

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		Simulation and Optimization of Electronic Circuits and Systems		
Lecturer (for lectures)		Petković M. Predrag		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS		10	Course status (obligatory/elective)	Elective
Prerequisites				
Course objectives		Adoption and systematization of knowledge about algorithms for analysis and optimization of analogue, simulation of digital as well as mixed signal circuits. Adopting advanced knowledge in modeling electronic devices.		
Course outcomes		Simulation of analog circuits: Domains of abstraction: DC, AC, TR time domain. Algorithms for simulation. Concepts of equation formulation for the analysis of electronic circuits. Algorithms for simulation. Simulation of linear resistance circuits. Frequency domain and s-domain. Simulation of non-linear resistance circuits. Simulation of linear reactive circuits. Simulation of non-linear reactive circuits. Simulation of car with distributed parameters. Methods of Modeling Electronic Components. Characteristic examples of the model: diode, transistors and four-layer structures. Algorithms for simulation of digital circuits. Signal and operator modeling. Modeling the delay. Asynchronous simulation. The principle of the selection of roads and the next event. Simulation of cars with mixed signals. Generating power supply and methods for estimating power and delay. Optimization of electronic circuits: Significance of weight function. Optimization procedures based on the Newton's algorithm. Statistical optimization methods. Simulated cure. Evolutionary algorithms. The notion of tolerance and yield. Deterministic and statistical analysis of tolerances.		
Course outline				
Theoretical teaching		Simulation of analog circuits: Domains of abstraction: DC, AC, TR time domain. Simulation algorithms. Concepts of equation formulation for the analysis of electronic circuits. Simulation of linear R circuits. Frequency domain and s-domain. Simulation of non-linear R circuits. Simulation of linear reactive circuits. Simulation of non-linear reactive circuits. Simulation of circuits with distributed parameters. Methods of Modeling Electronic Devices. Characteristic examples of the model: diode, transistors and four-layer structures. Algorithms for simulation of digital circuits. Signal and operator modeling. Delay modeling. Asynchronous simulation. The route selection and the next (subsequent) event principles. Simulation of mixed signals circuits. Methods for estimating power and delay. Optimization of electronic circuits: Significance of weight function. Optimization procedures based on the Newton's algorithm. Statistical optimization methods. Simulated annealing. Evolutionary algorithms. The notion of tolerance and yield. Deterministic and statistical analysis of tolerances.		
Practical teaching (exercises, OFE, study and research)		Practice, research work.		
Textbooks/references				
1	V. Litovski, Projektovanje elektronskih kola, Nova Jugoslavija Vranje, 2000, ISBN 86-7369-015-3.			
2	V. Litovski and M. Zwolinski, VLSI Circuit Simulation and Optimization, Chapman and Hall, London, 1997, ISBN 0 412 63860 6.			
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	Individual projects and research papers.		
Grade (maximum number of points 100)			
Pre-exam duties	Points	Final exam	Points
Activity during lectures		Written exam	
Exercises		Oral exam	30
Colloquia			
Projects	70		