Study programme(s): Information Technologies	
Level: Bachelor	
Course title: Combinatorics, Probability and Statistics	
Lecturer: Mirjana D. Mikalački	
Status: obligatory	
ECTS: 6	
Requirements: Discrete Structures 1, Discrete Structures 2	

Learning objectives

Teaching students to understand basic ideas and concepts of probability theory, that includes some combinatorics, and statistics, with applications in computer science.

Learning outcomes

Minimal: At the end of the course, it is expected that students know basic concepts of combinatorics and standard types of random variables and distributions that are most commonly used in computer science and that they can calculate expectation and variance, and master some standard statistical methods.

Desirable: At the end of the course, it is expected that successful students can combine basic and advanced knowledge in probability theory and statistics in solving more complex problems.

Syllabus

Basics of combinatorics, counting, binomial and multinomial coefficients. Principle of inclusion and exclusion. Events, outcomes, probability spaces and their properties. Conditional probability. Bayes' formula, independent events. Random variables. Discrete and continuous distributions. Expectation, properties. Variance, properties. Limit theorems. Simulations. Probability and algorithms.

Statistical analysis. Population, sample. Methods of parameter estimation. Hypothesis testing.

Literature

- D. Mašulović, *Odabrane teme diskretne matematike*, Departman za matematiku i informatiku, PMF u Novom Sadu, 2007.
- S. Ross, *A First Course in Probability*, Ninth Edition, Pearson, 2014.
- J. Rice, *Mathematical Statistics and Data Analysis*, Third Edition, Duxbury, 2006.
- M. Mitzenmacher, E. Upfal, *Probability and computing: Randomized algorithms and probabilistic analysis*, Cambridge University Press, 2005.
- R. Tošić, *Kombinatorika*, Univerzitetski udžbenik 88, 1999.
- D. Rajter Ćirić, *Verovatnoća*, drugo dopunjeno izdanje, PMF, Novi Sad, 2009.
- Z. Lozanov Crvenković, *Statistika*, PMF, Novi Sad, 2012.

Weekly teaching load				
Lectures: 3	Exercises: 2	Practical Exercises: 0	Student research: 0	Other: **0**

Teaching methodology

Frontal lectures, using classical methods. Blackboard exercises.

Grading method (maximal number of points 100)

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