**EEX5362 – PERFORMANCE MODELLING**

**Deliverable 01**

**University Registration Queue System**

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# High-level Problem

At the start of every semester, many students come to the university to register for their courses. Because students arrive around the same time, long queues form at the registration counters. Each counter is managed by staff who handle one student at a time.

Some students finish registration quickly, while others take longer, which causes uneven waiting times and congestion. This creates delays, stress, and sometimes confusion among students.

The **University Registration Queue System** aims to study and improve this process by analyzing how students arrive, how long they wait, and how efficiently staff handle registration.  
By understanding these factors, the university can reduce long waits, balance staff workload, and improve the registration experience.

# 2. Dataset Description

The dataset records student arrivals and registration details. It contains the following fields:

|  |  |
| --- | --- |
| **Field** | **Description** |
| student\_id | Unique ID number for each student |
| arrival\_time | The time the student entered the registration queue |
| service\_start\_time | The time registration began for the student |
| service\_end\_time | The time registration was completed |
| service\_time\_seconds | Time taken for registration (seconds) |
| waiting\_time\_seconds | Time the student waited before being served |
| queue\_lenght\_at\_arrival | No of student already waiting when they arrived |
| staff\_id | ID of the staff member who handled the registration |

This dataset helps to measure the queue behaves

# 3. Performance Objectives

The main performance goals of this system are:

1. **Minimize average waiting time** — reduce the time students spend in line.
2. **Maximize throughput** — increase the number of students registered per hour.
3. **Identify bottlenecks** — find when and where queues become too long.
4. **Optimize staff utilization** — make sure all staff are efficiently used without being overloaded.
5. **Maintain service quality** — ensure most students are served within a reasonable waiting time.