EP2200 Queuing Theory and Teletraffic Systems 7.5 credits

Köteori och teletrafiksystem

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for EP2200 valid from Spring 2024

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Computer Science and Engineering,Information and Communication Technology

Specific prerequisites

Knowledge in basic probability theory and statistics, 6 credits, corresponding to completed course SF1912/SF1914/SF1915/SF1916/SF1920/SF1921/SF1922/SF1923/SF1924/SF1935.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to

- explain the basic theory of Markov-processes and apply the theory to model queuing systems,
- derive and use analytic models of of Markovian queuing systems, queuing networks and also some simpler non-Markovian systems,
- explain and use results derived for complex non-Markovian systems,
- define queuing models of communication or computer systems, and derive the performance of these systems,
- use adequate tools to present scientific work,

in order to be able to carry out mathematical modeling based performance evaluation of communication, computing, or other resource sharing systems.

Course contents

The classical theory of queueing systems:

- Discrete and continuous time Markov chains, birth-death processes, and the Poisson process.
- Basic terminology of queuing systems, Kendall's notation and Little's theorem.
- Markovian waiting systems with one or more servers, and systems with infinite as well as finite buffers and finite user populations (M/M/).
- Systems with general service distributions (M/G/1): the method of stages, Pollaczek-Khinchin mean-value formula and and systems with priority and interrupted service.
- Loss systems according to Erlang, Engset and Bernoulli.
- Open and closed queuing networks, Jacksonian networks.

The theory is illustrated by examples from telecommunication and computer communication such as blocking in circuit switched networks, preventive and reactive congestion control, and traffic control for guaranteeing quality of service.

Furthermore, students develop their skills to perform performance analysis of queuing systems and to present the results, using mathematical software and suitable text editors.

Examination

- INL1 - Assignment, 1.5 credits, grading scale: P, F
- TENA - Oral exam, 6.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH’s coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Transitional regulations

TEN1 is replaced by TENA.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.