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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) | General Mathematics (elective), Mathematical Models in Physics (obligatory) |
| Course title | Fundaments of Fourier Analysis |
| Level of study | [ ] Bachelor [x]  Master’s [ ]  Doctoral |
| Type of course | [x]  Obligatory [x]  Elective |
| Semester  |  [x]  Autumn [ ] Spring |
| Year of study  | 1 |
| Number of ECTS allocated | 7.5 |
| Name of lecturer/lecturers | Nebojša Č. Dinčić |
| 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 basic techniques in the theory of Fourier analysis. The student will master methods for dealing with Fourier series and various forms of Fourier transforms. Student should be acquainted with importance and some applications of Fourier analysis. |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| Fourier series: periodic functions, orthogonal systems and complete systems of vectors. Complex and multiple Fourier series, Riemann theorem, problems of pointwise and uniform convergence of Fourier series, and approximating properties of partial Fourier sums. Differentiation and integration of Fourier series.Fourier transform: Fourier integral, conditions for Fourier integral representation of functions. Fourier transform, inverse Fourier transform, sine and cosine Fourier transform. Fourier transform of the derivative of the functions. Fourier transformation and convolution. Fourier transform of square-integrable functions. Schwartz space and Plancherel theorem. Fourier transform in *Rn* and Fourier transform of distributions. Fourier analysis on finite Abelian groups.Various applications of Fourier series and transforms: application in solving ordinary and partial differential equations; algorithms for discrete and fast Fourier transform (DFT and FFT), Poisson summation formula, Shannon theorem and Heisenberg uncertainty principle; JPEG and mp3 compression. |
| **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** | **10** | **Written examination** | **40** |
| **Practical teaching** |  | **Oral examination** |  |
| **Teaching colloquia** | **50** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |