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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty**  | **Faculty of Sciences and Mathematics** |
| **GENERAL INFORMATION** |
| Study program  | Computer Science |
| Study Module (if applicable) |  |
| Course title | Data Structures and Algorithms |
| Level of study | [x] Bachelor [ ]  Master’s [ ]  Doctoral |
| Type of course | [x]  Obligatory [ ]  Elective |
| Semester  |  [x]  Autumn [ ] Spring |
| Year of study  | second |
| Number of ECTS allocated | 8.00 |
| Name of lecturer/lecturers | Jelena Ignjatović |
| Teaching mode |  [x] Lectures [ ] Group tutorials [ ]  Individual tutorials [ ] Laboratory work [ ]  Project work [ ]  Seminar [ ] Distance learning [ ]  Blended learning [ ]  Other |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** |
| The main purpose of the subject is to introduce basic abstract data structures, principles of their implementation and to introduce basic algorithms for using of these structures. At the end of the course a student would master basic abstract data structures, criteria for their implementation and basic algorithms for working with these structures, as well as to acquire the ability to independently and creatively solve complex problems using the acquired knowledge and known algorithms. |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| **Data types** - integer, real, character, static and dynamic data; **Elementary data structures** - arrays, matrices, sparse matrix, multidimensional arrays, records, sets, abstract data types; **Lists** - linear lists, cyclic lists, doubly linked list, cyclic doubly linked list, stack, queue; successive linear search, successive multiple-search; **The concept of recursion** - recursive mathematical functions, application recurrent relation to the analysis of recursive algorithms;**Hashing** - hash tables, hash functions, hashing methods; **Ordered binary search trees** - basic vocabulary operations, expected height of a binary tree;**Red-black trees** – basic operations;**Balanced trees** - AVL trees, BL-trees; **Graph algorithms** - BFS and DFS algorithms, Kruskal’s and Prime’s algorithm, basic analysis of the algorithms and their costs; **Standard complexity classes**; **Sorting methods** - insertion method, bubble method, merge sort, sorting by division, quick sort. |
| **LANGUAGE OF INSTRUCTION** |
| [x] Serbian (complete course) [ ]  English (complete course) [ ]  Other \_\_\_\_\_\_\_\_\_\_\_\_\_ (complete course)[ ] Serbian with English mentoring [ ] Serbian with other mentoring \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **ASSESSMENT METHODS AND CRITERIA** |
| **Pre exam duties** | **Points** | **Final exam** | **Points** |
| **Activity during lectures** | **5** | **Written examination** | **25** |
| **Practical teaching** | **10** | **Oral examination** | **40** |
| **Teaching colloquia** | **20 (2x10)** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |