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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 [x]  Doctoral |
| Type of course | [ ]  Obligatory [x]  Elective |
| Semester  |  [ ]  Autumn [x] Spring |
| Year of study  | 1 |
| Number of ECTS allocated | 12 |
| Name of lecturer/lecturers | Predrag S. Stanimirović |
| Teaching mode |  [x] Lectures [ ] Group tutorials [ ]  Individual tutorials [ ] Laboratory work [ ]  Project work [x]  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** |
| [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** | **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** |