HIGHER MATHEMATICS AND PROBABILITY THEORY I

<table>
<tr><td>Credit points</td><td colspan="3">4 CP</td></tr>
<tr><td>Duration of the course</td><td colspan="3">1 sem.</td></tr>
<tr><td>Study course annotation</td><td colspan="3">The course provides the basic knowledge of higher mathematics necessary for every student-economist, and also develops the skills needed in the construction of mathematical proofs. Duringthe study process, students should acquire such knowledge, skills and abilities that will allow them
to use mathematical methods productively and creatively in special economic courses, to interpretthe results of calculations made with the help of mathematical models.</td></tr>
<tr><td>Aim of the study course</td><td colspan="3">• Development of mathematical thinking, formal notations of geometric properties and relationships, including so that the necessary calculations can be used in economic disciplines;
• Learning the mathematical apparatus that is applicable in economic disciplines and used in economic literature;
• Learning mathematical methods of economic analysis, developing students' intelligence.</td></tr>
<tr><td rowspan="2">Study course results</td><td>Knowledge</td><td>Skills</td><td>Competences</td></tr>
<tr><td>1. Knows various concepts related to algebra questions matrices, determinants, functions, polynomials.
2. Knows vectors and related things. Knows three different vector multiplications and theirdifferences.
3. Knows various types of geometric figures - both in the plane and in space, their definitions and properties.
4. Knows the concept of a function and related things composite function, inverse function, sequence of numbers, limits of functions and sequence of numbers.
5. Knows the derivative of a function and its geometric interpretation.</td><td>1. Can perform operations with matrices, determinants.
2. Able to solve LVS with several techniques.
3. Can multiply and divide polynomials.
4. Able to divide a rational part into partial parts.
5. Can perform operations with vectors. Able to solve problems related to vector multiplication.
6. From the given equation, you can determine plane and space figures. Can solve planimetry and stereometry problems.
7. Can create composite functions from basic functions. Can find the limits of various functions and number strings both by definition and by various properties of functions, number strings and also limits.
8. Can find the derivative of a function both by definition and by basic formulas.</td><td>1. Able to apply his knowledge in solving various problems related to mathematics.
2. Able to use the mathematical apparatus insolving scientificproblems related to the profession, the student has acquired the ability to use mathematical methods in practice.
3. By successfully studying,the student acquires practical competence in mathematics as a tool for solving natural scienceproblems, in mathematical methods as a tool in conducting research, and in the connection betweennatural sciences and theoretical mathematics.</td></tr>
<tr><td>Study course content</td><td colspan="3">Topics
1 Elements of financial mathematics
2 Matrices. Determinants
3 Systems of linear equations
4 Functions. Borders
5 Derivative</td></tr>
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	6	Studying functions
	7	Vectors, vector space
	8	A straight line and a plane in space
	9	Integral calculations
	10	Multi-argument function
	11	Differential equations
Form of assessment:	Differentiated written assessment, during which the teacher can ask questions	
Obligatory literature:		
1. Fundamentals of Business Mathematics and Statistics (FMS). Foundation / The Institute of Cost Accountants of India (ICAI). - 2nd ed. - 2014. - 426 p.: fig., table.		
Additional reading:		
1. Mathematics of the financial markets. Financial instruments / Alain Ruttiens. - 2013. -351 p. 2. Discrete Mathematics and its Applications / Kenneth H. Rosen. - 6th ed. - McGraw-Hill, 2007. - 843		
Other sources of information:		
1. Electronic database of the BSA library (www.bsa.edu . lv): 2. EBSCO (ENG): http://search.ebscohost.com 3. Databases of the Latvian National Library http://www.lnb.lv).		
Changes and additions to the program and literature list are possible during the study process		

HIGHER MATHEMATICS AND PROBABILITY THEORY II

<table>
<tr><td>Credit points</td><td colspan="3">4 CP</td></tr>
<tr><td>Duration of the course</td><td colspan="3">2 sem.</td></tr>
<tr><td>Study course annotation</td><td colspan="3">The course provides the basic knowledge of probability theory and mathematical statistics, whichis necessary for every student-economist, and also develops the skills necessary in the creation of mathematical proofs and the processing of statistical data. During the study process, students mustacquire such knowledge, skills and abilities that will allow them to productively and creatively use statistical methods in special economic courses, to interpret the results obtained with the helpof mathematical models. The course covers the basic concepts and theorems of classical probability theory, distribution laws of random variables, functions and numerical characteristics, concepts of regression, entropyand information.</td></tr>
<tr><td>Aim of the study course</td><td colspan="3">The aim of the study course is to acquire basic knowledge and practical skills in the collection,processing and analysis of statistical data.
To achieve this goal, students are introduced to:
• types of maintenance and presentation of statistical information, as well as the mostimportant statistical indicators describing the empirical distribution;
• the basics of probability theory, creating an understanding of the application possibilitiesof probability theory;
• to the basic concepts, ideas and methods of mathematical statistics on which statisticalhypothesis testing, correlation and regression analysis are based.</td></tr>
<tr><td rowspan="2">Study course results</td><td>Knowledge</td><td>Skills</td><td>Competences</td></tr>
<tr><td>1. Knows various concepts related to probability theory - definitions of probability, random events, random variables, elements of combinatorics.
2. Knows the numerical characteristics of case sizes.
3. Knows sampling methods and related matters.
3. Knows different types of formulas related to probability theory (Bayes formula, Bernoulli formula, etc.)
4. Knows the types of distributions (binomial distribution, Poisson distribution, uniform distribution, exponential distribution, normal distribution).
Knows the basic elements of mathematical statistics population, sample, series of variations).
Knows the hypothesis testing scheme</td><td>4. Can perform operations with combinatorics elements.
5. Able to solve problems in the calculation of probabilities with several techniques, using basic formulas and theorems of probabilities.
6. Can calculate mathematical expectation, variance, standard deviation.
1. Able to find the distribution law and distribution function of a random variable.
2. Can draw up absolute frequency table, relative frequency table, accumulated absolute frequency table.
3. Can construct frequencyhistograms</td><td>1. Able to apply his knowledge in solving various tasks related to mathematics and statistics.
2. Able to use the mathematical apparatus in the solutions of scientific problems related to the profession, the student has acquired the skill of using mathematical methods in practice.
3. By successfully studying, the student acquires practical competence on statistics as a means of solving natural science problems , on mathematical methods as a means of conducting research and on the connection of natural sciences with theoretical mathematics and statistics.</td></tr>
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Study course content	**Topics**	
	1	Basic concepts of probability theory. Events. Elements of combinatorics. Definitions of probability
	2	Case sizes
	3	Point estimates and interval estimates of distribution parameters
	4	Sampling methods. Sampling errors
	5	Statistical hypothesis testing
	6	Rows of variations
	7	Analysis of variance. Regression analysis
Form of assessment:	Differentiated written assessment during which the instructor can ask questions	

Obligatory literature:

1. Probability Theory. A First Course in Probability Theory and Statistics / Werner Linde. - Berlin: De Gruyter, 2010. – 395 p. - (+CD)
2. Probability, Random Processes, and Statistical Analysis / Hisashi Kobayashi, Brian L. Mark and William Turin. -Cambridge, University Press, 2012. - 780 p

Other sources of information:

1. Electronic database of the BSA library (www.bsa.edu . lv):
2. EBSCO (ENG): http://search.ebscohost.com
3. Databases of the Latvian National Library http://www.lnb.lv).

Recommended periodicals:

1. Central Statistics Office of the Republic of Lithuania. Statistical data collections
2. Central Statistics Office of the Republic of Lithuania. Latvia's regions in numbers

Web links:

1. www.uwm.edu

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