

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		Random processes in telecommunication systems		
Lecturer (for lectures)		Milović M. Daniela		
Lecturer/associate (for exercises)		Eferica M. Predrag		
Lecturer/associate (for OFE)		Eferica M. Predrag		
Number of ECTS	6	Course status (obligatory/elective)	Elective	
Prerequisites				
Students acquire basic knowledge from random processes and statistical processing of signals and applications in telecommunication systems. Students will be able to model random processes and understand the concepts of stationarity, ergodicity of statistical independence, correlation, and modelling of noise. They will be able to design optimal linear systems and solve various communication problems.				
Course objectives				
Defining the concepts of the theory of random processes and applications in telecommunication systems. Analysis of practical problems in which random processes occur and solving complex tasks using acquired knowledge.				
Course outcomes				
Defining the concepts of the theory of random processes and applications in telecommunication systems. Analysis of practical problems in which random processes occur and solving complex tasks using acquired knowledge.				
Course outline				
Continuous and discrete random signals. Random processes - stationarity and independence, correlation function and spectral power density. Random processes in linear systems. Estimation of parameters: statistical model, MLE. Bayes estimation, MMSE estimation. Signal detection. Noise modelling. Optimal linear systems. Wiener's filter. Matched filter. Optimum filtering. Extraction of signals from noise by correlation and matched filter. Test hypothesis: statistical model, Neyman-Pearson test, MLE test. ML test, MAP test, Bayes test, sufficient statistic.				
Theoretical teaching				
Auditory and computer exercises.				
Practical teaching (exercises, OFE, study and research)				
Auditory and computer exercises.				
Textbooks/references				
1	Probability, Random Variables and Stochastic Processes, A. Papoulis, S. Unnikrishna Pillai., Mc Graw Hill, 2002			
2	Statistical Signal Processing, Steven M. Kay, Vol. I: Estimation Theory and Vol. II: Detection Theory, Prentice Hall Signal Processing Series, 1993			
3	Statistical Signal Processing, Louis Scharf. Statistical Signal Processing, Prentice Hall, 1991			
4	Probability and Random Processes, Geoffrey R. Grimmett, David R. Stirzaker, Oxford University Press, 2001			
5	Information Theory, Inference, and Learning Algorithms, David J. C. MacKay, Cambridge University Press, 2003			
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, auditory exercises, homeworks, office hours.				
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures		5	Written exam	25
Exercises		25	Oral exam	25
Colloquia				
Projects		20		