

Course Project Guidelines

Note 1. This is a new course, and so precise details of the grading breakdown and checkpoint format are subject to change. In case any changes are made, this document will be updated and an announcement will be made in class and by email.

Note 2. This document assumes the reader has familiarized themselves with course policy, and in particular understands the concept of “engagement points” and “interactive follow-up.”

Summary

The goal of the course project is for you to “roleplay” a real-world problem-solver using the skills taught in the course, concluding in a proposal for how to solve a problem of your choice. Once you pick your problem, it will be evaluated from the perspective of a hypothetical “client” who is considering your proposal among many competing proposals. Your job is to convince the “client” of the strength of your proposal.

The “client” is not a mathematician – they are (for example) the president of a school board, professional society, or wing of an NGO. Part of your proposal will need to convince them that you understand the problem well, part will need to convince them that a mathematical approach is worthwhile, and part will need to convince them that your overall solution is strong. But, the “client” is detail-oriented – they expect to actually understand the important details of your proposal and how it differs from a hypothetical competing proposal. Your final output is a concrete proposal, not an implementation.

The lectures will give you several examples of this done well, but your project will be narrower in scope (and, your project will only be a concrete proposal, whereas the examples from lecture have also already been executed).

Project Components and Estimated Timeline

The components and timeline below are estimated, and subject to minor or moderate changes. The project will be broken down into two components, which you can think of roughly as a “midterm” and a “final”.

Thorough Background.

- **Brief Summary.** Pick a problem and a hypothetical “client.” Deeply understand the many “real-world” components that you’ll have to consider. Make a convincing argument that the course methodology is appropriate for this problem.
- **Estimated Format.** A detailed written document (≈ 5 pages) and interactive follow-up.
- **Estimated Due Date.** Written document: shortly after Fall Break. Interactive follow-up: 1-2 weeks after written document is due.
- **Estimated Grading Breakdown.** Written document: 15%, interactive follow-up: 25%.

Proposed Solution.

- **Brief Summary.** Propose a concrete, detailed solution to the proposed problem. Make a convincing (rigorous, logical, detail-oriented) argument to the hypothetical “client” that your proposal is a good solution to the problem.
- **Estimated Format.** A detailed written document ($\approx$ 5-10 pages) and interactive follow-up.
- **Estimated Due Date.** Written document: first week of December. Interactive follow-up: reading period.¹
- **Estimated Grading Breakdown.** Written document: 20%, interactive follow-up: 40%.

Reflection.

- **Summary.** Write a brief reflection on the skills you learned in the course, and how
- **Estimate Format.** A written document ($\approx$ 1-2 pages).
- **Estimated Due Date.** Sunday, December 20, 4pm.
- **Estimated Grading Breakdown.** Engagement points – precise number TBD.

Teams and External Sources

Teams. Each project will be completed by a team of 2-3. Each team will submit a single writeup (co-authored by all team members). *Each interactive follow-up will be an individual assessment.*²

External Sources. To simulate a “real-world” assessment, you are permitted to use *any external sources and tools* (including generative AI) you like for the writeups, as well as any preparation for the interactive follow-up. *Please still note that University (and course) policy requires that you acknowledge all external sources and tools used.*³ The interactive follow-up is a live in-person assessment, and therefore you are (obviously) *not permitted* to use any tools or external sources during the interactive follow-up.

¹At least two dates will be offered for the interactive follow-up – dean’s date itself will not necessarily be one of the dates.

²That is, if there are 20 students in the course who form 10 teams of two, there will be 10 total writeups and 20 total interactive follow-ups.

³But, to be explicit, the acknowledgements will not in any way impact the grade assigned. For example, we will generally not read the acknowledgements before fully grading the submitted assignment.

FAQ about AI Usage

It is not necessary to read anything below in order to effectively engage with the project. The answers below are given for students who have lots of questions about the role of AI in education and would feel better to see some answers for this course.

- **Why this assignment format?** This project attempts to mimic (to the extent possible) an interaction you are likely to have in the real world. You will still submit written work product, and often the recipient of that product will just want high-quality product and not care how it was generated. Still, the recipient will sometimes also ask you live questions about that product in order to gauge your ability to handle future work (rather than simply the quality of this particular generated product).⁴ At the same time, the analogy between this project and the real-world interaction is imperfect, and this document describes the project.
- **Please remind me of the nature of interactive follow-ups.** Sure. I will read each of your writeups from the perspective of a “client.” Naturally, I’ll have follow-up questions. For example, maybe I’ll want to ask you how your solution handles a twist you didn’t consider. In particular, the purpose of the interactive follow-up is for me to learn more from you than what I learned just from reading your writeup. The purpose of the interactive follow-up is *not* for you to prove to me that you understand your writeup.⁵
- **Before answering a bunch of questions about the written assignments, can you quickly remind me that 65% of the evaluation comes from live interactive follow-ups?** Yes. Below, I’ll answer a bunch of questions about the role of AI in written assignments. But, please remember that you’re primarily evaluated on your performance in interactive follow-ups and that you’ll get $\approx 0\%$ on the interactive follow-ups if you don’t learn anything.
- **Am I allowed to ask AI to one-shot my written assignments, and copy/paste the answer?** As far as course policy is concerned, you’re allowed to ask AI to one-shot your assignment, and copy/paste a submission whose content you don’t understand (provided you acknowledge doing so), and the submission will be graded only on the basis of the submitted content and not how it was generated.
- **How well do you expect one-shot AI solutions to perform on the written assignments?** I honestly have no idea – many aspects make this hard: (a) AI capabilities will certainly change throughout the semester, (b) AI capabilities vary across models, (c) this is a new course and so I don’t even know yet exactly how we’ll evaluate the written submissions, (d) AI will certainly be useful for *something*, but not all students will have access to the same AI models.
- **OK, so do you expect me to be able to add anything to an AI-generated written solution?** Oh, absolutely – that’s not the issue. A student who learns the skills taught in this course will definitely be able to improve an AI-generated written solution. But, I’m unsure whether we’ll be able to fairly and rigorously evaluate the quality of improvement, given the challenges raised in the previous answer.

⁴For example, perhaps this is a job interview, and the employer wants to use this brief assessment to gauge your ability to complete more substantive work. Or, perhaps the client chooses your proposal, and is now relying on you to execute the project competently.

⁵Although, of course, if you don’t understand your writeup, it will likely be very hard to teach me even more than what’s contained in your writeup.

- **OK, I'm ready for some advice on using AI for the written assignments.** You should feel both of the following sensations towards your submitted work: (a) you *understand why the submitted work is strong*, and (b) you *have the skills to generate* the submitted work. Without (a), there's a significant risk that the work is not in fact strong, and a guarantee that you'll get slammed on the interactive follow-up. Without (b), you have no shot of (a) and no shot of strengthening the submitted work (and, there's a significant risk you'll get slammed on the interactive follow-up). If you stick to these two principles, I suspect you'll be OK with whatever AI workflow works for you.

Put another way, I do strongly encourage using AI as a *time-saving tool*, and I strongly discourage using AI to do anything you don't know how to do yourself or how to evaluate.⁶ But, this is just advice and not course policy – you're definitely allowed to submit work that you can't evaluate or produce, and accept the consequences.

⁶At minimum, if AI produces something you don't currently know how to do yourself or how to evaluate, I strongly suggest learning how to do both before submitting it!