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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty**  | **Faculty of Sciences and Mathematics** |
| **GENERAL INFORMATION** |
| Study program  | Computer Science, Mathematics |
| Study Module (if applicable) |  |
| Course title | Formal languages, automata and computability |
| Level of study | [ ] Bachelor [ ]  Master’s [x]  Doctoral |
| Type of course | [ ]  Obligatory [x]  Elective |
| Semester  |  [ ]  Autumn [ ] Spring |
| Year of study  |  |
| Number of ECTS allocated | 12.00 |
| 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)** |
| Introduction to the basic ideas, concepts and results of the computation theory, formal languages ​​and automata and modern trends in automata theory. After the completion of this course a student would master the basic ideas, concepts and results of the theory of formal languages ​​and automata, would become familiar with the most current types of automata, and would be able to apply mentioned ideas, concepts and results, independently and practically, in the scientific research within this or some other scientific fields. |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| **Introduction to automata theory**;**Free monoid of words** -Words, order on the monoid of words, languages, generative grammars, rules of implicationChomsky’s hierarchy; **Deterministic finite automata** (**DFA**) – achievable part of an automaton;**Minimization of automata** - congruence relations on automata, homomorphism between automata, derivatives (factors) of a language, algorithms for minimization of automata;**Non-deterministic finite automata** (**NFA**) - numerous of algorithms for determinization of automata; **Bisimulations between NFAs** - types of simulations and bisimulations**Regular languages -** properties of regular languages, regular grammars, Kleene ​​Theorem, minimum machine language;**Context-free languages –** context-free grammars, push-down automata as their representation, application: parsers, mark-up languages, XML;**Context-dependent languages –** context-dependent grammars, Turing machines as representation of these languages; **Fuzzy automata, quantum automata, probabilistic automata, timed automata, weighted automata and determinization of weighted automata**. |
| **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** | **--** |
| **Practical teaching** |  | **Oral examination** | **70** |
| **Teaching colloquia** | **20** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |