DD2350 Algorithms, Data Structures and Complexity 9.5 credits

Algoritmer, datastrukturer och komplexitet

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

Establishment

Course syllabus for DD2350 valid from Autumn 2017

Grading scale

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

Education cycle

Second cycle

Main field of study

Computer Science and Engineering

Specific prerequisites

Programming and computer science corresponding to DD1338/DD1320/DD1321/DD1325/DD1327/DD1339/ID1020.

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:

- develop and implement algorithms with data structures and analyse them with respect to correctness and efficiency,
- compare alternative algorithms and data structures regarding efficiency and reliability,
- define and translate central concepts such as P, NP, NP-completeness and undecidability,
- compare problems with respect to complexity by means of reductions,
- handle problems with high complexity

in order to be able to

- independently construct computer programs that use time and memory efficiently,
- in professional life identify and attack problems that are unrealistically resource demanding or not possible to solve on a computer.

Course contents

Design principles of algorithms: Decomposition, greedy algorithms, dynamic programming, local and exhaustive search. Algorithm analysis. Approximation algorithms and heuristics. Applications with algorithms for problems on sets, graphs, arithmetic and geometry. Implementation of algorithms.

Data structures: Review of hash tables and heaps; balanced trees, Bloom filters. Use and implementation of data structures. Computability and complexity: The concept of reduction, the complexity classes P (polynomial time) and NP (non-deterministic polynomial time). NP-complete problems, undecidable problems. Coping with untractable problems. Terminology in Swedish and English.

Course literature

Will be announced on the course web no later than 10 weeks before the start of the course.

Examination

- MAS2 - Individual master´s test, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- MAS1 - Individual master´s test, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Theory examination, 2.5 credits, grading scale: P, F
- LAB1 - Laboratory assignments, 4.0 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.

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

Under special circumstances, other examination formats may be used.
In this course, the code of honor of the school is applied, see: http://www.kth.se/en/csc/student/hederskodex

Other requirements for final grade

Passed laboratory assignments, two master's tests and theory examination. The final grade is the lowest of the three A-E grades.

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.