DD1327 Fundamentals of Computer Science 6.0 credits

Grundläggande datalogi

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

Establishment

The official course syllabus is valid from spring semester 2025 according to the decision of Director of First and Second Cycle Education: J-2024-2230. Date of decision: 2024-10-18.

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

DD1331 or equivalent (for example DD1310).

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

– systematically test programs to discover errors
– use abstraction as a tool to simplify the programming
– design and document program packages that other programmers can use
– select an appropriate algorithm for a given problem
– compare algorithms with regard to time and memory usage
– describe and implement different algorithms for search and sorting
– model problems using graphs and implement algorithms for searching in graphs
– formulate and implement recursive algorithms
– write and use a simple BNF syntax
– implement, and design algorithms for, basic data structures
– determine correctness for iterative and recursive algorithms
– design and use regular expression

in order to

– become a good problem solver using programming
– be able to use computational methods in application projects
– be able to take advanced courses in computational mathematics, machine learning and theoretical computer science.

Course contents

Algorithms and data structures: a systematic overview of the concepts abstract data types, stacks, queues, lists, trees, searching, sorting and recursion based on the knowledge the students acquired in the programming course.

Introductory programming. Hashing, priority queues, search trees, problem trees and simple syntax analysis and regular expressions.

Algorithm analysis with regard to both efficiency and correctness. Correctness proofs.

Programming: software development methodology, program quality, abstraction, modularisation, testing, system calls, standard libraries.

Examination

• HEM1 - Individual Home Assignments, 4.0 credits, grading scale: A, B, C, D, E, FX, F

• PRO1 - Individual Project Assignment, 2.0 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.

The assignments should be submitted in writing before the deadline and should be presented orally and with peer review during the exercise sessions. Reflection questions are included in the project task at the end of the course.

Other requirements for final grade

Attendance is mandatory for the exercises where assignments are to be presented.

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.