

Project Guidelines

Key points

- Deadline:* 11:59pm, Dec 8
Format: 6 pages, 11pt font, 1in margins, typed in LaTeX
Collaboration: At most one teammate

Overview

The final project is an in-depth study of a topic in to complexity theory. There are two main types of projects:

- *Original research:* An attempt to make a novel research contribution in complexity theory. The contribution does not necessarily have to be of publishable quality. The project can consist of minor improvements to existing work or even of failed attempts.
- *Survey paper:* A high-level survey of an area or an in-depth survey of a particular theorem or result. Your goal should be to “add value” to the source material that you’re drawing from—for example, focusing on a topic area that hasn’t been covered before or giving a cleaner exposition of a proof than currently exists. Generally speaking, you should focus on a deeper understanding of a few papers/results rather than a shallow understanding of many papers/results.

Some mix of research and survey is also allowed.

Evaluation

Your write-up will be graded on the first 6 pages. You are welcome to submit more than 6 pages if you like, but I may not read them. References do not count towards your page count. The grading for the assignment will be based on the following criteria:

- *Quality of work:* How much value does the work add to the source material? To be clear, you do not have to do something exceptionally novel to score well here. A reasonable way to gauge your success here is to consider if a fellow student in CSE 200 would find your work interesting and better than reading from another source.
- *Technical Precision:* Does your work have sufficient technical depth? While the survey can certainly be an opportunity to take a high-level view of a topic, you should at some point grapple with the technical details. Including proofs and proof sketches are a good way of satisfying this requirement.
- *Quality of writing:* Have you presented your work in a clear and understandable way? This includes the clarity of individual sentences as well as the overall structure of the writing. This should not be considered any less important than the other two criteria.

Picking a project topic

A good strategy for a survey paper is to start with a general question and then show how to address that question using results from a few papers. It's even better if you identify new open problems whose answers would make even more progress on the question.

Here are some ideas for selecting a project:

- Combine your own research with something in complexity theory
- Take a concept we've explored in this class and look at it in greater depth
- Look at the papers that have appeared in recent theory conferences:
 - Symposium on Theory of Computing (STOC): [2023](#), [2022](#), ...
 - Symposium on Foundations of Computer Science (FOCS): [2023](#), [2022](#), ...
 - Innovations in Theoretical Computer Science (ITCS): [2023](#), [2022](#), ...
 - Computational Complexity Conference (CCC): [2023](#), [2022](#), ...

Miscellaneous tips

- Make your write-up self-contained. Any references to previous work should be clearly cited, and the results used from those papers should be reintroduced. That is, I should not have to read another paper to read your paper.
- Avoid significant blocks of text that reiterate basics from the class. You can assume I know that material relatively well. Focus on things not covered in class.

A note on academic integrity

You may use any resource/material you like to do the research/investigation part of your project. However, referenced material should be properly cited, and *the entire submitted manuscript should be written in your own words*. Plagiarizing/copying text from other sources (both human and AI) will result in a grade of 0 for the project.