

**SYLLABUS**

# **Declarative Languages 7.5 credits D7012E**

**Deklarativa språk**

**Course syllabus admitted: Autumn 2023 Sp 1 - Present**

**DECISION DATE  
2021-02-17**

# Declarative Languages 7.5 credits D7012E

## Deklarativa språk

### Second cycle, D7012E

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

Knowledge of imperative programming (D0009E Introduction to Programming) and object-oriented programming & design (D0010E Object-oriented Programming and Design). Functions and relations, combinatorics, 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).

Good knowledge in English equivalent to English 6.

## Selection

The selection is based on 30-285 credits

## Course Aim

The student should

1. Demonstrate knowledge of best practices for software development in functional and logic-based languages and its scientific foundation.
2. Demonstrate the ability to critically, independently analyze and model complex problems and use appropriate methods to plan and solve problems through declarative software and analyze and evaluate the results.
3. Demonstrate the ability to create technological solutions using polymorphic type systems in functional languages , and to critically evaluate and analyze them.
4. Demonstrate the ability to create technological solutions, using the declarative search algorithms in logic-based languages , and to critically evaluate and analyze them.
5. Demonstrate the ability to identify the need for and acquire further knowledge by solving problems that require acquisition of considerable body of knowledge on their own.
6. Show awareness of research and development by understanding the limitations and possibilities of declarative programming.
7. Show profound knowledge of functional programming and broad knowledge of it including the application of functional programming in traditional languages .

## Contents

Expressions vs. commands, functional programming, pattern matching, higher order functions, recursion over lists and trees. Static type safety, polymorphic types, overloading with type classes, type inference, type abstraction, introduction to expressive module systems. Declarative programming of effects, monads. Relations vs. functions from an operational view, logic programming, unification and back-tracking. Properties of declarative programs, evaluation semantics, referential transparency. Declarative programming in classic languages.

## Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The first half of the course is devoted to functional programming using Haskell while the second part focuses on logic programming using Prolog. Instruction consists of lectures and laboratory work. Lab assignments are reported in writing and by demonstration, and may be associated with a deadline. Homework assignments that render credit marks on the subsequent written exam may also occur during the course.

## 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. Written exam as well as written and oral lab assignment reports. Passing the lab assignment part of the course requires a passed grade on all individual assignments.

The course goals are examined as follows:

Goals 1, 2, and 6: Written exam.

Goals 2, 3, 4, 5, 6, and 7: Lab assignments.

## 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.

## Course offered by

Department of Computer Science, Electrical and Space Engineering

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	3	Mandatory	A07	
0003	Written exam	G U 3 4 5	4.5	Mandatory	S22	

## 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 Department of Computer Science and Electrical Engineering 2007-02-28