



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIT251 Algorithms, advanced course, 7.5 credits

Algoritmer, fortsättningskurs, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2020-12-18 and was last revised on 2021-11-01 to be valid from 2022-08-29, autumn semester of 2022.

Field of education: Science 100%

Department: Department of Computer Science and Engineering

Position in the educational system

The course is a part of the Computer Science Master's programme and is also given as a single subject course at University of Gothenburg.

The course can be part of the following programmes: 1) Computer Science, Master's Programme (N2COS), 2) Applied Data Science Master's Programme (N2ADS) and 3) Computer Science, Bachelor's Programme (N1COS)

Main field of studies

Computer Science

Specialization

A1F, Second cycle, has second-cycle course/s as entry requirements

Entry requirements

The requirement for the course is to have successfully completed courses corresponding to 120 hec within the subject Computer Science or equivalent, including successful completion of DIT093 Algorithms, 7.5 hec (or equivalent).

Applicants must prove knowledge of English: English 6/English B or the equivalent level of an internationally recognized test, for example TOEFL, IELTS.

Learning outcomes

After completing the course the student is expected to be able to:

Knowledge and understanding

- apply important design and analysis techniques for algorithms, in particular, ways to approach NP-complete problems,
- describe current research on algorithms,

Competence and skills

- apply design and analysis techniques to solve new problems that may arise in various applications,
- explain complex algorithms and their proofs in written form,

Judgement and approach

- find connections between algorithmic problems and turn them into formal reductions,
- perform more complex analysis of algorithms, in particular, analyze the worst case and expected time complexities and error probabilities for randomized algorithms.

Course content

The course covers the following topics;

- approximation algorithms and approximation schemes for NP-complete problems, and their analysis,
- use of linear programming, in particular for approximation,
- network flow with some complex applications,
- randomized algorithms and their analysis by appropriate random variables,
- helpful input structures like tree structures and input parameters.

Sub-courses

1. **Assignment** (*Inlämningsuppgift*), 7.5 credits

Grading scale: Pass with distinction (5), Pass with credit (4), Pass (3) and Fail (U)

Form of teaching

Lectures, exercises, feedback and consultations.

Language of instruction: English

Assessment

The course is examined by hand-in exercises and a final take-home exam.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades

The grading scale comprises: Pass with distinction (5), Pass with credit (4), Pass (3) and Fail (U).

The grading scale comprises Fail (U), 3, 4 or 5.

To pass the course, all mandatory components must be passed. To earn a higher grade than Pass, a higher weighted average from the grades of the components is required.

Course evaluation

The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire is used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

Additional information

The course replaces DIT280 Algorithms advanced course 7,5 hp. The course cannot be included in a degree which contains DIT280. Neither can the course be included in a degree which is based on another degree in which the course DIT280 is included.

The course is a joint course together with Chalmers.

Course literature to be announced 8 weeks prior to the start of the course.