II2206 Stochastic Simulation 7.5 credits

Stokastisk simulering

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

Establishment

The official course syllabus is valid from the autumn semester 2022 in accordance with head of school decision: J-2021-1873.Decision date: 14/10/2021

Grading scale

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

Education cycle

Second cycle

Main field of study

Computer Science and Engineering, Electrical Engineering

Specific prerequisites

Knowledge and skills in programming, 5 credits, equivalent to completed course DD1337/DD1310-DD1318/DD1321/DD1331/DD100N/ID1018.

Knowledge in mathematical statistics, 6 higher education credits, equivalent completed course SF1910-SF1926/IX1501.

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 shall be able to

- generate stochastic variables (random number) with arbitrary distribution
- design simulations with discrete events
- estimate parameters from the simulation results and the statistical error of the estimates
- test hypotheses by means of simulations
- evaluate the chosen stochastic model with regard to consistency with real data
- evaluate the resource efficiency that simulation tools can give in relation to traditional experimental methods.

For higher grades, the student should also be able to

- generate vectors of random number with given correlation properties
- estimate parameters in correlated time series
- evaluate different simulation methods with regard to resource efficiency and design efficient simulation strategies through different methods for variance reduction.

Course contents

The course contains the following parts:

- Introduction to simulation – resource efficiency design of complex systems
- Stochastic Modelling
- Random number generation
- Simulation of discrete event
- Output analysis parameter estimation, error estimation, time series analysis, ergodicity and correlation
- Experimental design and methods for variance reduction
- Hypothesis test and model validation

Examination

- HEM1 - Home Assignments, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- PRO1 - Project, 3.5 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.