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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  Master’s  Doctoral | |
| Type of course | | Obligatory  Elective | |
| Semester | | Autumn Spring | |
| Year of study | | I | |
| Number of ECTS allocated | | 7.5 | |
| Name of lecturer/lecturers | | Jelena V. Manojlović | |
| Teaching mode | | 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** | | | |
| 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** | | | |