Programming: Abstraction and Modelling

Programme course

8 credits

Programmering - abstraktion och modellering

TDDC74

Valid from: 2017 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2017-01-25

Replaced by
TDDE44

Main field of study
Computer Science and Engineering, Computer Science

Course level
First cycle

Advancement level
G1X

Course offered for
- Biomedical Engineering, M Sc in Engineering
- Mathematics, Bachelor´s Programme
- Applied Physics and Electrical 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
Elementary computer usage.

Intended learning outcomes
After completing this course, the students should be able to use data and program structures to represent computational problems and their solutions. More specifically, the students should be able to:

- exhibit a good understanding of the basic concepts in computer programming
- use an interactive programming environment to systematically and incrementally construct programs
- represent recursive and interative algorithms for problem solving
- construct data and program structures that facilitate design of programs that are reusable, easy to understand and easy to maintain
- successfully carry out a small programming project and write the required documentation

Course content

- Introduction to the programming environment used during the labs.
- The programming language SCHEME (a dialect of LISP): expressions, symbols, lists, variables and environments, lambda-notation, procedures, higher-order procedures.
- Abstraction methods: procedure abstraction, data abstraction with abstract data types and interfaces.
- Evaluation models: recursive and iterative processes.
- Basic data structures: trees, queues and tables. Pointers.
- Programming paradigms: functional, imperative and object oriented programming,
- Models for program interpretation: the substitution model and the environment model.
- Models for objects and state. Assignment.
- Organization and modularity of larger programs. Data-driven programming,
- Specification and documentation of a project.

Teaching and working methods

Lectures, problem classes and laboratory work with programming assignments. The course runs over the entire spring semester.

Examination

KTR4	Optional computer test	0 credits	U, G
KTR3	Optional computer test	0 credits	U, G
PRA1	Project	3 credits	U, 3, 4, 5
LAB1	Laboratory Works	3 credits	U, G
DAT1	Computer examination	2 credits	U, 3, 4, 5

The written examination can be substituted by two quizzes during the first period of the course. Written examinations of the entire course are given in June, October and August.

Grades

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

Other information

Supplementary courses: Programming - data structures and algorithms. Data and program structures.

Department
Institutionen för datavetenskap

Director of Studies or equivalent
Jalal Maleki

Examiner
Jalal Maleki

Course website and other links
http://www.ida.liu.se/~TDDC74

Education components
Preliminary scheduled hours: 64 h
Recommended self-study hours: 149 h

Course literature
Abelson, H, Sussman, G, J, Structure and Interpretation of Computer Programs. MIT Press. Boken finns även att tillgå på http://mitpress.mit.edu/sicp/full-text/book/book.html

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.