About this course

Situations where resources are shared among users appear in a wide variety of domains, from lines at stores and toll booths to queues in telecommunication networks. The management of these shared resources has direct consequences on users, through waiting times or blocking probabilities, just to name a couple of examples.

This MOOC on Queuing Theory will introduce the main mathematical tools that are necessary to anticipate the performance levels of queueing systems, and to understand the behavior of other systems that evolve randomly over time.

You'll learn how to describe a queuing system statistically, how to model the random evolution of queue lengths over time and calculate key performance indicators, such as an average delay or a loss probability.

Pratical coursework will be carried out using ipython notebooks on a Jupyterhub server which you will be given access to.

By the end of this MOOC, you will be able to

- Characterize a queue, based on probabilistic assumptions about arrivals and service times, number of servers, buffer size and service discipline
- Describe the basics of discrete time and continuous time Markov chains

- Model simple queuing systems, e.g. M/M/1 or M/M/C/C queues, as continuous time Markov chains
- Compute key performance indicators, such as an average delay, a resource utilization rate, or a loss probability, in simple single-server or multi-server system
- Design queuing simulations with the Python language to analyze how systems with limited resources distribute them between customers