Study programme(s): Computer Science

Level: bachelor

Course title: Discrete Probability and Statistics

Lecturer: Miloš Stojaković

Status: obligatory

ECTS: 6

Requirements: Discrete Structures 1, Discrete Structures 2

Learning objectives

Students should learn and understand the basic notions and concepts of probability theory, several standard approaches in statistical analysis, as well as their connections with computer science.

Learning outcomes

Minimum: At the end of the course, it is expected that a student is able to perform basic discrete probabilistic analysis based on counting, and master standard statistical methods.

Desirable: At the end of the course, it is expected that a successful student is able to apply his/her knowledge of probability theory in a more complicated setting, possibly requiring a deeper analysis.

Syllabus

Counting in combinatorics and discrete probability spaces. Formal definition of a probability space. Probability measure, independence, random variables. Discrete and continuous distributions, conditional probability. Expectation, properties. Variance, properties. Limit theorems. Simulations.

Randomness and computation. Probability in information theory.

Statistical analysis. Parameter estimation, maximum likelihood and moment methods, tests, confidence intervals.

Literature

- S. Ross, *A First Course in Probability,* Pearson, 2014.
- J. Rice, *Mathematical statistics and data analysis,* Duxbury, 2006.
- M. Mitzenmacher, E. Upfal. *Probability and computing: Randomized algorithms and probabilistic analysis,* Cambridge University Press, 2005.

Weekly teaching load				
Lectures: 2	Exercises: 2	Practical Exercises: 0	Student research: 0	Other: **0**

Teaching methodology

Blackboard lectures, blackboard exercises.

Grading method (maximal number of points 100)

Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	**50**	*Oral exam*	**50**