ID1021 Algorithms and Data Structures 7.5 credits

Algoritmer och datastrukturer

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

Establishment

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Completed course in programming equivalent to ID1018.

Active participation in a course offering where the final examination is not yet reported in LADOK is considered equivalent to completion of the course.

Registering for a course is counted as active participation.

The term 'final examination' encompasses both the regular examination and the first re-examination.

Language of instruction

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

Intended learning outcomes

On completion of the course, students should be able to

- describe a number of common algorithms for search and sorting and their properties
- compare algorithms with regard to time and memory usage
- implement data structures as linear lists stacks, queues, hash tables, binary tree and search trees
- identify problems where the data structures above are useful and design simple algorithms with these
- write programmes that use algorithms and data structures by means of good programming principles such as systematic tests and abstraction
- model problems as search problems and implement algorithms for breadth-first-search, depth-first-search or best-first-search

in order to

- be able to design programmes that solve problems by using commonly occurring algorithms and data structures
- acquire sufficient prior knowledge to be able to take advanced courses in computer science.

Course contents

Basic algorithm analysis:

- Simpler analysis with respect to the resource needs of algorithms in the form of time and memory.

Fundamental algorithms:

- simple numerical algorithms
- sequential and binary search algorithms
- Depth first search and Width first search.
- sorting algorithms: selection sorting, insertion sorting, Quicksort, heapsort, mergesort.

Fundamental data structures:

- linear lists, stacks, queues, hash tables, binary tree, heaps, binary search trees and problem trees.

Program Design:

- design and implementation of programmes that use basic algorithms and data structures to solve computer science problems.

Examination

- ARBA - Course work, 4.5 credits, grading scale: P, F
- TENA - Written exam, 3.0 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.

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.