

AM205: Final project information

The final project is worth 30% of the total grade and is due at 5 PM on Wednesday December 14th. The project, plus any other associated documents and code, should be submitted via Canvas.

In general, the project should be completed in teams of two or three students. Single-person projects will also be allowed with permission of the instructor. Projects with $n \geq 4$ people will also be considered, but will require permission of the instructor and a written statement detailing the division of the work. All team members will receive the same grade for the project.¹ The best place to find team members is on Piazza, by posting some information about yourself and your areas of interest.

Topic

The final project should involve applying methods from the class to an application area of interest. The project should involve some coding, and purely theoretical projects will not be allowed.

It is fine (and in many cases encouraged) to take project ideas directly from existing research topics. However, in this case, the project should be based on aspect or direction that is carried out specifically for this course, as opposed to simply submitting ongoing or existing work. Three examples of projects are given at the end of this document.

Format and length

The table below gives a *very rough* guideline about the length of the final project write-up.

Team members	Pages
1	9
2	14
3	18

However, the precise length of the write-up is not important; the scientific content of the project is more important, and keeping your write-up concise and to-the-point is preferable.

In addition, there will be an option to submit a poster to the CS fall poster session, which takes place on Friday December 9, 12pm–2pm in the Maxwell–Dworkin lobby. Harvard IACS will cover the poster printing costs. Details of poster printing will be given nearer the time. Submitting a poster will count as a 25% reduction the length of the project write-up. The poster will not be graded at the poster session itself. An electronic version of the poster must be submitted to Canvas by the December 14th deadline, together with the project write-up.

¹In exceptional circumstances, grades may be assigned differently among team members.

Project proposal – deadline November 17th, 6 PM

To ensure the everyone starts off on the right track, each team must arrange a half-hour meeting with Chris, Yang, Matt, Jinsoo, or Nick to discuss their project idea and direction. Only the meeting is required—it is not necessary to submit a written proposal.

This must be completed by Thursday November 17th at 6 PM. Four points will be automatically awarded for doing this.

Grade breakdown

The project will be graded out of 60 points. A complete breakdown is shown below.

- **4 points** – Automatically awarded for completing the project proposal by the deadline.
- **8 points** – Project motivation: what problem are you trying to solve? What has been done before in this area? If appropriate, cite relevant books and papers.
- **24 points** – Project methods and results: what mathematics and code did you develop for your problem? Where appropriate, did you consider mathematical analyses of your approach? Is the code that you developed correct?
- **6 points** – Project conclusions: did you solve what you set out to do? What are possible limitations and problems with your approach? How you could you develop the project further?
- **18 points** – Project presentation and organization, divided among the following categories:
 - write-up clearly written with good spelling and grammar,
 - figures and tables clear and properly labeled,
 - code well-commented and well-organized.

Example projects

Three examples of suitable projects are given below:

- Chris took a similar computing course during graduate school. He was already developing a serial code for his thesis to study mixing in granular materials. For the class he developed two parallel versions of the code, which required the consideration of a new set of implementation issues.
- Previous TF Jordan Hoffmann took the course in Fall 2014, and completed a two-person project on analyzing the MBTA subway system. The project involved obtaining passenger usage data from the MBTA on the Red Line, building a model for train

motion, and then considering a variety of different scenarios for optimizing the train dispatch protocol.

- Previous TF Raphaël Pestourie took the course in Fall 2014, and completed a two-person project on solving the Helmholtz equation in a waveguide, using finite-difference and finite-element methods. The project made use of the Bi-CGSTAB iteration for solving large sparse matrix problems. The Bi-CGSTAB iteration was preconditioned using the multigrid method.

Chris, Yang, Matt, Jinsoo, and Nick are happy to discuss other previous projects during office hours.