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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) |  |
| Course title | Stochastic Processes |
| Level of study | ☐Bachelor ☐ Master’s x Doctoral |
| Type of course | ☐ Obligatory x Elective |
| Semester  |  x Autumn ☐Spring |
| Year of study  | I |
| Number of ECTS allocated | 12 |
| Name of lecturer/lecturers | Prof. dr Marija Milošević |
| Teaching mode |  xLectures ☐Group tutorials ☐ Individual tutorials ☐Laboratory work ☐ Project work ☐ Seminar ☐Distance learning ☐ Blended learning ☐ Other |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** |
| *The foundations of the theory of stochastic processes in continuous time and stochastic calculus which may serve as a guide to the introduction of other special courses. Students should be able to learn major courses of stochastic processes and their applications.* |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| * The space of finite-dimensional distributions.

• Separability, measurability and continuity.• Gaussian processes.• Processes with independent increments.• Second-order processes. Orthogonal expansions and Hilbert space of processes.• Processes with orthogonal increments.• Stationary processes. Spectral representation. Linear transformations. Ergodicity.• Markov processes. Equivalent definitions. The strong Markov property. Homogeneous Markov processes. Diffusion equations (Kolmogorov's and Feller's equations). Diffusion processes. Birth and death processes.• Brownian motion. The Construction of Brownian motion and properties of trajectories. Martingale properties and stopping time properties.• Stochastic measures and integrals. |
| **LANGUAGE OF INSTRUCTION** |
| xSerbian (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** | **35** |
| **Practical teaching** |  | **Oral examination** | **35** |
| **Teaching colloquia** | **30** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |