problems related to basic counting

## Typesetting (LaTeX) Resources

All submitted homework for this class must be typed. Diagrams may be hand-drawn and scanned and included in the typed document. You can use a word processing editor if you like (Microsoft Word, Open Office, Notepad, Vim, Google Docs, etc.) but you might find it useful to take this opportunity to learn LaTeX. LaTeX is a markup language used widely in computer science and mathematics. The homework assignments are typed using LaTeX and you can use the source files as templates for typesetting your solutions.

If you have never used LaTeX, we recommend cloud resources (e.g. Overleaf: <https://www.overleaf.com>) that don't require you to download and install LaTeX on your local machine. In particular, Overleaf has great collaboration functionality if you choose to work with a group.

Cheat sheet of math symbols used in LaTeX is available at this link:

<http://tug.ctan.org/info/undergradmath/undergradmath.pdf>

## Grading and academic integrity

Grades in this class are designed to reflect your work and to document evidence of your learning this core material. By working together to explore the CS 40 material with integrity, we can each help ensure a fair and interesting quarter of building the foundations needed for your continued development in Computer Science.

The graded components for CS 40 will be Zybook activities, collaborative and individual homeworks, quizzes, and a final exam. Your overall grade for CS 40 will be computed using the weights

- Zybook activities (completed individually): 15% of overall score.
- Homeworks: 35%. No makeups but the homework with the least points will be dropped.
- Quizzes: 15% of overall score. No makeups but the quiz with the least points will be dropped.
- Final Exam August 6 (Tentative): 35% of overall score. No makeups

Note: There are two types of activities in zyBook: participation and challenge. The “participation activities” are graded for attempt only. The “challenge activities” are graded for correctness. However, you can try them as many times as you like without penalty. They are more like mini autograded homeworks. An orange check mark will appear on the top right corner of the activity after you complete each activity. No late submissions will be accepted.

## Academic Integrity

Please read about actions that are categorized as Academic Dishonesty on the UC Santa Barbara Office of Student Conduct website: <http://studentconduct.sa.ucsb.edu/academic-integrity>

Academic integrity violations will be taken seriously, reported to the campus-wide Office of Student Conduct, and will result in either lowering your grade by a whole grade point or an F in the course. Key facts about academic integrity related to CS 40:

- Use only resources explicitly allowed for each assignment. Resources not affiliated with this quarter's version of the class may use inconsistent notation or definitions. If you need help, please reach out to the instructor, TAs, and tutors.
- Collaborative homeworks may be done with a group of up to 4 students. Do not share written solutions or partial solutions for homework with other students in the class who are not in your group.
- zyBook activities must be completed individually. You may discuss concepts in the book with your group but not the specifics of the activities.
- Individual homeworks must be done only by you with limited guidance from course staff. Do not share written solutions or partial solutions for homework with any other student. Doing so would dilute their learning experience and detract from their success in the class.
- Before and during taking any individual assessment, do not attempt to obtain information about the contents of the exam from students who have already taken it or from any nonauthorized source.
- You may not ask for help from anyone while taking individual assessments since they are intended to reflect your own mastery of the material. In particular, you may not collaborate on quiz/exam questions with other students in the class and you may not post any portion of the quiz/exam on forums where others may assist you.
- After taking an exam or quiz, do not discuss its contents with anyone in the class who has not yet taken it. Do not post information about it or share information about it with others who haven't taken it.

## Policies

### Late Submission

Students are given two wildcards for the course. Each wildcard allows the student to extend *one homework or one zyBook deadline by one week*. The wildcard cannot be used for the last week since the grades are due. To use

a wildcard, make a private post on piazza notifying all the instructors (you needn't provide any explanations). Late submissions without wildcards will not be entertained, so use them wisely.

## **Regrades**

Regrades need to be requested within three days of announcement of grades. The regrade window will be set in Gradescope. In the regrade request, include a brief but detailed explanation of why you think there was an error in the grading. A regrade request may lead to us reviewing the entire assignment and may lead to the score being adjusted up or down depending on any errors found in the original grading. All regrades will be considered once the regrade window closes; thank you in advance for your patience while we carefully look through them.

## **Accommodations for students with disabilities**

Students requesting accommodations for this course due to a disability must provide a current letter issued by the Disabled Students Program (DSP). Please use the DSP Student Portal as early in the quarter as possible to facilitate timely accommodations. For more information, see this url: <https://dsp.ext-prod.sa.ucsb.edu/>.

## **Class material and intellectual property**

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