

<b>Study program:</b> Information technology			
<b>Type and level of studies:</b> Undergraduate Academic Studies			
<b>Course unit:</b> Data Structures and Algorithms			
<b>Teachers in charge:</b> Olga M. Ristić			
<b>Language of instruction:</b> English			
<b>ECTS:</b> 6			
<b>Prerequisites:</b> Introduction to programming, Programming languages			
<b>Semester:</b> Winter			
<b>Course unit objective:</b> Enable students to apply basic data structures, abstract data types, and corresponding algorithms in software development. The application of algorithms in solving specific problems is essential for software development. Studying basic data structures is an important prerequisite for efficient software operation.			
<b>Learning outcomes of Course unit:</b> Students are enabled to follow the study of modern programming techniques and independently keep up with the development of software products. The readiness of students to implement various data structures in the Java programming language.			
<b>Course unit contents:</b> <b>Theoretical classes</b> Definitions and concepts of data structures and algorithms. Design and analysis of algorithms. Execution time of algorithms. Big O notation. Recursion. Linear and non-linear structures. One-dimensional and multidimensional arrays. Stacks. Queues. Lists. Sorting algorithms (Selection, Bubble, Insertion sort,...). Data searching algorithms (sequential, binary, interpolation,...). Recursive algorithms. Trees. Binary trees. Binary search trees. Graphs. Algorithms for traversing graphs. Minimum spanning trees. Topological sorting. Dynamic programming. <b>Practical classes</b> The practical exercises accompany the lectures and individual work in solving problems and tasks. Application and development of educational software for simulation and animation of data structures and algorithms.			
<b>Literature:</b> [1] James Cutajar, Beginning Java Data Structures and Algorithms, Packt Publishing, 2018, ISBN: 9781789537178 [2] Miodrag Živković: Algoritmi, Matematički fakultet, Beograd, 2000, ISBN 86-7589-020-6. [3] Dejan Živković: Uvod u algoritme i strukture podataka, Univerzitet Singidunum, Beograd, 2021, ISBN 978-86-7912-311-4. <a href="https://singipedia.singidunum.ac.rs/izdanje/40839-uvod-u-algoritme-i-strukture-podataka">https://singipedia.singidunum.ac.rs/izdanje/40839-uvod-u-algoritme-i-strukture-podataka</a> [4] James Cutajar: Beginning Java Data Structures and Algorithms, Packt Publishing, 2018, ISBN: 9781789537178 [5] Clifford A. Shaffer: Practical Introduction to Data Structures and Algorithm Analysis (Java Edition), dover publications, 2010, (доступна бесплатно на интернету: <a href="https://people.cs.vt.edu/shaffer/Book/">https://people.cs.vt.edu/shaffer/Book/</a> ).			
<b>Number of active teaching hours: 4</b>		<b>Lectures: 2</b>	<b>Practice: 2</b>
<b>Teaching methods:</b> Implementation of lectures and exercises based on the model of interactive teaching (teaching methods: popular lecture, discussion); activated forms of learning: verbal meaningful receptive learning, cooperative learning, practical learning.			
<b>Evaluation (maximum number of points 100)</b>			
<b>Exam prerequisites:</b>		No. of points:	<b>Final exam:</b>
Activities during teaching process		10	Final exam (written):
Practical teaching			Final exam (oral):
Colloquium		60	30
Practical teaching			