This semester you will embark on a semester long research project in some area of algorithm design and analysis. The outcome of your work will be an in-depth survey of research on algorithms for a particular problem or a particular algorithmic technique. You should be able to relate your research topic to what we have done in class in 271–2.

Here is a list of possible topics. We will talk briefly about these in class, but you will need to do a little work on your own to discover more about them. If a particular topic interests you and you would like to know more about it, please feel free to talk to me.

1. String matching problem
2. Algorithms for Computational Biology (overlaps somewhat with string matching)
3. Maximum flow problem
4. Steiner tree problem
5. Convex hull problem
6. Voronoi diagrams
7. Triangulation problem
8. Fast Fourier Transform
9. Online scheduling algorithms
10. Online paging algorithms (and the $k$-server problem)
11. Online algorithms for financial games
12. Randomized algorithms for graph problems
13. Approximation algorithms for single machine scheduling
14. Linear Programming and the simplex method
15. Local search algorithms
16. Simulating annealing
17. Parallel algorithms for graph problems
18. Quantum computing
19. Molecular computing (DNA-based computing)
At the end of the semester, you will hand in a significant paper detailing your research and make a presentation to the class so that we can all benefit from your work. To help you pace yourselves, we will set the following timetable for intermediate benchmarks:

**Jan 25** Choose your problem and have it approved.

**Feb 8** Hand in a more detailed description of your problem, the specific goals of your project, and at least 3 references you have found in the computing literature. At least 2 of these references need to be papers from a research conference or journal.

**Feb 10** Give a short 5 minute talk to the class explaining your problem.

**Mar 10** Hand in a rough draft of your paper. You need not have completed your research at this point, but you should have made significant progress and written the introduction describing the problem.

**Apr 3** Hand in a second draft of your paper. At this point, the vast majority of your research should be behind you and this paper should start to resemble the final product.

**Apr 14** Hand in your almost-final paper. This copy will be handed out to the class a few days before your talk so that they will have read your paper before your talk. You must also hand in the marked-up copies of all previous drafts of your paper.

**Apr 17–28** Give your presentation to the class. You should plan on a 30–45 minute talk during which you will teach the class about your topic.

**May 1** Hand in your final paper, with revisions based on my and your classmates' comments. Also hand in the previous marked-up draft. Finally, hand in two candidate final exam questions based on your work. Please refer to our past exams for ideas on what these might look like.

We will talk more during the semester about how to do research in Computer Science and how to write a research paper.