COSC 450: Analytical Performance Modeling
Final Project

The goal of the final project for this course is to explore in depth some topic related to performance modeling and queueing theory. This is a fairly open-ended project because I want you to choose a topic that interests you.

Here are some forms that your project might take:

- **Literature survey:** Choose a queueing-related problem of interest, and find out what research exists on this topic. This type of project would involve lots of searching for papers, reading, and synthesizing existing research results. Your goal would be to develop a clear picture of the state of the art on this problem, and to identify related open problems.

- **Deeper dive into course material:** There are a number of topics that we touched upon in class, but didn't have time to explore in great depth. For example, maybe you want to learn more about solving complex Markov chains, or methods for finding distributional results in an M/G/1, or capacity provisioning in an M/M/k. This type of project would involved reading the textbook chapter that we skipped and then doing something beyond what is in the book. Your goal would be to achieve a thorough understanding of the topic and apply this understanding to some related problem.

- **Studying an application:** Queueing systems are everywhere, and chances are you've encountered queueing systems that you care about in your life. This type of project would involve developing some sort of analysis and simulation-based understanding of your system. Your goal would be to gain a new understanding of performance in your system, and maybe explore some options for improving performance.

Feel free to suggest another idea if there's something else you would like to do!

The project has four required components:

- **Proposal (due Weds. 11/6):** Submit a detailed description of what you plan to do in your project. Your proposal should include:

  - Who are you working with? (submit only one proposal per group)
  - What type of project are you planning to do?
  - What system(s) do you plan to study? Why is this topic interesting and/or important?
  - Project Description: Briefly describe the goal of your project. Include a 100% goal (what you want to accomplish if all goes as expected), a 75% goal (what you can still accomplish of things go more slowly than expected), and a 125% goal (what you might accomplish if things go faster than expected).
    * If you're doing a literature survey: list 3-4 papers that you've found so far that are relevant to your topic. Why did you select those papers?
    * If you're doing a deep dive: how do you plan to go beyond the textbook material?

* If you're doing an application study: what experiments do you plan to do? What analysis do you plan to do?
* If you're doing some other kind of project: give as much detail as you can about the nature of your project and what your output at the end will look like.

– Logistics: Put in place a plan for how you will accomplish the goal of your project.

* Schedule: What does each member of your group plan to do each week between now and the end of the semester? (I won't hold you to this schedule, but it is meant to help you form a realistic and concrete plan for what you need to do. You are setting your own weekly homework for the rest of the semester.)
* Checkpoint: We will have an in-class project checkpoint and work day on Wednesday, 11/20. What do you plan to have accomplished by that time? Set a goal that is reasonable: make sure you're aiming to get enough done by the checkpoint (remember, there are only two weeks of class remaining after Thanksgiving break), but try not to be overly ambitious.
* Getting started: What work have you done so far on this project (aside from writing your proposal)? Have you found some related literature, written some code, etc.? Do you have any questions that need to be addressed before you can make further progress?

- **Checkpoint (due Weds. 11/20):** In your proposal, you'll give an intermediate goal for what you aim to have accomplished by this date. Each group will give a short (3-5 minutes) report in class about what you've done so far, and then I will meet with each group to discuss your progress and any questions in more detail. If you run into difficulties with your project, don't wait until the checkpoint to ask!

- **Presentation (due Mon. 12/9):** Give an in-class presentation about your project. We'll do this over the course of two days; the duration of the presentations will depend on the number of groups and the group sizes. Your goal will be to communicate to the rest of the class what you did in your project and what you learned. This might look like a course lesson, a research talk, or something else, depending on the topic and style of your project.

- **Writeup (due Weds. 12/18):** You'll submit a final paper reporting on your project. Again, the form that this takes will depend on the form of your project. A literature review project may involve writing a narrative paper discussing existing research results, whereas an application study might involve a writeup that looks like a research paper.

We will talk in more detail about guidelines for the project presentation and writeup once you've all chosen topics and completed project proposals.