



## COMPUTER SCIENCE AND ENGINEERING

### **DIT281 Algorithms, advanced course, 7.5 credits**

Algoritmer, fortsättningskurs, 7,5 högskolepoäng

*Second Cycle*

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#### **Confirmation**

This course syllabus was confirmed by Department of Computer Science and Engineering on 2017-02-13 and was last revised on 2017-06-07 to be valid from 2017-08-20, autumn semester of 2017.

*Field of education:* Science 100%

*Department:* 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) and 2) 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 DIT600 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.

## 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 (VG), Pass (G) and Fail (U).

**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.