HF1001 Queuing Theory and Mathematical Statistics 7.5 credits

Köteori och matematisk statistik

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

Establishment

Course syllabus for HF1001 valid from Autumn 2007

Grading scale

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

Education cycle

First cycle

Main field of study

Information Technology, Technology

Specific prerequisites

Language of instruction

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

Intended learning outcomes

After completion of the course the student should be able to

- define and explain basic concepts in descriptive statistics and probability theory

- solve some standard problems that include random variables

- construct a confidence interval to estimate a population mean

- define and explain basic concepts in the theory Markov processes, M/M/m, M/M/m/K and M/M/m/K/C queueing systems

- derive and apply main formulas for some properties (such as stationary probabilities, average waiting and system time, expected number of customers in the que, etc.) of M/M/m, M/M/m/K and M/M/m/K/C queueing systems.

- to calculate the traffic intensity, blocked traffic and the utilization of some queueing systems

- analyze and solve problems using computer aid (Maple, Matlab or Mathematica)

Course contents

- Basic concepts of probability theory. **Combinatorics.** Sample space. The axioms of probability. Conditional probability. Independence of events.

- Discrete and continues random variables

- Stochastic processes. Markov chains in discrete and continuous time. Chapman -Kolmogorov equations. Stationary probabilities. Poisson process. Birth-death processes.

- Basic concepts in queuing theory. Little's theorem.

- Arrival processes and service time. Queuing disciplines. Stationary probabilities. Offered load (traffic). Blocked load. Effective load. Utilization. Blocking probability.

- Markovian wait systems.

- M/M/m: Queueing system with m servers, infinite number of waiting positions and infinite number of customers.

- M/M/m/K: Queueing system with m servers, limited number (=K) waiting positions and infinite number of customers.

- M/M/m/K/C: Queueing system with m servers, limited number (=K) waiting positions and limited number of customers (=C).

- Markovian loss systems: Erlang´s loss system, Engset's loss system, Binomial (Bernoulli's) loss system

Course literature

Will be decided before each start of the course.

Last time Vännman, Kerstin: Matematisk statistik
Körner, Ulf: Köteori was used.

Examination

- TEN2 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, 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.

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

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.