

## Logic Programming (C003783)

Course size (nominal values; actual values may depend on programme)

Credits	6.0	Study time	180 h	Contact hrs	60.0 h
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Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	Dutch	seminar: practical PC room classes	30.0 h
		lecture	30.0 h

Lecturers in academic year 2020-2021

Scholliers, Christophe	WE02	lecturer-in-charge
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Offered in the following programmes in 2020-2021

	crdts	offering
<a href="#">Bachelor of Science in Computer Science</a>	6	A

Teaching languages

Dutch

Keywords

Programming languages, Logic programming, Backtracking, Unification, Prolog

Position of the course

This course provides an introduction into logic and the applications of logic in computer science. Central topics are classical formalisms for logic and logics for modal checking. The student learns how to apply these logics.

Contents

The first half of this course covers propositional and predicate logic. We start with natural deduction, the soundness and completeness for propositional logic. We treat Post's theorem on functional completeness of the connectives, propositional resolution and the Davis-Putnam procedure. Then natural deduction and semantics of the predicate calculus will be treated. The second half of the course deals with applications of logic in computer science. Model checking, the logics LTL and CTL, and binary decision diagrams will be explained. This course fits with the following competencies for the Bachelor education computer science: 1.1, 1.2, 1.5, 1.6, 2.3.

Initial competences

A basic knowledge of mathematics is presupposed, in particular knowledge of sets, functions, relations and trees as treated in discrete mathematics. Furthermore the student is supposed to have a working knowledge on formal propositional and predicate calculus, as taught in reasoning, abstracting and formulating.

Final competences

- 1 The student understands the syntax and semantics of first-order logic.
- 2 He/she recognizes which logical problems can be tackled with propositional or predicational logic and which can't.
- 3 He/she is able to prove simple statements in a natural deduction calculus or to disprove false assertion using models.
- 4 He/she is aware of the possibilities and restrictions of first-order logic and knows that there are extensions relevant to computer science.
- 5 He/she can apply tools for automated reasoning to support correctness proofs.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

## Conditions for exam contract

This course unit cannot be taken via an exam contract

## Teaching methods

Lecture, seminar: practical PC room classes

## Extra information on the teaching methods

Theory: Lectures, Exercises: Lectures with discussion, Seminar: coached exercises on PC

## Learning materials and price

Clocks, William F., and Christopher S. Mellish. \*Programming in PROLOG\*. Springer Science & Business Media, 2003.

Sterling, Leon, and Ehud Y. Shapiro. \*The art of Prolog: advanced programming techniques\*. MIT press, 1994.

## References

## Course content-related study coaching

The theory is explained in detail during the lectures. Additional explanations can be obtained when necessary. The seminars and practical exercise sessions are aimed at enhancing the understanding of the theoretical principles. An electronic learning environment supports the communication between students and teachers. Feedback after the project work allows monitoring of the individual study progress for the course. Lecturer and assistant are available for the student who have questions about the theory or the exercises.

## Evaluation methods

end-of-term evaluation and continuous assessment

## Examination methods in case of periodic evaluation during the first examination period

Written examination

## Examination methods in case of periodic evaluation during the second examination period

Written examination

## Examination methods in case of permanent evaluation

Assignment

## Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

## Extra information on the examination methods

The students are evaluated on a project assignment. Furthermore there is theory-exam which verifies whether the student masters the treated course materials.

## Calculation of the examination mark

1st exam: periodic (75%) and permanent (25%) evaluation.

2nd exam: periodic evaluation (100%).