

Description of Discipline

Title of Discipline: <i>Probability Theory and Mathematical Statistics</i>					
Semester	Duration	Type of Discipline	ECTS Credits	Academic Workload	Language of Instruction
3	180 hrs.	compulsory	6	50 hours of classroom training, 130 hours of self-study	Ukrainian

Learning Outcomes	Teaching Methods	Evaluation Methods
LO5. To apply analytical and methodological tools to substantiate offers and make managerial decisions by various economic agents (individuals, households, enterprises and public authorities).	Lectures, taking notes, practical classes, exercises, tasks and practice	Oral evaluation, final tests, reports, graphic methods, exam
LO7. The ability to apply economic and mathematical methods and models to solve economic problems.	Lectures, presentations, watching videos, exercises, tasks and practice	Oral evaluation, final tests, reports, graphic methods, exam
LO10. To apply theoretical knowledge to solve practical problems and interpret the results properly.	Practical classes, exercises, practice, problem educational tasks, presentation	Written evaluation, colloquium, exam
LO16. The ability of abstract thinking, analysis and synthesis to identify key characteristics of economic systems of different levels as well as behavior features of their business entities.	Practical classes, exercises, discussion, problem educational tasks and presentation	Individual and combined evaluation, colloquium, essays, presentations, exam

Title of Discipline / <i>Probability Theory and Mathematical Statistics</i>				
Semester	Duration	Type of Discipline	ECTS Credits	Student Workload
3	210 hrs.	mandatory	7	60 hours of teaching, 150 hours of self-study

Requirements for Participation	Type of examination (oral, written, term paper, etc.)	Methods of teaching and learning (lectures, seminars, etc.)	Discipline Coordinator
Complete general secondary education	Written exam	Lectures, practical classes	M. Yurchenko

Learning Outcomes
GC3. Ability to abstract thinking, analysis and synthesis. GC4. Ability to apply knowledge in practical situations. GC5. Ability to communicate in the state language both orally and in writing. GC7. Skills in the use of information and communication technologies. GC8. Ability to search, process and analyze information from various sources.

SC6. Ability to apply economic and mathematical methods and models to solve economic problems.

SC7. Ability to use computer technology and data processing software to solve economic problems, analyze information and prepare analytical reports.

SC9. Ability to predict socio-economic processes on the basis of standard theoretical and econometric models.

SC10. Ability to use modern sources of economic, social, managerial, accounting information for the preparation of official documents and analytical reports.

SC27. Ability to prepare information, choose the type of model, calculate its parameters and assess adequacy.

SC34. Ability to navigate the basic methods and systems of man-made safety, reasonably choose known devices, systems and methods of protection of man and the environment from hazards.

PLO5. Apply analytical and methodological tools to substantiate proposals and make management decisions by various economic agents (individuals, households, enterprises and public authorities).

PLO7. Apply appropriate economic and mathematical methods and models to solve economic problems.

PLO9. To analyze the functioning and development of economic entities, to determine the functional areas, to calculate the relevant indicators that characterize the effectiveness of their activities.

PLO10. Apply the acquired theoretical knowledge to solve practical problems and meaningfully interpret the results.

PLO16. Be able to think abstractly, apply analysis and synthesis to identify key characteristics of economic systems at different levels, as well as the behavior of their subjects.

PLO27. Ability to apply knowledge and understanding to solve problems that are characteristic of the economy.

PLO31. Master the skills of oral and written professional communication in state and foreign languages.

PLO36. Ability to present and discuss the results obtained and transfer the acquired knowledge.

Contents

MODULE 1. BASIC THEOREMS OF PROBABILITY THEORY

Topic 1. Subject and methods of probability theory. Elements of combinatorics. Experiment. The set, the space of elementary consequences of the experiment. Random events.

Topic 2. Addition theorem on probability. Continuous probability theorem. Multiplication theorem on probability. Dependent and independent events. Formula of total probability. Bayes's theorem.

Topic 3. Bernoulli trial. Poisson limit theorem. De Moivre–Laplace theorem.

MODULE 2. RANDOM VARIABLES

Topic 1. Random variables. Random distribution function and its properties. Discrete and continuous random variables. Density of random variable distribution. Random vector. Distribution function, density of random vector. Independent random variables. Student's t-distribution, F-distribution.

Topic 2. Numerical characteristics of random variables. Expected value and its properties. Variance of random variable. Chebyshev's inequality. Correlation matrix of a random vector. Regression.

Topic 3. The convergence of sequences of random variables. Properties. The law of large numbers. Characteristic functions and their properties. Central limit theorem.

MODULE 3. ELEMENTS OF MATHEMATICAL STATISTICS

Topic 1. Problems of mathematical statistics. General and sample populations and their numerical characteristics. Graphic representation of sampling data: polygon and histogram. An empirical distribution function. Point estimation of distribution parameters. Interval estimation of distribution parameters.

Topic 2. Criteria of analysis of variance. χ^2 criterion. Kolmogorov–Smirnov test. Elements of analysis of variance. Elements of correlation theory. Elements of regression theory.

Exemplary Literature

Primary:

1. Barkovsky V.V., Barkovskaya N.V., Lopatin O.K. Probability theory and mathematical statistics. - Kyiv: ЦУЛ, 2002. - 448 p.
2. Bobyk O.I., Beregova G.I., Kopytko B.I. Probability theory and mathematical statistics. - Kyiv: Professional, 2007. - 560 p.
3. Ventzel E.S., Ovcharov L.A. Applied problems of probability theory. - M.: Radio and communication, 1983. - 415 p.
4. Volkovets A.I., Gurinovich A.B. Probability theory and mathematical statistics. Practicum.– Minsk, 2003. - 65 p.
5. Gihman I.I., Skorokhod A.V., Yadrenko M.J. Probability theory and mathematical statistics. - Kyiv: Higher School, 1979. - 320 p.
6. Gmurman V.E. Guide to solving problems in probability theory and mathematical statistics. - Moscow: Vyshcha shkola, 2002. - 404 p.
7. Gnedenko B.V. Course of probability theory. - Moscow: Nauka, 1988. - 404 p.
8. Karmelyuk G.I. Probability theory and mathematical statistics. Manual for solving problems - Kyiv .: Center for Educational Literature, 2007. - 575 p.
9. Kaniovskaya I.Y. Probability theory in examples and problems. - Kyiv: NTUU Polytechnic, 2004. - 154 p.
10. Kopych I.M., Sorokovsky V.M. Elements of probability theory and mathematical statistics: theory and workshop. -Lviv: LKA Publishing House, 2001. -336 p.
11. Kartashov M.V. Probability, processes, statistics. - Kyiv: VPTs Kyiv University, 2007. - 494 p.

Secondary:

1. Senyo P.S. Probability theory and mathematical statistics. - Київ: Znannia, 2007. - 556 p.
2. Slyusarchuk P.V. Probability theory and mathematical statistics. - Uzhhorod: Karpaty, 2005. - 180 p.
3. Turchin V.M. Probability theory. - Kyiv: ACK, 2004. - 206 p.
4. Shiryaev A.N. Probability. - M .: Nauka, 1989. - 640 p.
5. Cherney R.K. Workshop on probability theory and mathematical statistics. - Kyiv, 2006. - 328 p.

Web resources

1. The official site of the library. V. Vernadsky. - Access mode: <http://nbuv.gov.ua/>
2. Official site of the Scientific Library of CPNU. - Access mode: <http://library2.stu.cn.ua/>

Academic staff

Name	Academic degree	Position	Qualification / Academic Discipline	Full-time / Part-time	Area of Teaching
Yurchenko Maryna Yevheniivna	PhD in Physical and Mathematical Sciences	Head of the Department of Accounting, Taxation and Audit	Taras Shevchenko National University of Kyiv, Mechanical and Mathematical Faculty, specialty – Mechanics, Analytical Mechanics and Dynamics of	Full-time	Statistics, Probability Theory and Mathematical Statistics

			Rigid Body, qualification - Mechanic, Applied Mathematics; PhD in Physical and Mathematical Sciences, 01.02.04 Mechanics of Deformed Rigid Body		
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