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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty**  | Faculty of Electronic Engineering, Niš |
| **GENERAL INFORMATION** |
| Study program  | Telecommunications |
| Study Module (if applicable) | Telecommunications and Signal Processing, Radiocommunication Engineering and Technologies |
| Course title | DSP Algorithms and Programming |
| Level of study | ☐Bachelor ☐ Master’s ☐ Doctoral |
| Type of course |  Obligatory Х Elective |
| Semester  |  ☐ Autumn ☐Spring |
| Year of study  | I |
| Number of ECTS allocated | 4 |
| Name of lecturer/lecturers | Nikolić R. Tatjana, Stojčev K. Mile |
| Teaching mode |  ☐Lectures ☐Group tutorials ☐ Individual tutorials ☐Laboratory work ☐ Project work ☐ Seminar ☐Distance learning ☐ Blended learning ☐ Other |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** |
| The goal of this course is to introduce students with the theoretical and practical knowledge required for implementation of the basic algorithms used in the domain of digital signal processing using DSP processors.Training student to use the DSP processor for digital signal processing using modern development tools and software. |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| Review of the theory of digital signal processing. Digitization of analog signals. A/D and D/A converters. Specificity and DSP processor architectures. Representation of the data using fixed and floating point format and arithmetic; the effect of finite length words. Instruction set. Programming the DSP processors in assembly language and higher programming language. Development kits and tools: assembler, linker, simulator, debugger. Programming of DSP algorithms: convolution, correlation, digital filters (IIR, FIR, LMS, DFT, FFT, and IFFT). Audio signal processing using DSP processors. Image processing using DSP processors. Code optimization.It is planned that students individually do the following exercises: 1) Manipulation with number of fixedand floating-point format, 2) Understanding the capabilities of modern development tools for the design, 3) Implementation of FIR and IIR filters using MATLAB and FDATool, 4) Practical application of FFT, 5) Generation of sinusoidal and noise signal, DTM (dual-tone multifrequency) generator and detector; 6) Audio signal processing, sound source location, and the use of the cepstrum in speech recognition, 7) Echoes cancelation, 8) Techniques for channel coding and application in communications, 9) Digital image processing, histogram, filtering, application of standard JPEG and DCT, 10) Medical imaging processing, filtering electrocardiogram (ECG) and electroencephalogram (EEG) signals. Exercises are carried out using software tools MATLAB and Code Composer Studio, and DSP development system. |
| **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** | **10** | **Written examination** | **20** |
| **Practical teaching** | **20** | **Oral examination** | **20** |
| **Teaching colloquia** | **30** | **OVERALL SUM** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |