

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		Mathematical Models in Industry		
Lecturer (for lectures)		Antić S. Dragan, Milojković T. Marko		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Training students to meet the increasing needs of the modern industry for abstract models and predictions both during research and in the production process itself.			
Course outcomes	Gaining knowledge of the mathematical models in the industry, their obtaining and applications as well as possibilities for the use of sophisticated mathematical methods to solve practical problems of the modeling in the modern industry.			
Course outline				
Theoretical teaching	Models of dynamical systems. The classification of the models. Abstract models. Principles of mathematical modeling. Types of mathematical models. Examples of mathematical models. The mathematical modeling of technical systems (mechanical, hydraulic, thermal, chemical and technological). Simplification of mathematical models. Validation and verification of the model. Mathematical modeling of disturbance. Modelling of industrial systems. Modeling of complex systems. Current trends in modeling of industrial systems. Modeling using orthogonal functions. Applications of genetic algorithms, fuzzy logic and neural network in the mathematical modeling in the industry. Commercial software for the modeling of industrial systems.			
Practical teaching (exercises, OFE, study and research)				
Textbooks/references				
1	D. Antić, B Danković, "Modelling and simulation of dynamical systems", Faculty of Electronic Engineering, Niš, 2001. (in Serbian)			
2	M. Milojkovic, D. Antić, S. Nikolic, "Practical handbook on modelling and simulation of dynamical systems", Faculty of Electronic Engineering, Niš, 2018. (in Serbian)			
3	C. Close, D. Frederick, J. Newell, "Modeling and Analysis of Dynamic Systems", John Wiley & Sons, 2002.			
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 methods (classical - lectures or mentor - consultations) will be adapted according to the number of students. By using scientific journals and other literature, the student deepens the material from lectures, and through the consultations and study research with the teacher student should be trained to write his own scientific work.			
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			