



# DD2458 Problem Solving and Programming under Pressure

## 9.0 credits

Problemlösning och programmering under press

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

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

### Establishment

Course syllabus for DD2458 valid from Autumn 2016

### Grading scale

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

### Education cycle

Second cycle

### Main field of study

Computer Science and Engineering

### Specific prerequisites

One of the courses DD1352 Algorithms, Data Structures, and Complexity, DD2352 Algorithms and Complexity, or equivalent.

# Language of instruction

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

## Intended learning outcomes

The overarching goal of the course is that the students should be able to use programming as a tool for problem solving, and should be able to apply theoretical knowledge from other computer science courses to solve practical problems. The course has a large focus on going all the way from theory (in the form of algorithm design) to practice (in the form of a working program).

After passing the course the student should be able to:

- use algorithm design methods such as greedy algorithms, dynamic programming, decomposition, and combinatorial search to construct algorithms for solving given problems,
- apply basic algorithms in areas such as graph theory, number theory, and geometry on given problems and adapt them to problem-specific circumstances,
- analyze the efficiency of different algorithms in order to decide which ones are sufficiently efficient in a given context,
- compare different problems with respect to difficulty,
- implement algorithms and data structures given abstract specifications,
- identify bugs in others' solution attempts on a problem,
- communicate with others during problem solving in groups,
- present algorithms, data structures, and problems verbally in a concise and lucid way.

The goals are attained by solving number of homework assignments, implementing a small library of algorithms and data structures, solving problems in groups during problem solving sessions, and by presenting solutions to homework assignments.

## Course contents

Algorithms: computational geometry, graph algorithms, number theoretic algorithms, string matching. Design and analysis of algorithms: dynamic programming, amortized analysis, estimating the complexity of an algorithm. Programming skills mainly in C and Java.

## Course literature

Course literature will be announced on the course web page at least 4 weeks before course start.

## Examination

- LAB1 - Programming Contests, 4.5 credits, grading scale: A, B, C, D, E, FX, F

- ÖVN1 - Exercises, 4.5 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.

The grade is based on the number of solved problems of the various kinds, and, to some extent, on the quality of the presentations. As the problems are of greatly varying difficulty, the student that solves many problems will automatically also solve a number of harder problems, thereby motivating the higher grade. For grade A one additionally needs to solve a given number of extra difficult problems.

In this course all the regulations of the code of honor at the School of Computer science and Communication apply, see: [http://www.kth.se/csc/student/heder-skodex/1.17237?l=en\\_UK](http://www.kth.se/csc/student/heder-skodex/1.17237?l=en_UK).

## Other requirements for final grade

Examination can only be done during the course.

## 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.