

Tárgyleírás

Szak megnevezése: Programtervező Informatikus MSc

Oktatás nyelve: magyar, angol

Tárgy neve: Models of computation

Tárgyfelelős neve: Dr. Lukovszki Tamás

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: AT

Az oktatás célja angolul / Aim of the subject:

The aim of the subject is to gain a better understanding of the concepts of computation and computational modeling through the study of important classical and unconventional computational models. Another goal is to learn how these models can be used in solving theoretical and practical problems.

Knowledge

- In order to be able to perform their work in an innovative way and do research (when necessary) in their own IT specialisation, they have comprehensive and up-to-date knowledge of general mathematical and computing principles, rules and relationships, formal models and tools in computing science.
- They know the characteristics of the major models and their applicability in solving theoretical and practical problems.

Abilities:

- They are able to apply their mathematical, computer science and informatics skills in a novel way in order to solve tasks in IT research and development.
- They are able to formalize complex IT tasks, to identify and study their theoretical and practical background and then to solve them.

Attitude:

- They follow professional and technological developments in their IT field, in particular in theory of computing.
- They adopt and coordinate the ethical principles of work, organizational culture and research.
- They share professional knowledge, mediates professional results.
- They are open to initiate collaboration with IT and other specialists.

Autonomy, responsibility:

- They take responsibility for their professional decisions made in their IT-related activities.
- They take responsibility for observing and enforcing deadlines.
- They take responsibility for own and fellow workers' work.

Az oktatás tartalma angolul / Major topics:

Classical models of computing: finite automata, pushdown automata, Turing machines, variants of these computing devices, partial recursive functions, random access machines, circuits, cellular automata, Petri nets. Other important models: networks and models of parallel and distributed computing. Neural networks. Unconventional models of computing (natural computing). Computational power, efficiency, computational and descriptive complexity of the discussed models and their applicability in solving theoretical and practical problems.

A számonkérés és értékelés rendszere angolul / Requirements and evaluation:

Midterm quiz and final oral or written exam with weights 50-50%.

Irodalom / Literature:

- 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
- M. Sipser, Introduction to the Theory of Computation, 3rd edition, Cengage, 2012
- G. Păun, G. Rozenberg, A. Salomaa: DNA Computing – New Computing Paradigms. Springer, 1998
- Gh. Păun, Membrane Computing. An Introduction. Springer, 2002