



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIT961 Data Structures, 7.5 credits

Datastrukturer, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2017-02-10 and was last revised on 2018-03-26 to be valid from 2019-01-21, spring semester of 2019.

Field of education: Science 100%

Department: Department of Computer Science and Engineering

Position in the educational system

The course is a compulsory course in the Computer Science Bachelor's Programme and a single-subject course at the University of Gothenburg.

The course can be part of the following programmes: 1) Mathematical Sciences, Master's Programme (N2MAT), 2) Bachelor's Programme in Mathematics (N1MAT) and 3) Computer Science, Bachelor's Programme (N1COS)

Main field of studies

Computer Science

Specialization

G1F, First Cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

The requirements for the course is to have successfully completed:

- a course in imperative or object-oriented programming, 7.5 hec (e.g., DIT012 Imperative Programming with Basic Object-orientation, or equivalent),
- a course in functional programming, 7.5 hec (e.g., DIT440 Introduction to functional programming, or equivalent),
- a course or sub-course in discrete mathematics, 7.5 hec (e.g., DIT980 Discret Mathematics for Computer Scientists, the sub-course Introductory Algebra of MMG200 Mathematics 1, or equivalent).

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding

- explain some basic abstract data types and data structures, including lists, queues, tables, trees and graphs,
- explain some of the algorithms used to manipulate and query these data structures in an efficient way, and explain why they are correct,

Competence and skills

- apply basic abstract data types and data structures, and algorithms related to these,
- implement and use abstract data types as interfaces, and data structures as classes, in an object-oriented programming language,
- implement and use abstract data types in a functional programming language,

Judgement and approach

- make informed choices between different data structures and algorithms for different applications,
- analyse the efficiency of some algorithms.

Course content

The course covers the following topics:

- abstract data types,
- data structures and algorithms focusing both on imperative, object-oriented and functional languages,
- simple complexity analysis of imperative and functional code,
- differences between lazy and strict evaluation of functional data structures,
- common data structures such as arrays, lists, trees, hash tables and how these can be used to implement abstract data types such as stacks, queues, priority queues, dictionaries and graphs,
- standard algorithms for these data structures and their resource demands,
- iterators,
- sorting algorithms,
- standard libraries for data structures and algorithms.

Sub-courses

1. **Written exam** (*Tentamen*), 4.5 higher education credits
Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
2. **Laboratory work** (*Laboration*), 3 higher education credits

Grading scale: Pass (G) and Fail (U)

Form of teaching

The teaching consists of lectures, exercises, and laborations, as well as supervision in connection to the laborations.

Language of instruction: Swedish and English

The course might be given in English.

Assessment

The course is examined by an individual written exam given in an examination hall (4.5 hec) and laboratory work (3.0 hec). The laboratory work is normally done in pairs.

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).

To be awarded Pass (G) for a full course, the students must pass both the exam part and the laboratory work. To be awarded Pass with Distinction (VG) for a full course, the student must, in addition, receive a VG on the written exam part.

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

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

The course replaces the DIT960 Data structures 7,5 hp course. The course cannot be included in a degree which contains DIT960. Neither can the course be included in a

degree which is based on another degree in which the course DIT960 is included.