



# FID3006 Compilers and Execution Environments 7.5 credits

Kompilatorer och exekveringsmiljöer

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 FID3006 valid from Autumn 2021

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

## Language of instruction

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

## Intended learning outcomes

After passing the course, the doctoral student shall be able to

- design and implement programs with lexical, syntactic, and semantic analysis

- construct program code for the generation of machine code for non-trivial high-level programs
- test, evaluate, and implement methods for optimizing programs
- apply and reason about current research within the area

## Course contents

The course covers technologies for implementation of programming languages by means of compilers, both for real and virtual execution environments, technologies to read, understand, translate, improve as well as execute programs:

- To read programs: lexical analysis and syntax analysis. Finite state machines, regular expression context free grammars, LL and LR-parsing.
- To understand programs: semantic analysis, type checking.
- To translate programs: machines and instructions.
- Intermediary code, choice of instructions, conventions for procedure calls.
- To improve programs: machine independent optimisations; computer-oriented optimisations (register allocation, scheduling of instructions).
- To execute programs: virtual execution environments and runtime systems. Memory management, garbage collection, to load and link programs, just-in-time compilation.
- To apply and reason about research within the area of compilers and programming languages: to conduct a smaller individual project where current research articles within the area are used, where the project can (but does not have to) be related to the doctoral student's own research.

## Examination

- EXA1 - Examination, 7.5 credits, grading scale: P, 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 course is examined using hand-in assignments, seminars, peer reviewing tasks, and a final project assignment.

## Other requirements for final grade

The doctoral student receives a pass grade (P) on the FID3006 course if they complete the examination (passing criteria is given in the course memo of FID3006) as well as finish and present (orally and in writing) a smaller individual project at the end of 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.