

## CS-251 Theory of computation

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Cursus	Sem.	Type
Communication systems	BA4	Obl.
Computer science	BA4	Obl.
HES - IN	Е	Obl.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Written
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	2 weekly
Number of	
positions	

#### Summary

This course constitutes an introduction to theory of computation. It discusses the basic theoretical models of computing (finite automata, Turing machine), as well as, provides a solid and mathematically precise understanding of their fundamental capabilities and limitations.

#### Content

- Basic models of computation (finite automata, Turing machine)
- Elements of computability theory (undecidability, reducibility)
- Introduction to time complexity theory (P, NP and theory of NP-completeness)

## Keywords

theory of computation, Turing machines, P vs. NP problem, complexity theory, computability theory, finite automata, NP-completeness

#### **Learning Prerequisites**

#### Required courses

CS-101 Advanced information, computation, communication I CS-250 Algorithms

### **Learning Outcomes**

By the end of the course, the student must be able to:

- Perform a rigorous study of performance of an algorithm or a protocol
- Classify computational difficulty of a decision problem
- Define the notion of NP-completeness
- Analyze various computation models
- Design a reduction between two computational problems
- Characterize different complexity classes
- Explain P vs. NP problem

#### Transversal skills

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- Use a work methodology appropriate to the task.
- Continue to work through difficulties or initial failure to find optimal solutions.

# **Teaching methods**

Ex cathedra with exercises

#### **Assessment methods**

Written exam and continuous control

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