UNIVERSITY OF GOTHENBURG

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIT321 Finite Automata Theory and Formal Languages, 7.5 credits

Finite Automata Theory and Formal Languages, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by The IT Faculty Board on 2006-11-17 and was last revised on 2018-03-26 by Department of Computer Science and Engineering to be valid from 2019-01-21, spring semester of 2019.

Field of education: Science 100%
Department: Department of Computer Science and Engineering

Position in the educational system

The course is a part of the Computer Science Bachelor´s Programme and a single subject course at the University of Gothenburg.

The course can be part of the following programmes: 1) Computer Science, Master's Programme (N2COS), 2) Mathematical Sciences, Master's Programme (N2MAT), 3) Computer Science, Bachelor's Programme (N1COS), 4) Bachelor's Programme in Mathematics (N1MAT) and 5) No translation available (NDATM)

Main field of studies	*Specialization*
Computer Science	G1F, First Cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

The requirement for the course is to have successfully completed:

- a course in discrete mathematics (as for example MMGD10 or equivalent)

- a course in functional programming (as for example DIT440 or equivalent) or in object oriented programming (as for example DIT011 or DIT950 or equivalent).

Learning outcomes

After completion of the course the student is expected to be able to:

Knowledge and understanding

- explain and manipulate the different concepts in automata theory and formal languages such as formal proofs, (non-)deterministic automata, regular expressions, regular languages, context-free grammars, context-free languages, Turing machines;
- explain the power and the limitations of regular languages and context-free languages;

Skills and abilities

- prove properties of languages, grammars and automata with rigorously formal mathematical methods;
- design automata, regular expressions and context-free grammars accepting or generating a certain language;
- describe the language accepted by a automation or generated by a regular expression or a context-free grammar;
- transform between equivalent deterministic and non-deterministic finite automata, and regular expressions;
- simplify automata and context-free grammars;
- determine if a certain word belongs to a language;
- define Turing machines performing simple tasks;

Judgement and approach

- differentiate and manipulate formal descriptions of languages, automata and grammars with focus on regular and context-free languages, finite automata and regular expressions.

Course content

Formal proofs. Finite automata, regular expressions, and algorithms connecting the two notions. Pumping lemma for regular languages and properties of regular languages. Context-free grammars. Pumping lemma for context-free languages and properties of context-free languages. If time allows the course will contain a short introduction to push-down automata and Turing machines.

Form of teaching

Language of instruction: English

Assessment

The course is examined by individual weekly assignments (1.5 hec) during the course and an individual written exam (6.0 hec) given in an examination hall at the end of the course.

To pass (G) the assignment part of the course the student needs to individually get at least 50% of the total sum of all the weekly assignments. To get pass with distinction (VG) in the exam, the student needs to get at least 80% of the total points in the written exam.

A student who has failed two examinations on the same material has the right to request a change of examiner. Such a request must be submitted to the Department in writing and shall be granted unless there are particular reasons not to do so.

In cases where a course has been discontinued or has undergone major changes, students must be guaranteed at least three examination opportunities (including the regular opportunity) based on the previous content of the course for a period of at least one year.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
The final grade on the course is based on the performance (number of points) obtained on both the assignments and the exam parts of the course together.

To Pass (G) the course the student needs to pass both the assignments and the exam parts of the course.

To Pass the course with Distincion (VG) the student needs to pass both the assignments and the exam parts of the course and in addition the student needs to have obtained at least 74% of the total number of points in the whole course (when counting assignments and exam together).

Course evaluation

The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire is used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

Additional information

The course is a joint course together with Chalmers.