Specification for the book of courses

Study program	Electrical Engineering and Computer Science		
Module	Communications and Information Technologies - Communications and Information Processing		
Type and level of studies	Undergraduate Academic Studies		
The name of the course	Modeling and Simulation of Telecommunication Systems		
Lecturer (for lectures)	Đorđević T. Goran		
Lecturer/associate (for exercises)	Cvetković M. Aleksandra		
Lecturer/associate (for OFE)	Cvetković M. Aleksandra		
Number of ECTS	5	**Course status (obligatory/elective)**	Elective
Prerequisites			
Course objectives	Basics theoretical and practical knowledge for modeling and simulation of telecommunication channels, transmitters and receivers. The deepening of the acquired knowledge from Telecommunications Theory.		
Course outcomes	The students will learn to perform spectral analysis of stochastic signals and modeling telecommunication channels, transmitters and receivers. They will be able to perform simulation studies of uncoded and encoded signal transmission (ASK, FSK, PSK, QAM) over telecommunication systems and determine their performance. They will be able to perform software implementation of adaptive equalization, Viterbi algorithm and BCJR algorithm.		
Course outline			
Theoretical teaching	Algorithms for generating stochastic variables with given distribution. Stochastic signals. Convolution and correlation of stochastic signals - estimation based on the generated or measured samples. Spectral analysis of stochastic signals. Application of autoregressive model with slider mean value for generating signal samples with given autocorrelation function. Modeling of telecommunication channels. Modeling of transmitters and receivers. Simulation of digital signal transmission in baseband and passband. Systems for adaptive processing of stochastic signals. Simulation of filtering and adaptive equalization. Software implementation of Viterbi and BCJR (Bahl, Cocke, Jelinek, Raviv). Software implementation of encoding and decoding of block and convolution codes. Monte Carlo simulation for estimation of error probability. Importance of sampling method to accelerate performance evaluation. Spatial-Time Codes - Simulation of the Alamuti Scheme..		
Practical teaching (exercises, OFE, study and research	Exercises on the board and laboratory exercises will be organized from all method units from the lectures		
Textbooks/references			
1	M. C. Jeruchim, P. Balaban, K. Sam Shanmugan, Simulation of Communication Systems – Modeling, Methodology, and Techniques, Kluwer Academic/Plenum Publishers, NY, 2000.		
2	D. B. Drajić, Introduction to Statistical Telecommunications Theory (in Serbian), Akademska misao, Belgrade, 2006.		
3	W. C. Jakes, Microwave Mobile Communications, John Wiley – IEEE Press, 2nd edition, 2004.		
4	J. G. Proakis, M. Salehi, Digital Communications, 5th edition, McGraw-Hill, New York, USA, 2007.		
5	S. Lin, D. J. Costello, Jr., Error Control Coding, 2nd edition, Pearson – Prentice Hall, 2004.		

Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
2	2	1	0	0
Teaching methods	Lectures. Exercises. Laboratory exercises. Consultations.			

Grade (maximum number of points 100)			
Pre-exam duties	**Points**	**Final exam**	**Points**
Activity during lectures	5	**Written exam**	20
Exercises	5	**Oral exam**	30
Colloquia	30		
Projects	10		