



Faculty of Economic Sciences, Communication and IT  
Computer Science

### Syllabus

#### Course Approval

The syllabus was approved by the Faculty Board of Economic Sciences, Communication and IT on 12 September 2012, and is valid from the Spring semester of 2013 at Karlstad University.

**Course Code:** DVGA17

**Theoretical Computer Science, 7.5 ECTS Credits**

**(Teoretisk datalogi, 7.5 Swedish credit points)**

**Degree Level:** Bachelor

**Progressive Specialisation:** G1F (First cycle, has less than 60 credits in first-cycle course/s as entry requirements)

#### Language of Instruction

Swedish

#### Prerequisites

The courses DVGA02 Software Development Methodology 7.5 ECTS cr, or DVGA11 Graphical User Interface 7.5 ECTS cr, or DVGA16 Programming Techniques II 7.5 ECTS cr, or equivalent

#### Major Field of Study

DVA (Computer Science)

#### Learning Outcomes

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

- construct an automaton for regular expression,
- construct pushdown automaton for a context-free grammar,
- use the pump lemma to determine whether a language is regular, context-free or neither,
- construct the Turing machine to solve a given problem,
- give an account of the Church-Turing hypothesis, the decidability of problems and the halting problem, and
- give an account of complexity classes.

#### Content and Form of Instruction

The course deals with the fundamentals of automaton theory, formal language, computation and complexity theory. The course is central to the understanding of the potentials and limitations of the computer and why some problems are to compute, difficult or easy. The course comprises the following components:

Alphabet, strings and language

Finite automata

Regular expressions

Pushdown-automata

Context-free grammar

Turing machines

Computation ability

Complexity theory

Reading List

See separate document.

Examination

Assessment is based on mandatory laboratory and hand-in assignments and a written exam.

Grades

One of the grades Pass with Distinction (5), Pass not without Distinction (4), Pass (3), or Fail (U) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course assessment is based on student views and experiences as reported in written course evaluations and/or group discussions. Students will be informed of the result of the evaluation and of the measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional Information

Students who enrolled before 1 July 2007 will complete their studies in accordance with the requirements of the earlier admission. Upon completion students may request degree and course certificates to be issued under the current ordinance if they meet its requirements.

The local regulations for studies at the Bachelor's and Master's levels at Karlstad University stipulate the obligations and rights of students and staff.

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