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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty**  | Faculty of Sciences and Mathematics |
| **GENERAL INFORMATION** |
| Study program  | **Computer Science** |
| Study Module (if applicable) | Information processing |
| Course title | Information theory and coding |
| Level of study | [ ] Bachelor [x]  Master’s [ ]  Doctoral |
| Type of course | [x]  Obligatory [ ]  Elective |
| Semester  |  [ ]  Autumn [x] Spring |
| Year of study  | 1 |
| Number of ECTS allocated |  |
| Name of lecturer/lecturers | dr Marko Petković |
| 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 foundamental concepts in information theory and modern methods for source and channel coding. Introduction to the theory behind most popular compression programs (ZIP, RAR, etc.), foundaments of channel coding as well as applications to modern satellite, mobile and optical communication.* |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| **Foundamental concepts in information theory:** Entropy, properties and units, multidimensional random variable entropy, mutual information and relative entropy, entropy of natural languages.**Discrete sources of information:** Stationary sources and its entropy, Markov chains, differential entropy.**Source coding:** uniquely decodable codes, prefix codes, Kraft inequality, McMillan theorem, Shannon source coding theorem, Shannon-Fano and Huffmann coding, arithmetical and LZ (LZW, Deflate, ZIP) coding.**Communication channels:** statistical model of communication channel, capacity.**Channel coding:** Asymtotic equipartition property, Shannon channel coding theorem, optimal (ML and MAP) decoders, linear block codes, convolutional codes, cyclic codes, LDPC codes and iterative decoding.**Continuous signal coding:** Sampling theorem, scalar quatizers, Lloyd-Max algorithm for optimal quantizer construction, companding quantizers, vector quantizers. |
| **LANGUAGE OF INSTRUCTION** |
| [x] Serbian (complete course) [x]  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** | **100 (50+50)** |
| **Teaching colloquia** |  | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |