

Specification for the book of courses

Study program	Electrical Engineering and Computer Science			
Module	Common			
Type and level of studies	Doctoral studies			
The name of the course	DSP Architectures and Algorithms			
Lecturer (for lectures)	Nikolić R. Tatjana			
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	The goal of this course is to involve students to theoretical and practical knowledge required for designing hardware for implementation of algorithms in the field of digital signal processing and software development for DSP processors.			
Course outcomes	Competence of students to use DSP processor for digital signal processing in real time and modern tools for efficient design and implementation of complex DSP applications. Competence for hardware design of basic DSP blocks and usage of DSP IP cores for the implementation in complex DSP applications.			
Course outline				
Theoretical teaching	Specificity and DSP processor architecture. Areas of DSP applications. Data presentation and arithmetic, the effect of finite length words, aspects of the program, working in real time, and hardware interface. Programming the DSP processors in assembly language and higher programming language. DSP for use in fixed point format. DSP in floating point format. DSP for embedded applications. DSP on FPGA. Code optimization. Hardware realizations: digital filters (FIR and IIR), Discrete Fourier Transform, CORDIC, algorithms for cryptography, digital modulation and demodulation circuits.			
Practical teaching (exercises, OFE, study and research)	It is planned that students individually do seminar papers in the following areas: 1) manipulation with the numbers in fixed- and floating-point format, 2) understanding the capabilities of modern development tools for the design, 3) digital filter, 4) FFT, 5) convolution and correlation, 6) interpolation and decimation, 7) adaptive filtering, and 8) interface with DSP processor.			
Textbooks/references				
1	Shoab Ahmed Khan, Digital Design of Signal Processing Systems: A Practical Approach, Wiley, 2011.			
2	U.M-Baese, Digital Signal Processing with Field Programmable gate Arrays, Springer-Verage, Berlin, 2007.			
3				
4				
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
3	0	0	0	0
Teaching methods	Teaching is held in a form of lectures and mentoring work with students. Independent and team work of students during solving tasks within research projects.			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam		Points
Activity during lectures		Written exam		
Exercises		Oral exam		50
Colloquia				
Projects	50			