Subject code	Credits
MAT1013	6

Title

TIKIMYBIÒ TEORIJA IR MATEMATINĂ STATISTIKA

Title in English

PROBABILITY THEORY AND MATHEMATICAL STATISTICS

Subject goal and annotation

Acquired fundamental knowledge of probability theory and mathematical statistics, the basic principles of application of probability models and statistical methods, ability to apply knowledge and skills in implementation of analytical researches of various system and processes: collect data and information about the problematic phenomenon select and ground the methods of analysis, present obtained results and make conclusions based on it.

Prerequisites

Undergraduate course: mathematics, algebra.

Relationship between the learning outcomes of the Programme and learning outcomes of the subject

Learning outcomes of the Programme	Learning outcomes of the subject	Criteria for measuring the achievement of learning outcomes
1. Knowledge and understanding of basic mathematics, physics and nature, and its applicability in engineering. 7. Formalization and specification of real-world problems, and ability to describe them at an abstract level	1. To identify the main methodologies for sample creation and to describe the specificity of data collection according to the chosen methodology of sample creation	The student defines the methodologies of statistical sample creation.
	2. To perform an initial statistical data analysis: to estimate the numeric values of characteristics, to interpret the obtained results and to draw conclusions.	The student clearly defines and estimates at least half of the main numeric data characteristics.
	3. To present statistical data from different perspectives using graphics	The student presents the graph of empirical density function.
	4. To estimate the point and interval values of model parameters	The student is able to present the definitions for the notions of point and interval values.
	5. To formulate and test statistical hypotheses and to present the conclusions of the analysis	The student demonstrates the knowledge of the main principles while formulating and testing parametric hypotheses (on the theoretical level ï definitions).
	6. To evaluate the interdependence of quantitative and qualitative data	The student is able to name the main characteristics which define the interdependence of qualitative and quantitative data.
	7. To apply the methods of regressive analysis: to select a model, to estimate parameters, to test the statistical relevance between the parameters and the model, to adapt the model for forecasting	The student clearly describes the aim, the stages of application of regressive analysis and its potentials for practical use.
	8. To analyse independently a specific situation: to select proper statistical methods for analysis of given data set (related to computer system work)	The student demonstrates the minimal knowledge efficient for carrying out a specific situation analysis.

Subject content

1.	**Lecture topics and contents**	**Hours**
2.	Random events. Classical and statistical definition of probability	1
3.	Conditional probability and independent events.	1
4.	Total probability formula. Bayes formula. Bernoulli trial.	2
5.	Random variable. Probability distribution functions. Characteristics of random variables.	5
6.	Main classical probability distributions (with applications).	3
7	Statistical samples.	1
8.	Descriptive statistics.	5
9.	Point estimates of parameters.	2
10.	Interval estimates of parameters: confidence intervals, forecast intervals.	2
11.	Parametric hypothesis testing.	8
12.	Non-parametric hypothesis testing.	3
13.	Introduction to correlation analysis.	6
14.	Introduction to regressive analysis.	6
	Total	**45**

Practical work contents

1. Calculation of probabilities of random events.
2. Calculation of characteristics of random variables. Main classical probability distributions applications.
3. Calculation of descriptive statistics for given data set (and visualization).
4. Calculation of point and interval estimates of parameters.
5. Parametric and non-parametric hypothesis testing.
6. Correlation analysis of given data set.
7. Selection of regression model of given data set, testing of the statistical relevance between the parameters and the model, and adaptation for the forecasting.

Evaluation of study results

Final written exam (50%), mid-term written exam (25%), assessment practical work (10%) and assessment of laboratory work (15%).

Distribution of subject study hours

Lectures	45
Practical work	12
Laboratory work	18
Individual studies (including studies in groups, preparation for the mid-term and final exams)	87
Total	**162**

Recommended literature

No	**Authors of publication and title**	**Number of copies available**		
		in the Library of VMU	*in specialized publication collections at VMU*	*in other libraries*
Basic materials				
1.	Ļ ekanaviļ ius V., Murauskas G. Statistika ir jos taikymai. 1, 2 dalys. 2000.	54		
Supplementary materials				
1.	Pabedinskaitā A., Kiekybiniai sprendimÔmetodai, I dalis. 2009			
2.	Baļ inskas A., Janilionis V., Jokimaitis A. TikimybiÔ teorijos ir statistikos praktikumas: mokomoji knyga. 2000			
3.	Brase C. H. Understandable statistics: concepts and methods. 2003			

Subject prepared and coordinated by

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