PJSC "Higher Educational Institution
"INTERREGIONAL ACADEMY OF PERSONNEL MANAGEMENT"

МАУП

SYLLABUS
of the academic discipline

PROBABILITY THEORY

Level of higher education:	first (bachelor's) level
Field of knowledge:	D Business, Administration and Law
Specialty:	D3 Management
Study program:	Management

IAPM 2025

General information about the academic discipline

Name of the academic discipline	Probability Theory
Code and name of the specialty	D3 Management
Level of higher education	First (bachelor's) level
Discipline status	Compulsory
Number of credits and hours	4 credits/120 hours Lectures: 22 hours Seminars/practical classes: 30 hours Students' independent work: 68 hours
Terms of study of the discipline	2 semester
Language of instruction	Ukrainian
Final control type	Pass/fail (credit)

General information about the instructor. Contact information.

Full name of the instructor	
Academic degree	
Position	
Areas of scientific research	
Links to the registers of identifiers for scientists	

Contact information	
E-mail:	
Department phone	
Instructor's portfolio on the website	

Discipline's description.
The course provides knowledge on the use of mathematical methods in economics; on solving typical problems related to random variables; applying the laws of the theory of random processes and the theory of mass service; applying mathematical methods of statistical data analysis.

The subject of the discipline is the basic concepts of probability theory, statements, theorems; principles of building mathematical models of processes and methods of model research; possibilities of applying mathematical methods, limits of possible use of mathematical models.
The aim of the discipline is to create the theoretical foundations and practical skills in probability theory and mathematical statistics in the future specialist and effective use of probability theory and mathematical statistics in his future activities.

The objectives of the discipline:
mastering the basic principles and theoretical provisions of probability theory and mathematical statistics; mastering generally accepted norms for the application of mathematical symbols in scientific literature; mastering methods of formal transformations for solving analytical models of physical, economic and social objects; acquisition of practical skills in solving formal problems in probability theory and mathematical statistics.

Prerequisites for the discipline:
The course "Probability theory and mathematical statistics" is closely related to the course "Higher mathematics".

Post-requests for the discipline:
professional disciplines of the educational and professional program of the specialty.

Program competences

General competences	GC3. Ability for abstract thinking, analysis, and synthesis. GC4. Ability to apply knowledge in practical situations.
Special competences	SC17. Ability to independently identify economic problems and propose ways to solve them for analysis, forecasting, planning and optimization in management.
Intended learning outcomes	ILO12. Evaluate the legal, social, and economic implications of an organization's operations. ILO18. Demonstrate skills in analyzing the effectiveness of management of operational, marketing, foreign economic activity of the enterprise, justify the directions of its future development for the preparation and presentation of analytical reports.

Content of the academic discipline

№	Topics	Number of hours, of which:			
		Lectures	Seminars	Independent work	Teaching methods /assessment methods
2 semester Content module 1. Linear algebra and analytic geometry. Introduction to Mathematical Analysis and Differential Calculus					Teaching methods. The main types of classroom training are lectures, practical classes, consultations. When teaching lecture material, a combination of such forms and methods of teaching as lectures-conversations, lectures-visualizations is provided The lecture-conversation ensures the teacher's direct contact with the audience and allows you to draw your attention to the most important issues of the topic of the lecture, to determine in the process of dialogue the peculiarities of the perception of the educational material. You have the opportunity to consider the questions raised, make a self-assessment of the level of your training, learn to independently formulate conclusions and generalizations. Lecture-visualization includes a visual form of presentation of lecture material by technical means of learning. Reading such a lecture is reduced to extensive or brief commenting by the teacher on the visual materials being viewed. When conducting practical classes, students are provided with a detailed consideration of individual theoretical provisions of the academic discipline with the teacher and the formation of skills and abilities of their practical application through the student's individual performance of formulated tasks and solving situational problems. Assessment methods: oral control (oral survey, evaluation of participation in discussions, other interactive learning methods); written control (control, independent works, essays); test control

					(closed tests: test alternative, test compliance); method of self-control and self-assessment; assessment of case tasks.
Topic 1.	Empirical and logical foundations of the theory	2	2	4	
Topic 2.	Probabilities. Basic concepts of probability theory. Combinatorics methods	2	2	4	
Topic 3.	Basic theorems of probability theory, their economic interpretation. Consequences of addition and probability multiplication theorems.	2	2	4	
Topic 4.	Scheme of independent tests. Sequences of independent tests. Random variables and their economic interpretation.	1	2	4	
Topic 5.	Distribution laws and numerical characteristics of random variables. Numerical characteristics of one-dimensional random variables. The probability distribution function of a random variable. Laws of distribution of a discrete random variable.	1	2	6	
Topic 6.	Multidimensional random variables. The law of distribution of two-dimensional random variables.	2	2	4	
Topic 7.	Random argument functions.	1	2	4	
Topic 8.	Limit theorems of probability theory.	1	2	4	
Topic 9.	Elements of the theory of random processes and the theory of mass service	1	2	4	
Content module 2. Mathematical statistics					
Topic 10.	Primary processing of statistical data. Basic concepts of mathematical statistics.	2	2	4	
Topic 11.	Statistical and interval estimation of distribution parameters. Statistical estimates of distribution parameters.	2	2	4	
Topic 12.	Statistical verification of statistical hypotheses	1	2	4	
Topic 13.	Elements of regression theory.	1	2	6	
Topic 14.	Elements of correlation theory.	1	2	6	
Topic 15.	Elements of variance analysis.	2	2	6	
Modular test					
Total :		22	30	68	
Final assessment: pass/fail					

Technical equipment and/or software – official website of IAPM:
http://IAPM.com.ua The educational process involves the use of classrooms, a library, a multimedia projector, and a computer for conducting lectures and seminars with presentation elements. Studying individual topics and completing practical tasks requires access to internet resources, which is provided through a free Wi-Fi network.

Forms and methods of assessment.
Assessment of students' academic performance is divided into ongoing and final (semester) assessment.
Ongoing assessment is conducted during practical (seminar) classes and is aimed at systematically checking the understanding and assimilation of theoretical material, as well as the ability to apply theoretical knowledge when completing practical tasks. The possibilities of ongoing assessment are extensive: it can support learning motivation, stimulate educational and cognitive activity, enable a differentiated approach to teaching, and ensure individualization of the learning process.
Forms of student participation in the educational process subject to ongoing assessment include:

- oral reports;
- comments and questions to the speaker;
- consistent performance in seminar classes and active participation in discussions;
- participation in debates and interactive learning activities;
- analysis of legislation and academic literature;
- written assignments (tests, quizzes, creative tasks, essays, etc.);
- preparation of theses and summaries of academic or scientific texts;
- independent study of course topics.

Methods of ongoing assessment include: oral assessment (interview, discussion, report, presentation, etc.); written assessment (tests, essays, written presentations on assigned topics, etc.); combined assessment; presentation of independent work; observation as a method of assessment;testing; analysis of problem situations.

Grading system and requirements.
Table of distribution of points received by students

	Ongoing knowledge assessment	Module assessment task	Pass / Fail	Total points

Topics	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	T												
Work in a seminar	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
Independent work	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			

The table contains information about the maximum points for each type of assignment.

When assessing the mastery of each topic within ongoing educational activities, students receive marks in accordance with the approved assessment criteria for the respective discipline.

The criteria for evaluating learning outcomes and the distribution of points are regulated by the Regulations on the Assessment of Students' Academic Achievements at PJSC "HEI IAPM".

Modular assessment. Modular assessment in the discipline "Probability theory" is conducted in written form as testing using closed-type test items, including alternative and matching formats.

Criteria for evaluating the modular test in the academic discipline "Probability theory":
When evaluating the modular test, the volume and correctness of the completed tasks are taken into account:
- the grade "excellent" (A) is given for the correct completion of all tasks (or more than 90% of all tasks);
- the grade "good" (B) is given for the completion of 80% of all tasks;
- the grade "good" (C) is given for the completion of 70% of all tasks;
- the grade "satisfactory" (D) is given if 60% of the proposed tasks are completed correctly;
- the grade "satisfactory" (E) is given if more than 50% of the proposed tasks are completed correctly;
- the grade "unsatisfactory" (FX) is given if less than 50% of the tasks are completed.
Absence from the modular test work - 0 points.

The above grades are transformed into rating points as follows:
"A" - 18-20 points;
"B" - 16-17 points;
"C" - 14-15 points;
"D" - 12-13 points.
"E" - 10-11 points;
"FX" - less than 10 points.

The final semester assessment in the discipline "Probability theory" is a mandatory form of evaluating student learning outcomes. It is conducted within the time frame defined by the academic schedule and covers the scope of material specified in the course program.

The final assessment is administered in the form of a test. A student is admitted to the semester assessment only upon completion of all required coursework.

The final grade is assigned based on the student's performance throughout the semester. The student's rating score consists of the points accumulated through ongoing assessment activities and incentive points.

Students who have completed all required tasks and achieved a rating score of 60 points or higher receive a grade corresponding to the obtained rating without additional testing.

For students who have completed all required tasks but have a rating score below 60 points, as well as for those who wish to improve their score, the instructor conducts a final semester assessment in the form of a test during the last scheduled class of the discipline in the semester.

Assessment of additional (individual) types of educational activities. Additional (individual) types of educational activity include student participation in scientific conferences, research societies and problem groups, preparation of publications, and other activities beyond the tasks defined in the syllabus of the academic discipline.

By decision of the department, students who engage in research work or complete certain types of additional (individual) educational activities may receive incentive (bonus) points for a specific educational component.

Incentive points are not mandatory and are not included in the standard point distribution table or the main assessment scale.

A single event may serve as the basis for awarding incentive points for only one educational component – the one to which it is most relevant.

Assessment of independent work

The total number of points earned by a student for completing independent work is one of the components of academic performance in the discipline. Independent work for each topic, in accordance with the course program, is evaluated within the range of 0 to 1 points using standardized and generalized knowledge assessment criteria.

Scale for evaluating the performance of independent work (individual tasks)

The maximum possible assessment of independent work (individual tasks)	Execution level			
	Excellent	Good	Satisfactory	Unsatisfactory
1	1	0,75	0,5	0

Forms of assessment include: ongoing assessment of practical work; ongoing assessment of knowledge acquisition based on oral responses, reports, presentations, and other forms of participation during practical (seminar) classes; individual or group projects requiring the development of practical skills and competencies (optional format); solving situational tasks; preparation of summaries on independently studied topics; testing or written examinations; preparation of draft articles, conference abstracts, and other publications; other forms that ensure comprehensive assimilation of the study program and contribute to the gradual development of skills for effective independent professional (practical, scientific, and theoretical) activity at a high level.

To assess the learning outcomes of a student during the semester, a 100-point, national and ECTS assessment scale is used

Summary assessment scale: national and ECTS

Total points for all types of learning activities	ECTS assessment	National scale assessment for exam, course project (work), internship

		National scale assessment for exam, course project (work), internship	For pass/fail (credit)
90 – 100	A	excellent	pass
82 – 89	B	good	
75 – 81	C		
68 – 74	D	satisfactory	
60 – 67	E		
35 – 59	FX	unsatisfactory with the possibility of retaking	fail unsatisfactory with the possibility of retaking
0 – 34	F	unsatisfactory with mandatory re-study of the discipline	fail unsatisfactory with mandatory re-study of the discipline

Discipline's Policy:
- regularly attend lectures and practical classes;
- work systematically and actively in lectures and practical classes;
- catch-up on missed classes;
- perform the tasks required by the syllabus in full and with appropriate quality;
- perform control and other independent work;
- adhere to the norms of academic behaviour and ethics.

The discipline "Probability theory" requires adherence to the principles of ethics and academic integrity, with particular emphasis on preventing plagiarism in all its forms. All written assignments, reports, essays, abstracts, and presentations must be original, authored by the student, and not overloaded with quotations, which must be accompanied by references to primary sources. Violations of academic integrity include academic plagiarism, self-plagiarism, fabrication, falsification, copying, deception, bribery, and biased evaluation.

Student assessment is based on participation and activity in seminar/practical classes, completion of independent work tasks, and performance of assignments aimed at developing practical skills and competencies. Additional (bonus) points may be awarded for activities such as participation in round-table discussions, scientific conferences, or student research competitions.

Methodological support of the academic discipline
Teaching and methodological support for the discipline includes lecture notes, methodological guidelines for conducting practical (seminar) classes, and methodological recommendations for students' independent work in the academic discipline "Probability theory".

Recommended sources of information:

Basic literature:

1. Vasylyk I.M. Basics of probability theory and mathematical statistics: education. manual. Lviv: Ivan Franko National University, 2020. 184 p. ISBN 978–617–10–0354–5
2. Kvasnytsia G.A., Prytula M. M., Pryadko O. Ya. Probability theory and mathematical statistics / GA. Kvasnytsia, M.M. Prytula, O.Ya. Pryadko: education. manual in 2 hours: Ch.M.: Probability theory. Lviv: Ivan Franko National University, 2019. 168 p.
3. Solovka Y.T., Ostapivchuk P.G., Harpul O.Z., Voytyk S.A. Probability theory and mathematical statistics. Ivano-Frankivsk: Repository /ZVO «King Danylo University», 2021. 150 p.
4. Mathematical models and decision-making methods for sustainable development / O. V. Tryfonova, V. Timoshenko, S. A. Us. – Ministry of Education and Science of Ukraine, National Technical University "Dnipro Polytechnic". Dnipro : NTU «DP», 2023. 240 p.
5. Us S. A., Palekhova L. L. Modeling sustainable development: education. manual. Dnipro : NTU «Dniprovska Polytechnic», 2024. 160 p.
6. Hladashchuk O., Saienko V., Shyshkina O., Shlieina I., & Khrapatyi S. (2023). Activities and development of open universities in the states of European. Journal of Curriculum and Teaching, 12(2), 144-153.
7. Korolchuk O., Zyma I., Khrapatyi S., Vikhliaiev M., & Zavalko K. (2022). Current issues of state regulation of psychosocial support in the conditions of war in Ukraine. Neuropsychiatria i Neuropsychologia/ Neuropsychiatry and Neuropsychology, 18(1), 76-84.
8. Khrapatyi S., Levchenko A., Vashchenko M., Ponomarenko N., & Shyian, O. (2023). Education in the conditions of war: advantages and disadvantages. Multidisciplinary Science Journal, 5.
9. Udych, Z., Nestaiko, I., Senovska, N., Dynovych, A., & Khrapatyi, S. (2023). Higher Education as a Pedagogical System.
10. Motuzuk O., Nozdrenka O., Prylutska S., Bogutska K., Mishchenko I., Abramchuk O., & Prylutskyy Y. (2023). C60 fullerene reduces the level of fluctuations in the force response of intestinal gastrocnemius in chronically alcoholized rats. Applied nanoscience, 13(10), 7057-7067.
11. Khrapatyi S., Melnychuk T., Krasilova Y., Udovenko I., & Holotenko A. (2024). War veterans' retraining: development of educational programmes for economic recovery in Ukraine. Research in Post-Compulsory Education, 29(4), 642-659.
12. Khrapatyi S., Tokareva K., Ulushchenko O., Paramonova O., & Ivova I. (2024). Research on performance evaluation of higher vocational education informatization based on data envelopment analysis. STEM Education, 4(1), 51-70.
13. Kravchuk, Denys; Khrapatyi, Serhii ; Fedirko, Oleksandr ; Berezovska, Nina ; Rudzyn, Yira (2024) The Influence of Investments in Science and Technology on the Innovative Development of the Global Economic System. Economic Affairs (New Delhi)

14. Khranatyi S., Sidorova E., Zhameida O., Herman I., & Negrych M. (2024). Role of business and education in the development of the national economy: world experience and ways of improvement in Ukraine. Salud, Ciencia y Tecnología-Serie de Conferencias, (3), 644.
15. Truba, H., Khranatyi, S., Harashchuk, K., Shveta, D., & Proskurnia, A. (2024). Psycholinguistic underpinnings of image formation: Suggestion and manipulation in the educational network discourse. Thinking Skills and Creativity, 52, 101499.
16. Liannoi, Y., Khranatyi, S., Hanzha, V., & Kosenova, D. (2024). Public Management of Education and Science: Tendencies for Globalization, Digitalization, and Ukrainization. European Project Management Journal, 14(2), 57-77.

Additional literature:

1. Probability theory and mathematical statistics: workshop [Electronic resource] / E. Yu. Zhelezyakova, L. O. Norik; Kharkiv National Economic University S. Kuznets. - Electron. text data (2.34 Mb). - Kharkiv : Kharkiv named after S. Kuznets, 2019. 82 p.
2. Naiko DA. Shevchuk O. F. Probability theory and mathematical statistics: teaching. manual. Vinnytsia: VNAU, 2020. 382 p.
3. William Mendenhall,Robert J. Beaver,Barbara M. Beaver (2020) Introduction to Probability and Statistics. 15th Ed. Cengage Learning.

Information resources:

1. Library of the Kharkiv Institute of the MAUP, Kharkiv State Scientific Library named after. IN. G. Korolenko, prov. Korolenko, 18/ E-mail: L.Korolenko.Kharkov.com http://korolenko.kharkov.com
2. Kharkiv Regional Universal Scientific Library, str. Cooperative, 13/2. E-mail:director@ library.kharkov.ua http:// www.library.kharkov
3. https://www.khanacademy.org/math/statistics-probability/probabilitylibrary