Data Structures

Programme course

6 credits

Datastrukturer

TND004

Valid from: 2020 Spring semester

Determined by
Board of Studies for Computer Science
and Media Technology

Date determined
2019-09-23

Main field of study
Computer Science and Engineering, Media Technology and Engineering

Course level
First cycle

Advancement level
G2X

Course offered for
- Electronics Design Engineering, M Sc in Engineering
- Media Technology and 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
Programming in C++

Intended learning outcomes
The aim of the course is to give students the tools to independently be able to create programs that solve practical problems dealing with large amounts of data, taking into account efficient use of time and memory. Upon completion of the course the student should fulfill the following learning outcomes.

- To propose specific data structures and algorithms to address practical problems.
- To motivate objectively the choices made, concerning chosen data structures, and relate to the known scientific results in the field.
- To analyze the trade offs, regarding efficiency in several aspects, of different data structures proposed for addressing a practical problem.
- To implement and use the data structures and algorithms in application programs.

Course content
Algorithm analysis. Recursion. Lists, stacks and queues. Trees and tree traversals. Binary search trees, threaded trees and balanced trees. Hashing and hash tables. Priority queues and binary heaps. Sorting och searching. Indexed files. Graphs and graph traversals. Fundamental graph algorithms.

Teaching and working methods

Lectures, lessons, and laboratory work.

Examination

UPG1	Optional assignment	0 credits	U, G
LAB1	Laboratory work	3 credits	U, G
TEN1	Written examination	3 credits	U, 3, 4, 5

The optional assignment consists of two quizzes. Results on the quizzes will give credits to the computer examination (and re-examination until the month of October after the course is completed).

Grades

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

Other information

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is Swedish, the course as a whole or in large parts, is taught in Swedish. Please note that although teaching language is Swedish, parts of the course could be given in English. Examination language is Swedish.
- If teaching language is Swedish/English, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English (depending on teaching language).
- If teaching language is English, the course as a whole is taught in English. Examination language is English.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent
Camilla Forsell

Examiner
Aida Nordman

Course website and other links
http://weber.itn.liu.se/~aidvi05/courses/14/index.htmlhttp://weber.itn.liu.se/~aidvi05/courses/

Education components
Preliminary scheduled hours: 60 h
Recommended self-study hours: 100 h

Course literature
Data Structure and Algorithm Analysis in C++, Mark Allen Weiss, Addison Wesley, 4th edition, year 2014.