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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty**  |  |
| **GENERAL INFORMATION** |
| Study program  | **Computer Science** |
| Study Module (if applicable) |  |
| Course title | Artificial Neural Networks |
| Level of study | [ ] Bachelor [ ]  Master’s [x]  Doctoral |
| Type of course | [ ]  Obligatory [x]  Elective |
| Semester  |  [ ]  Autumn [x] Spring |
| Year of study  | 1 |
| Number of ECTS allocated | 12 |
| Name of lecturer/lecturers | Branimir Todorovic |
| 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 Artificial Neural Networks. Architectures and learning algorithms. Implementations and applications* |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| **Feed Forward Neural Networks. Multilayer perceptron. Radial Basis Function network. Error backpropagation. Gradient, subgradient and second order training algorithms. Recurrent neural networks: Elman, fully connected recurrent neural, NARX recurrent neural network. Error backpropagation through time, real time recurrent learning. Sequential Bayesian estimation of feedforward and recurrent neural networks. Extended, Unscented and Divided Difference Kalman filter as feedforward and recurrent neural networks training algorithms. Self-organizing neural networks and adaptive resonance theory. Training of deep neural architectures: vanishing and exploding gradient problem. Reinforcement learning in neural networks** |
| **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** | **20** | **Oral examination** | **50** |
| **Teaching colloquia** | **30** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |