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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 | Numerical methods 1 |
| Level of study | [x] Bachelor [ ]  Master’s [ ]  Doctoral |
| Type of course | [ ]  Obligatory [x]  Elective |
| Semester  |  [x]  Autumn [ ] Spring |
| Year of study  | 3 |
| Number of ECTS allocated |  |
| Name of lecturer/lecturers | dr Marko Petković |
| 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 purpose of this course is introduction to the basic numerical methods and their applications in some practical problems. Students will acquire basic concepts of numerical methods, including the construction, analysis and implementation of these methods.*  |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| **Error analysis:** Floating-point arithmetics, Absolute and relative error, Error propagation.**Recursive computation and summation:** Linear difference equations (LDE), Fast computation of solution of LDE, Stability of solution of LDE, Summation of series and convergence acceleration, Taylor and asymptotic series, Continued fractions, algorithm for computation of continued fractions.**Numerical solution of non-linear equations:** Banach fixed-point theorem, Iterative methods, Convergence order, Newton-Raphson method, Secant mehtod, Subdivision method, Aitken d2 method, Newton-Kantorovich method, Numerical computation of roots of polyomials. **Numerical linear algebra:** Matrix and vector norms, Matrix sequences and series, Gauss and Gauss-Jordan method, LU and Cholesky decomposition, Time complexity and implementation of direct methods for linear systems of equations.**Iterative methods for linear systems and matrix inversion:** Eigenvalues computation, Jacobi method, Householder method. **Modern methods in numerical linear algebra:** Krylov subspace methods, CG and BiCG methods, GMRES method. Software packages for numerical linear algebra and applications.  |
| **LANGUAGE OF INSTRUCTION** |
| [x] Serbian (complete course) [x]  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** |  | **Written examination** |  |
| **Practical teaching** |  | **Oral examination** | **50** |
| **Teaching colloquia** | **50 (25+25)** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |