

IE381/3081 – Modeling and Discrete Simulation Course

Marmara University, Istanbul, Turkey
November 25, 2019

Project 1

The project consists of two phases.

Phase 1: In the first phase you are required to identify the system that you would like to build the model and simulate. **Important Note:** Phase 1 will be evaluated as Homework-3, but the points will be included in the project evaluation score. A separate Homework-3 document will be submitted including the same items below.

Please determine a system that you want to model and simulate. You will also determine the requirements defined below. Please send your system description and the answer to the items defined below to the lecturer by email or make an appointment for a meeting at the office. You are required to get the approval of the lecturer for the scope of the project and any possible adjustment in the system definition. After getting the approval, submit your project (system) description as Homework-3 Report in Turnitin.

- Determine system components
- Determine the relations between system components
- Determine the input variables (decision variables and uncontrollable variables)
- Determine the type and the values (might be a *pdf*) of input variables (parameters).
- Determine the output variables (parameters), e.g. average time spent in the system per customer, average number of customer waiting at a specific queue. In your project, you have to measure at least one delay-related output parameter.

Phase 2: In the second phase, you are required to build the model, simulate and perform evaluation.

After the approval of your project, build your model and simulate the system. Please answer the following items;

- Collect data on the system you built. Regarding the input parameters,
 - o Estimate the mean values for the output (performance) parameters you defined above. You have to run (replicate) the simulation several times with different seed values. Estimates should be the mean of all runs (replications).
 - o Compute the 95% confidence intervals for the output parameters.
 - o Estimate the total number of replications needed to estimate mean output parameters with 10% enhancement (narrowing the CI for 10%).

- Compute the 95% prediction intervals for the output parameters.
- Change your system design and collect data on the changed system. Answer the following questions:
 - Are these two systems (first one and the changed one) statistically different? Please answer your question for the 95% confidence interval.
 - Estimate the additional replications needed to reduce the half-width of the confidence interval by 10% for the differences of the estimated values of the performance parameters.

Deliveries:

The following deliveries will be submitted via personal **Turnitin** account.

1. The **model** designed in AnyLogic. Please use the link for “Project-1 Code” in Turnitin.
2. A **report** including the following items. Please use the link for “Project-1 Report” in Turnitin.
 - a. Description of the following items:
 - The system you built.
 - Components of the systems and their relationships.
 - Input and output parameters and the values of the input values.
 - b. Answers to the questions above.

This is an individual/group project for students. Collaboration and cooperation between groups are not allowed.

Due date is December 27, 2019, until 23:59.

Ask any unclear matter to the lecturer. Good luck...

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