



## Course syllabus

Faculty of Technology  
Department of Computer Science

4DV508 Utvalda problem inom kompilatorkonstruktion, 7,5  
högskolepoäng

Selected Topics in Compiling, 7.5 credits

### **Main field of study**

Computer Science

### **Subject Group**

Informatics/Computer and Systems Sciences

### **Level of classification**

Second Level

### **Progression**

A1F

### **Date of Ratification**

Approved by Faculty of Technology 2014-10-03

The course syllabus is valid from autumn semester 2015

### **Prerequisites**

90 credits in Computer Science including Compiler construction I (4DV506), 7.5 credits or equivalent.

## Objectives

Upon completion of the course, the student should be able to:

- understand advanced state-of-the-art Compiling techniques
- apply state-of-the-art Compiling techniques to Compiling problems and Software Engineering problems in general
- learn novel approaches to Compiling and relate them to state-of-the-art techniques of Compiling and architectures of compilers.

## Content

The course gives an in-depth knowledge of compiling and optimizing of programs. Also, it discusses basic program analysis and transformation techniques not only applicable in compilation but also in reverse engineering and software maintenance.

The course covers the following topics:

- the theory behind the semantic analysis: Attributed Grammars (AG), their subclasses and the computational complexity of these subclasses, implementation techniques of AGs and AG generators.
- data flow analysis as a basis for intermediate code generation and program optimization: monotonous data flow frameworks and abstract interpretation as theoretical models.

- modern intermediate representations – static single assignment (SSA) form: construction of SSA from triple intermediate representation performing a value numbering data flow analysis, analyzes and optimizations on the SSA representation.
- code generation techniques beyond macro expansion:
- bottom-up rewrite systems
- optimizing the code selection and code generation
- open research problems due to new machine architectures

## Type of Instruction

Teaching consists of lectures, seminars and self studies.

## Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

Written examination and/or assignments which are presented orally and/or in written form. The assessment method will be decided at the start of the course.

Students who do not pass the regular examination are given the opportunity to do a resit examination shortly after the regular examination.

## Course Evaluation

A course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The result of the course evaluation will be filed at the department.

## Credit Overlap

This course cannot be part of a degree in combination with another course in which the content fully or partly correspond to the content of this course: 4DV008 Selected Topics in Compiling, 7.5 credits

## Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

## Required Reading and Additional Study Material

### Required reading

Relevant literature / papers will be selected together with supervisor and examiner.