DD2358 Introduction to High Performance Computing 7.5 credits

Introduktion till högprestandaberäkningar

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

The official course syllabus is valid from spring semester 2025 according to the decision of Director of First and Second Cycle Education: J-2024-2217.Date of decision: 2024-10-17

Grading scale

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

Education cycle

Second cycle

Main field of study

Computer Science and Engineering

Specific prerequisites

Knowledge and skills in programming, 6 credits, equivalent to completed course DD1337/DD1310-DD1319/DD1321/DD1331/DD100N/ID1018.

Knowledge in algorithms and data structures, at least
6 higher education credits, equivalent to completed course
DD1338/DD1320/DD1325/DD1328/DD1338/DD2325/ID1020/ID1021.

Knowledge in algebra and geometry, 7.5 higher education credits, equivalent to completed course SF1624.

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

- list characteristics of high performance computer architectures
- use software tools to measure and analyze the performance of given program code
- identify performance bottlenecks and performance optimization of given program code
- use tools for version control, testing and documentation for high-performance computer software
- use parallel computing to optimize program code
- develop and optimize a scientific application from scratch according to the best high-performance computing methods.

Course contents

This course introduces methods and tools for developing and optimizing the execution of program code on high-performance computing systems. It focuses on computing system architectures for high computational performance, tools for performance monitoring and analysis, software engineering for scientific code development and parallel computing. The course contains four modules:

- the fundamentals of computing systems for high-performance computing and measuring code performance
- data structures and methods for high-performance computing
- performance optimization
- the basics of parallel computing.

Examination

- LAB1 - Laboratory Assignments, 3.0 credits, grading scale: P, F
- LAB2 - Project, 4.5 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.

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.