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| **UNIVERSITY OF NIŠ** | | | | | | |
| **Course Unit Descriptor** | | **Faculty** | | | Faculty of Sciences and Mathematics | |
| **GENERAL INFORMATION** | | | | | | |
| Study program | | | | **Computer Science, PhD studies** | | |
| Study Module (if applicable) | | | |  | | |
| Course title | | | | I385 Design and Analysis of Algorithms 2 | | |
| Level of study | | | | Bachelor  Master’s  Doctoral | | |
| Type of course | | | | Obligatory  Elective | | |
| Semester | | | | Autumn Spring | | |
| Year of study | | | | 1 | | |
| Number of ECTS allocated | | | | 12 | | |
| Name of lecturer/lecturers | | | | Predrag S. Stanimirović | | |
| Teaching mode | | | | Lectures Group tutorials  Individual tutorials  Laboratory work  Project work  Seminar  Distance learning  Blended learning  Other | | |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** | | | | | | |
| *Investigate main algorithms and main strategies in defining algorithms. Particularly, investigate main algorithms of linear algebra and operations research.* | | | | | | |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** | | | | | | |
| **Basic notions:** Turing machine. Definition of computability, Big O, Little o, big omega and big theta notation. Complexity classes. **Technics of designing algorithms:** Divide-and-Conquer, Greedy, Dynamic programming, recursive algorithms, memoization, recurrent relations, complexity of algorithms and recurrent relations, Master method. **Аlgorithms of operations research:** Linear and convex programming, quadratic programming, simplex method, interior point methods, game theory; **Recursion and Divide-and-Conquer in matrix algebra:** Algorithms for matrix multiplication, recursive algorithms for inverting triangular and square matrices, recursive matrix factorizations, recursive algorithms for the pseudoinversion of square matrices, recursive algorithms and memoization in linear algebra; **Structured matrices:** Toeplitz, Circulant, Hankel matrices, Vandermonde matrices, correlations between structured matrices; Polygon triangulations. **Resource constrained project scheduling problems. NP hard problems in optimization.** | | | | | | |
| **LANGUAGE OF INSTRUCTION** | | | | | | |
| 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** | **10** | | **Written examination** | | | **30** |
| **Practical teaching** |  | | **Oral examination** | | | **60** |
| **Teaching colloquia** |  | | **OVERALL SUM** | | | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** | | | | | | |