

## **Tárgyleírás**

**Tárgy neve:** Design and Analysis of Algorithms

**Tárgyfelelős neve:** Dr. Szabó László Ferenc

**Tárgyfelelős tudományos fokozata:** CSc

**Tárgyfelelős MAB szerinti akkreditációs státusza:** AT

**Az oktatás célja angolul / Aim of the subject:**

### **Knowledge:**

- Possession of required knowledge in mathematics and process control, especially in the following areas: system and control theory, numerical methods, optimization methods.
- Detailed and expert-level knowledge of the technical terms and expressions of computer science in English.

### **Abilities:**

- Ability to formalize complex technical problems, to analyze theoretical and practical background, and to provide adequate solutions.
- Skills for cooperation and team work, and ability to take leading role.
- Ability for written and oral communication in English, using the technical terms and expressions of computer science. Ability to argue, to prepare reports, to read, understand and exploit scientific and technical material (e.g. books and papers).
- Expertise in utilizing sources of technical information, their critical interpretation and evaluation, and the extraction of information relevant to the solution of a specific problem.
- Ability to perform supervised scientific research, and skills required for post-graduate studies.

### **Attitude:**

- Attends professional, technological development related to their qualification.
- Commitment to critical feedback and self-assessment.
- Commitment to lifelong learning and receptivity to new IT competencies.
- Adopts and coordinates the ethical principles of work, organizational culture and research.
- Shares professional knowledge, mediates professional results.
- Commitment to quality standards and its IT tools.
- Open to initiate collaboration with IT and other specialists.

### **Autonomy, responsibility:**

- Takes responsibility for his professional decisions taken during his professional activities.
- Takes responsibility for observing and enforcing deadlines.
- Takes responsibility for own and fellow workers' work.

**Az oktatás tartalma angolul / Major topics:**

Stable matching. Gale-Shapley algorithm. Divide and conquer algorithms. Mergesort. Counting inversions. Master method. Fast matrix multiplication. Fast polynomial multiplication. Closest pair of points. Dynamic programming. Matrix chain multiplication. Sequence alignment. Knapsack, subset sum and change-making problems. Greedy algorithms. Scheduling problems. Clustering. Approximation algorithms. Load balancing problem. Center selection problem. Knapsack problem. Randomized algorithms. Quicksort. Quickselect. Freivald's matrix multiplication algorithm.

**A számonkérés és értékelés rendszere angolul / Requirements and evaluation:**

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

**Irodalom / Literature:**

- T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein: Introduction to Algorithms. Fourth Edition. The MIT Press, 2022.
- J. Kleinberg, É. Tardos: Algorithm Design. Addison Wesley, 2006.