Algorithmic Problem Solving

Programme course

6 credits

Algoritmisk problemlösning

TDDD95

Valid from: 2017 Spring semester

Determined by
Board of Studies for Computer Science
and Media Technology

Date determined
2017-01-25

Main field of study
Computer Science and Engineering, Computer Science

Course level
Second cycle

Advancement level
A1X

Course offered for
- Computer Science and Engineering, M Sc in Engineering
- Information Technology, M Sc in Engineering
- Computer Science and Software Engineering, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Design and Analysis of Algorithms

Intended learning outcomes
- Analyze the efficiency of different approaches to solving a problem to determine which approaches will be reasonably efficient in a given situation.
- Compare different problems in terms of their difficulty.
- Use algorithm design techniques such as greedy algorithms, dynamic programming, divide and conquer, and combinatorial search to construct algorithms to solve given problems.
- Strategies for testing and debugging algorithms and data structures.
- Quickly and correctly implement a given specification of an algorithm or data structure.
- Communicate and cooperate with other students during problem solving in groups.

Course content

Successful problem solving in computer science requires a solid theoretical foundation as well as ability to apply the theory to practical problem solving. The aim of this course is to develop your ability to solve complex algorithmic problems by applying knowledge of algorithms, data structures, and complexity theory. As a professional software developer it is essential to be able to analyze a problem, chose or design an algorithm, judge the efficiency of proposed algorithms, and to implement and test them quickly and correctly. In this course you will practice this by solving a large number of homework assignments and working under time constraints during problem solving sessions. The course will also contain a competitive element where individuals and teams should solve algorithmic problems with time and resource constraints.

The purpose is that the students should be able to use programming and algorithms as an effective tool for problem solving, and should get opportunity to apply theoretical knowledge from other courses to solve practical problems.

Teaching and working methods

The course consists of seminars and lab sessions. The seminars are used to go discuss home work exercises, algorithms and algorithmic problem solving. There will also be problem solving sessions where students should solve as many algorithmic problems as possible from a given problem set.

Examination

UPG1	Assignments	2 credits	U, 3, 4, 5
LAB1	Laboratory work	4 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för datavetenskap

Director of Studies or equivalent

Peter Dalenius

Education components

Preliminary scheduled hours: 48 h
Recommended self-study hours: 112 h

Course literature

Competitive Programming 3 Steven and Felix Halim. https://sites.google.com/site/stevenhalim/ Följande böcker kan vara av intresse: Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein Algorithmic Problem Solving, R. Backhouse, http://algorithmicproblemsolving.org/ How to Solve It, G. Polya

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.