

# Models of Computation

## 1: Introduction

# Organization

Lecture: Wednesday 12:15 - 13:45, room 2.712

Practice class: Wednesday 14:15 - 15:45, room 2.712

Web page: <http://people.inf.elte.hu/lukovszki/Courses/26MCE>

For successful completion:

0. Mandatory attendance:  $\leq 4$  absences
1. Active participation and work in solving and discussing exercises in practice classes
2. passing  $\geq 50\%$  of the 10 min. tests at the beginning of the practice classes
  - Test in week  $k$  is for the content of week  $k-1$
3. Successful exams (grade is computed as average of 2 exams).

Important dates:

- midterm test/exam (written): 2026-10-14
- final test/exam (written): 2026-12-02
- repeat exam (second trial exam in case of unsuccessful exam): 2026-12-09

# Content

- Introduction
- Classical models of computation
- Finite automata, regular expressions, regular languages, regular pumping lemma
- Push-down automata, context-free languages, context-free pumping lemma
- Turing machines, variants
- Decision problems, undecidability
- Reduction
- P, NP, PSPACE,...
- Hierarchy theorems
- Circuits
- Unconventional models of computing

# Literature

- M. Sipser, Introduction to the Theory of Computation, 3rd edition, Cengage, 2012
- J. E. Savage, Models of Computation: Exploring the Power of Computing, Brown University, 1998.  
<https://cs.brown.edu/people/jsavage/book/pdfs/ModelsOfComputation.pdf>
- M. Fernandez, Models of Computation: An Introduction to Computability Theory (Undergraduate Topics in Computer Science), Springer, 2009