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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty**  | Faculty of Science and Mathematics |
| **GENERAL INFORMATION** |
| Study program  | **Mathematics** |
| Study Module (if applicable) | Mathematics / Mathematical models in physics |
| Course title | Differential Equations and Dynamical Systems |
| Level of study | [ ] Bachelor [x]  Master’s [ ]  Doctoral |
| Type of course | [x]  Obligatory [ ]  Elective |
| Semester  |  [x]  Autumn [ ] Spring |
| Year of study  | I |
| Number of ECTS allocated | 7.5 |
| Name of lecturer/lecturers | Jelena V. Manojlović |
| 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 idea of the course is to give a solid introduction to the theory of linear systems of differential equations, the qualitative theory of ordinary DE and the concept of dynamical systems.* Our goal will be to explain the general principles of linear and nonlinear dynamical system in the plain, and also to illustrate them via specific examples*. Course focus on* on geometric thinking, computational and analytical methods and makes extensive use of demonstration software in qualitative analysis of dynamical system. |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| **Linear systems** : existence and uniqueness of solutions, fundamental matrix, matrix exponential function, Putzer algorithm, fundamental theorem for linear systems, diagonalization, Jordan forms, nonhomogeneous linear systems**Dynamical systems:** phase plane diagrams for linear system in the plain, Romeo and Juliet model, linearization of nonlinear system – Hartman-Grobman theorem, phase plane diagrams for nonlinear systems in the plain, limit cycles - Poincare-Bendixon theorem, Lotka-Volterra models, direct and indirect Lyapunov method |

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| **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** |  | **Written examination** | **50 (depending on teaching colloquia)** |
| **Practical teaching** |  | **Oral examination** | **50** |
| **Teaching colloquia** | **50**  | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |