



Final Project Guidelines and Requirements

Khoury College, Northeastern University

1 Key Logistics

All deadlines 6:00 pm Eastern

- Submit topic preferences [\[here\]](#) by Sep 18
- Groups assigned by Sep 20
- 1-2 page Proposal, due Sep 25, expect feedback by Sep 30 (3%)
- Mandatory progress check-in with a TA, TA office hours between Oct 23 - Oct 31 (2%)
- In-class presentations (15%)

Slides must be submitted by 6 pm on Nov 24 for CS4100 and Dec 1 for CS5100.

In-person attendance mandatory on all days, unless exemption granted by instructor for emergencies/unavoidable circumstances.

- CS4100: Nov 25, Dec 2, Dec 4
 - CS5100 Sec A (MW, 2:50-4:30 pm): Dec 4, Dec 9, Dec 11
 - CS5100 Sec B (MWTh, 10:30-11:35 am): Dec 5, Dec 9, Dec 11, Dec 12
- Final report, peer ratings and source code: (20%)
 - CS4100: Dec 4
 - CS5100: Dec 5

2 Overview

The aim of the final project is to allow you to pick one topic in AI to pursue in more depth than course assignments permit and build something cool related to it from the ground up. The project should be interesting (and hopefully useful to someone) - but you should also consider feasibility when proposing a project. You might start looking for ideas in your daily life - look for problems that you might want to solve using techniques covered in this course. If you can turn your solution into something that lasts and is used actively beyond the final project deadline, that would be a fantastic outcome!

I encourage you to be ambitious. There are no¹ restrictions on the topic/scope of the project (as long as it is relevant to AI). Go crazy with your initial ideas, and then try and figure out how much of it you can reasonably manage to implement in the given time frame. Consider scaled-down variants of problems if your favorite ideas require lots of training time, or just happen to be complicated. While negative *results* are completely acceptable, negative *effort* is not - i.e. a method not performing as well as expected is fine (and happens more often than you think!), but failure to correctly implement a proposed method will affect your grade.

You may find this a useful resource: (https://ics.uci.edu/~smyth/courses/cs175/project_reading.html) for inspiration, ideation, data collection, and some technical matters. Think ahead of what we've already covered in class, and feel free to talk to me about your ideas. Projects involving creative use of LLMs, deep learning, and reinforcement learning are particularly fun - and pose unique challenges that make them a worthwhile learning experience. A list of project ideas from previous semesters is attached at the end of this document - this should help you understand the expected level of complexity.

2.1 Project Proposal (due Sep 25)

The first step is a 1-2 page write-up of your project idea. It should contain a brief overview of what you're planning to do and how. Provide details of existing work related to your topic and their limitations, the novelty of your approach, and the scope of your work (including feasibility if appropriate). Describe your chosen methods, including the proposed data sources, or data-extraction steps, and the algorithms/methods to be used (you don't have to explain the entire algorithm just yet - names and/or citations to existing work will suffice). The key to a good proposal is that it specifies, concretely, an interesting project that can reasonably be completed in the allotted time using a specific approach. The proposal counts for 3% out of the 40% of your grade assigned to the project.

[LINK] [Here is a sample proposal](#) from my days as a graduate student. While this was for a course in Human Computer Interaction, had little to do with AI and is a very research-oriented topic, it should still give you an overall sense of which details are important, and how to precisely communicate them.

¹within reason, subject to ethical considerations

2.2 Progress Check-in (Oct 23 - Oct 31)

Each group is required to meet with any one of the section's TAs during their office hours between the dates specified above. This will be a quick 5-10 minute chat about how your project is coming along, and will help us identify any shortcomings or hurdles that need to be dealt with before the final presentations and report are due. Ideally, all group members should be present for this check in. This also gives us a chance to ensure that all members in the group are contributing equally to the project (more on this in deliverables below). This check-in counts for 2% out of the 40% project component of your grade.

2.3 Final Presentation (dates on page 1, attendance mandatory)

Each group will present their work through an in-class presentation, lasting no longer than 7 minutes, with an additional 2-3 minutes for questions. Presentations with live demos are highly encouraged; this gives you a chance to impress the audience and show off your work. In the interest of time, all demos must be pre-recorded and embedded in your presentation. To do so, upload your demo videos privately to YouTube (or another similar service) and embed the web-hosted video into your presentation - this will minimize both the submission file size for your PPT, as well as the probability of things going wrong during the presentation. All group members must be present and are expected to participate equally in the presentation. Points will be assigned on the basis of clarity of presentation (both visual and content-related), formatting of results, ability to answer relevant questions, and adherence to the time limit. A more detailed rubric will be shared with you closer to the presentations.

2.4 Final Deliverables (due dates on page 1)

2.4.1 Final Report

Your final project write-up should be a comprehensive technical report consisting of a **maximum** of 6 pages including references. You may use double-column research paper formats if you wish, and the use of \LaTeX is highly encouraged, but not mandatory. Please typeset algorithms, equations, and other mathematical operators as appropriate. A general outline of a project report would include some subset of the following sections (choose as appropriate for your project): a) Abstract, b) Introduction, c) Related Work, d) Problem Statement and Methods, e) Experiments and Results, f) Discussion and Conclusion.

The reader should be able to follow the problem you tried to solve, why it was interesting and relevant today, and what AI method(s) you attempted to use to do so. You should assume the reader is unfamiliar with the specific AI technique you used but is aware of basic computational concepts (such as your colleagues who may not yet have taken this course, but may have taken CS3500 and some introductory mathematics courses). You should report and discuss empirical results along with details about your experimental setup. Make sure that results are visualized or presented appropriately, and are easy

to follow. Think about how you can make it easy for a reader to reproduce your work - report hyperparameters and architecture choices where appropriate. Choosing the right format for your results is half the battle. You should conclude by addressing any potential limitations and discussing ways of improving or extending your work.

[LINK] [Here is a sample project report](#), from when I took advanced AI as a first-year graduate student. This should give you a sense of my expectations with respect to the writing, level of detail, and presentation of results. My expectations are naturally higher for students taking CS5100 compared to CS4100, and will be reflected in my grading.

2.4.2 GitHub Repository

The implementation of your course project should be submitted as a **public** GitHub repository, which should be well-organized with modular, re-usable, and properly commented code. All repositories must also include a detailed Read-Me file with instructions to recreate an appropriate environment and any necessary packages, and a walkthrough on how to run your code. Jupyter notebooks are not an acceptable submission format for the final project, but may be used solely for any data cleaning and preprocessing steps. If so, include the notebook and detailed documentation for the user in your GitHub repository.

[LINK] [Here is an excellent example repository](#) submitted by one of the student groups from CS4100 in Summer 2024. Armina, one of our CS4100 TAs, was part of this group!

[LINK] [Here's one of my repositories](#), documented to accompany one of my papers - the expectations for scientific journals are a bit different - and might be more relevant to those of you picking more research-oriented final projects.

2.4.3 Group Member Ratings, Contributions

At the end of the semester, each student will also be required to submit peer ratings for their group members using [this form](#), uploaded to Gradescope. This rating will be submitted individually, and will only be visible to the instructor and TAs. Consistent negative ratings from the rest of your group will have consequences on your project grade. All students are also expected to contribute directly to the actual implementation in terms of code. If a subset of students ends up doing the bulk of the technical work, that will affect your grade.

Working in teams can be challenging; however, it is a vital skill to gain at University. Be it academia or industry, most work with any real-world impact is the result of a collaboration. To track your team's progress, and to keep each other accountable, I highly recommend the use of project management tools, such as [this progress tracker on Notion](#). Having an objective source of contribution history can be an effective tool in conflict resolution, should the need arise.

3 Grading

Grading will be based on the clarity of the writing, the novelty of the project, general interest in the topic, the suitability of the approach selected and applied, and the execution of the methods proposed. A detailed rubric will be shared closer to the presentation dates. The presentation will account for 15% out of the 40% project component, and the final report, project tracking, and source code repository together will make up the remaining 20% of your grade.

4 Projects from Past Semesters

[\[LINK\] Check out this list of past projects.](#) This might give you some cool ideas, and help you aim for a reasonable level of complexity for your projects.