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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 | [x] Bachelor [ ]  Master’s [ ]  Doctoral |
| Type of course | [x]  Obligatory [ ]  Elective |
| Semester  |  [ ]  Autumn [x] Spring |
| Year of study  | 2. |
| Number of ECTS allocated | 7 |
| Name of lecturer/lecturers | Vladimir Rakočević, Milica Kolundžija |
| Teaching mode |  [x] 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** |
| [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** |  |
| **Practical teaching** |  | **Oral examination** | **50** |
| **Teaching colloquia** | **2 x 25** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |