

# Topics for entrance exams Master's Programme

*Study programme: Computer Science (all study branches)*

## 1. Discrete mathematics

- using combinatory reasoning in problem solving („How many times one can do ...“)
- fundamental notions of graph theory
- graph algorithms (connected components, shortest path, spanning tree)

## 2. Propositional logic

- logical connectives
- transformation of propositional formulas (de Morgan laws)
- conjunctive and disjunctive normal forms
- proofs by contradiction and by mathematical induction

## 3. Formal automata and grammars

- regular languages
- regular grammars
- deterministic and non-deterministic finite-state automata
- reduction of automata
- context-free grammars and push-down automata

## 4. Algorithms and programming

- time complexity of algorithms
- analysis of computation for simple programs
- divisibility, prime numbers
- decomposition of numbers
- positional notation (Horner scheme)
- recursion
- depth-first search and breadth-first search