

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		Approximation Methods		
Lecturer (for lectures)		Stančić Z. Goran		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives				
The expansion and upgrade of the basic knowledge acquired in the field of analog and digital signal processing. A new approximation methods study as a basic building block in analog and digital filter design.				
Course outcomes				
Students gain the necessary level of theoretical and practical knowledge to successfully answer any specific requirements related to the design, modeling, performance evaluation, estimation of sensitivity, optimization of the filter function, optimization of implementation structure, realization, practical application and verification of analog and digital filter systems.				
Course outline				
Theoretical teaching				
The approximation problems. The magnitude approximation methods. Maximally flat characteristics. Equiripple characteristics. Least-squares error approximation. The transitional characteristics. Other methods of magnitude approximation. Phase characteristic approximation methods. Maximally flat phase characteristics and group delay characteristics. Phase and group delay equiripple characteristics. Interpolation technique in phase approximation. Simultaneous magnitude and phase approximation. Phase and magnitude correctors. The other phase approximation methods. Time domain approximation methods. Equiripple approximation. Interpolation techniques. The other approximation methods. Direct approximation in the z-domain. Hilbert transformer.				
Practical teaching (exercises, OFE, study and research)				
The approximation methods in time domain. Min-max approximation. Least square error approximation. Interpolation techniques. The other approximation methods. Interpolation in z domain. The Hilbert transformer. Digital differentiators .				
Textbooks/references				
1	S. Mitra, Digital signal processing A computer based approach, McGraw-Hill, 2006.			
2	Jon G. Proakis, Dimitris Manolakis, Digital Signal Processing, Pearson, 2007.			
3	J.Proakis and D.Manolakis, Digital signal processing: principles, algorithms and applications,1988.			
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				
Lectures, auditory exercises,consultation				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures			Written exam	30
Exercises			Oral exam	40
Colloquia				
Projects		30		