GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Computability and Complexity (C000627)

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

Credits 6.0 **Study time 165 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	seminar
			lecture

Lecturers in academic year 2024-2025

Solda, Giovanni	WE16	lecturer-in-charge
Pakhomov, Fedor	WE16	co-lecturer

Offered in the following programmes in 2024-2025	crdts	offering
Master of Science in Teaching in Science and Technology(main subject Mathematics)	6	A
Master of Science in Computer Science	6	A
Master of Science in Mathematics	6	A
Exchange Programme in Computer Science (master's level)	6	A

Teaching languages

English

Keywords

Complexity, computability, Turing machine, NP-completeness.

Position of the course

Theoretical computer science.
Be able to judge computability and complexity of problems, understand different concepts of computability and the connection between mathematical proofs and computability.

Contents

1 Models of computation, Turing machines
2 Complexity classes, P and NP
3 Polynomial reducibility
4 NP-completeness, satisfiability
5 Undecidable problems, the halting problem

Initial competences

It is useful to have attended a basic course on Discrete Mathematics and a course on Formal Languages and Finite Automata (such as the course Automata, Computability and Complexity), or to have acquired the competencies from such courses another way.

Final competences

1 The student is familiar with different concepts of computability and complexity and can compare them.
2 He or she can judge the complexity of various problems.
3 He or she can apply this knowledge to new problems.

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

Seminar, Lecture

Study material

Type: Handouts

Name: Lecture notes'
Indicative price: Free or paid by faculty
Optional: no

References

- Michael Sipser: Introduction to the Theory of Computation, Cengage Learning, 2013, 481 pages, ISBN 978-1-133-18781-3
- S. Arora, B. Barak: Computational complexity. A modern approach. Cambridge University Press, Cambridge, 2009. 579 pp. ISBN: 978-0-521-42426-4.
- R.I. Soare: Turing computability: Theory and applications, Springer, 2016, 263pp, ISBN:978-3-642-31933-4.
- S.Homer and A.L. Selman: Computability and complexity theory, Springer, 2001, 194 pp, ISBN:0-387-95055-9.

Course content-related study coaching

Individually -- students can always contact the lecturers.

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Oral assessment, Written assessment

Examination methods in case of periodic assessment during the second examination period

Oral assessment, Written assessment

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

The permanent evaluation is based on presentations by the student and his active participation during the lectures.

Calculation of the examination mark

Permanent evaluation: mark between 0 and 10.
Periodic evaluation: mark between 0 and 5 for each of written and oral exam, out of 10 in total.
The final mark is the sum of these two.