SYLLABUS

Compiler construction and formal languages 7.5 credits D7050E

Kompilatorteknik och formella språk

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2021-02-17

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LULEÅ TEKNISKA UNIVERSITET

Compiler construction and formal languages 7.5 credits D7050E

Kompilatorteknik och formella språk

Second cycle, D7050E

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Datalogi	Computer Technology

Main field of study

Computer Science and Engineering

Entry requirements

Basic knowledge in mathematics corresponding to M0049M Linear Algebra and Differential Equations. Knowledge of imperative programming (D0009E Introduction to Programming) and object-oriented programming & design (D0010E Object-oriented Programming and Design). Functions and relations, set theory, state automata (M0009M Discrete Mathematics). Searching and sorting, common data structures like queues, stacks, lists, trees and graphs (D0012E Algorithms and Data Structures). Stack-based assembly programming (D0013E Microcomputer engineering).

Good knowledge in English equivalent to English 6.

Selection

The selection is based on 30-285 credits

Course Aim

The student should be able to:

- Demonstrate knowledge of the disciplinary foundation of and proven experience regarding computational theory and models of computation, regular expressions and grammars, context-free languages and grammars, and semantic analysis through logical inference systems.

  This is shown in laboratory and theoretical assignments.

- Demonstrate the ability to identify, formulate and deal with issues autonomously and creatively and to analyse and evaluate technological solutions.

  This is shown through laboratory work and a lager project assignment designing and implementing a modern compiler covering aspects of: lexical and syntactic analysis, intermediate representations and transformations, type-checking and semantic analysis, code optimization and register allocation, and machine code generation for common architectures.

- Demonstrate the ability to identify the need for further knowledge and undertake ongoing development of his or her skills.

  This is shown in laboratory and project assignments which require gathering of information and critical evaluation of both the students own work and the work of fellow students.

- Demonstrate insight into research and development though understanding the possibilities and limitations of compiler technology.

  This is shown through laboratory and project assignments adopting recent methodologies and modern tooling.

Contents

Fundamental theories about computation and different models of computation. Construction of compilers. Lexical analysis, syntax analysis, and translation into abstract syntax. Regular expressions and grammars, context-free languages and grammars, lexer and parser generators. Identifier handling and symbol table organization. Type-checking, logical inference systems. Intermediate representations and transformations for different languages. Code optimization and register allocation. Machine code generation for common architectures.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
Teaching consists of lectures, homework assignments, laboratory work, and seminars. The laboratory work may be associated with a deadline.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.
Seminars and written home assignments and lab assignment reports. The grade is determined by the performances on all the moments.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course D7050E is equal to D7011E

The course replaces the courses D7006E and D7011E.

Course offered by

Department of Computer Science, Electrical and Space Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0001	Seminars, home assignments, laboratory work	G U 3 4 5	7.5	Mandatory	A19	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Jonny Johansson, HUL SRT 2021-02-17

Syllabus established

by Jonny Johansson, HUL SRT 2019-02-15