

# Project Queueing Analysis and Simulation

Due date: 20 May 2016

The aim of the project is to study different scheduling disciplines for  $G/G/c$  (multiserver) queueing systems. In particular, consider gamma-distributed service and interarrival times and the following 4 scheduling disciplines:

1. First come first served (FCFS): upon service completion, the server selects the customer that entered the queue first.
2. Last come first served (LCFS): upon service completion, the server selects the customer that entered the queue last.
3. Shortest service time first (SSTF): upon service time completion, the server selects the customer with the shortest service time.
4. Random order of service (ROS): upon service completion, the server randomly selects a customer.

Create a discrete event simulator in Python for the  $G/G/c$  queueing system with the scheduling disciplines above. Which performance measures to study and for what parameter ranges is not specified. Select parameters/performance measures to gain understanding how the scheduling discipline affects performance of the queueing system. You should at least study the waiting time and queue content and include plots of performance measures versus system parameters. To compare scheduling disciplines, it is good practice to show curves for different scheduling disciplines in the same plot.

## Reporting:

1. 10 pages maximum including Python code for generating the performance measures for a given set of parameters; There is no need to include code for generating the plots.
2. Try to explain your results whenever possible.
3. Use the batch means method to get the confidence interval for at least one estimator.
4. Whenever applicable, think of various options of how to estimate performance measures and compare variance.

If you have additional questions, please contact the teaching assistant Ekaterina Evdokimova via email ([ekaterina.evdokimova@telin.ugent.be](mailto:ekaterina.evdokimova@telin.ugent.be)).

The project is due 20 May 2016. Upload a single pdf-file “`firstname.lastname.pdf`” of your report to the Minerva dropbox.