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| **UNIVERSITY OF NIŠ** | | | | | | |
| **Course Unit Descriptor** | | **Faculty** | | | Faculty of Sciences and Mathematics | |
| **GENERAL INFORMATION** | | | | | | |
| Study program | | | | **Mathematics** | | |
| Study Module (if applicable) | | | |  | | |
| Course title | | | | Measure Theory and Integration | | |
| Level of study | | | | Bachelor  Master’s  Doctoral | | |
| Type of course | | | | Obligatory  Elective | | |
| Semester | | | | Autumn Spring | | |
| Year of study | | | | 2. | | |
| Number of ECTS allocated | | | | 7 | | |
| Name of lecturer/lecturers | | | | Vladimir Rakočević, Milica Kolundžija | | |
| Teaching mode | | | | Lectures Group tutorials  Individual tutorials  Laboratory work  Project work  Seminar  Distance learning  Blended learning  Other | | |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** | | | | | | |
| *Introduction to the measure theory and the Lebesgue integral.*  *The course is studying the fundamental concepts of the theory of measurable sets, the Lebesgue measure, the measurable functions and the Lebesgue integrals.* | | | | | | |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** | | | | | | |
| **Measurable sets: Measure space (sigma - algebra, algebra, sigma - ring, ring), sigma - algebra generated by collection of subsets, Borel sets, monotone collection of subsets.**  **Measure: Basic concepts, invariant measures on R, “light” and “heavy” problem of the measures on R.**  **Outer measures:** **Caratheodory's theorem, outer measures defined by measure, uniqueness of the extension, completion of the measure space, existence of the** **Lebesgue–Stieltjes measure, outer measure on R, approximation theorem of the Lebesgue measurable sets.**  **Measurable functions: Definition, examples, elementary operations with measurable functions, real (extended real) measurable functions, approximation of measurable functions by simple functions.**  **Integral of measurable functions: Integral of simple non-negative measurable functions, integral of non-negative measurable functions, examples, basic properties of integrals, Levi's theorem, Fatou’s lemma, integral as a measure, the term almost everywhere. Integral (arbitrary) measurable functions (definition, integral properties, Lebesgue's Dominated Convergence Theorem, integrals with parameters, Lebesgue integral, Riemann and Lebesgue integral, improper integral and Lebesgue integral.** | | | | | | |
| **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** | | |  |
| **Practical teaching** |  | | **Oral examination** | | | **50** |
| **Teaching colloquia** | **2 x 25** | | **OVERALL SUM** | | | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** | | | | | | |