

# Queueing Project Guidelines

## Summary

The purpose of this group project is to encourage students to apply queueing theory to a real-life environment involving waiting of some form. The project will entail data collection, modeling and analysis using the theoretical tools developed in this course. The project will culminate in a final report from which includes a brief introduction to the problem studied, details of the modeling and analysis, and concluding remarks and recommendations that can be made from the analysis.

## Data Collection

In some cases you will need to get permission to gather data. For example, if you want to watch a service facility such as a bank or post office you should ask permission of the management of the facility. Be sure to inform them that you are using this only as a student project and in no way will the performance (good or bad) of their servers be publicized.

Be sure to collect sufficient amounts of data. This will ensure a more valid model. When observing a queue, it is best to arrive at a peak period to gather a large amount of data quickly, say in just an hour. For example, if watching a traffic signal, it would be best to do so during rush hours in the morning, lunch or late afternoon. Whatever time period is chosen should be used throughout the study. Mixing slow & busy periods of activity will likely invalidate the simple models studied in this course.

Also, be sure to watch the full service period of a customer included in the data. Each data record corresponds to a customer, including their arrival time, time to enter service, time to leave service.

## Group Formation

I have formed 2 groups of 3 students each. A queueing project involves the gathering of the arrival/departure times, queueing times and service times of a steady stream of customers. This can be quite hectic with a lot of moving parts.

## Report Requirements

A written report (3-5 or so pages) should include a **1-page Executive Summary** that summarizes the rest of the report which details these features:

- ✓ **Introduction** – describe the queueing setting, including any issues of capacity
- ✓ **Data Analysis** – describe any data exploration that you performed, including any pertinent visualizations of the data. Also discuss the statistical analysis of the distributions of inter-arrival, service and waiting times.
- ✓ **Modeling** – explain the theoretical queueing model that best describes the real-world setting. Perform a test of the validity of this model with real-world data. Usually, this entails simply testing the hypothesis that the first moment (expectation) of waiting time matches the theoretical model. Also discuss the modeling “hurdles,” i.e., things that didn’t work and how you creatively overcame these difficulties.
- ✓ **Conclusions** – summary, strengths & weaknesses of model, recommendations for improving model or queueing environment.
- ✓ **Appendices** – attach computer file(s) to Canvas assignments area.

## Grading

The project constitutes 10% of the course grade. The project grade will depend on:

- ✓ modeling accuracy & validity
- ✓ correctness & thoroughness of results & conclusions
- ✓ report readability & style