SE2750
Stochastic Modeling and Theory of Queues and their Applications

Professor: Oualid Jouini

Language of instruction: French – **Number of hours**: 36 – **ECTS**: 3

Prerequisites: Basic knowledge of probability

Period: S6 Elective 01 February to March IN16DE1, SEP6DE1

  S8 Elective 08 February to March IN28IE1, SEP8IE1

Course Objectives

Queueing theory is one of the area of operational research. It provides various tools needed to model, analyze and optimize many real-world situations. The objective of this course is to present and develop the basic analysis methods of queueing and queueing network systems. We provide various applications for system modelign and analysis using queueing models. The case studies are applications for manufacturing (inventory management) and service systems (call centers and health care systems).

On completion of the course, students should be able to

- ✧ use queueing theory in order to model various situations where the resources are limited and the system parameters are random
- ✧ use the basic approaches, methods and tools required for the analysis and optimization of these types of systems

Course Contents

- ✧ Introduction to stochastic processes
- ✧ Markov chains
- ✧ Simple queueing systems
- ✧ Advanced queueing systems
- ✧ Case study: estimating customer waiting time in call centers
- ✧ Case study: appointment scheduling in health care service
- ✧ Case study: analysis of inventory systems (make-to-order and make-to-stock systems)

Course Organization

Tutorials: 33 hr, Written exam: 2 hr

Teaching Material and Textbooks

- ✧ Copy of slides and case studies
- ✧ Kleinrock L. (1975), Queueing Systems, A Wiley-Interscience Publication, Vol. 1
- ✧ Asmussen S. (2003), Applied Probability and Queues, 2nd edition Springer-Verlag, New-York

Evaluation

2-hr written final exam (documents and computers allowed)