

## Specification of the course for the Book of courses

<b>Study program</b>		Applied statistics		
<b>Title of the course</b>		<b>Introduction to probability theory</b>		
<b>Teachers (for lectures)</b>		Miljana Jovanović		
<b>Teacher/fellow teacher (for exercises)</b>		Jasmina Đorđević		
<b>ESPB</b>	8	<b>Status of the course (obligatory (O) /elective (E))</b>		0
<b>Conditions</b>	none			
<b>Aim of the course</b>	The aim of this course is to give an introduction of the theory of probability and random variables necessary for understanding the statistical analysis. This course is a prerequisite for all other courses in the study program.			
<b>Course outcomes</b>	After passing this exam, students will master the concept of probability and random variables. They will understand the characteristics of one-dimensional and multidimensional random variables. Students will understand and will be able to apply the central limit theorem, and will understand the basic principles of statistical analysis based on the theory of large numbers.			
<b>Content of the course</b>				
<b>Theoretical classes</b>	Statistical experiment, probability space. Axioms of probability. The classical definition of probability. Geometric probability. Statistical definition of probability. Properties of probability. Independent events and conditional probability. The formula of total probability and Bayes formula. Random variables. Distribution functions. Discrete random variable. Continuous random variable. Random vectors. Independence of random variables. Functions of random variables and random vectors. Numerical characteristics of random variables. Mathematical expectation. Moments. Covariance and correlation coefficient. Covariance matrix. Information and entropy. Characteristic functions. Limit theorem. Types of convergence in probability theory. Čebyšev type inequalities. Laws of large numbers. Central limit theorem and its applications. Empirical distribution function and the central theorem of statistics. Conditional distribution. The definition of conditional distributions with respect to random variable. Conditional mathematical expectation and variance.			
<b>Practical classes</b>	Content of practical classes follows theoretical classes through solving the problems in investigating areas.			
<b>References</b>				
1	Ivković Z., "Teorija verovatnoća sa matematičkom statistikom", Naučna knjiga, 1989.			
2	Spanos, Aris: Probability Theory and Statistical Inference, Cambridge: University Press, 1999			
3	Danijela Rajter-Čirić: Probability, Novi Sad: Faculty of Science, Department of Mathematics and Informatics, 2009.			
4	Spiegel, Murray R.: Theory and Problems of Probability and Statistics, New York: McGraw-Hill, 2000			
<b>The number of contact hours per week during the semester / trimester / year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>DON</b>	<b>Research work</b>	<b>Other classes</b>
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<b>Teaching methods</b>	Lectures, exercises, individual work			
<b>Evaluation of knowledge (maximum score 100)</b>				
<b>Pre exam duties</b>		<b>points</b>	<b>Final exam</b>	<b>points</b>
<b>Activity during lectures</b>		10	<b>oral exam</b>	40
<b>colloquia</b>		50		