

APPROVED

At the meeting of the Department of Higher Mathematics
Economic and Mathematical Methods
Protocol № 1 dated 31.08.2022

Completed by:

I. Lebedeva, associate professor of the Department of Higher Mathematics,
Economic and Mathematical Methods

Sheet of renewal and re-approved of syllabus of the academic discipline

Academic year	Data of the department meeting – the developer of syllabus of the academic discipline	Protocol number	Signature of the chief of the department

ЗАТВЕРДЖЕНО

на засіданні кафедри вищої математики
та економіко-математичних методів
Протокол № 1 від 31.08.2022 р.

Розробник:

Лебедева І.Л., канд. фіз.-мат. наук, доц. кафедри вищої математики та економіко-математичних методів

**Лист оновлення та перезатвердження
робочої програми навчальної дисципліни**

Навчальний рік	Дата засідання кафедри – розробника РПНД	Номер протоколу	Підпис завідувача кафедри

Abstract of the Discipline

The current stage of globalization of the world economy and the formation of the information society determine the active use of the mathematical apparatus in all spheres of practical activity in general and in international business in particular. The application of mathematical methods and models in solving practical problems of economics and management allows: to improve economic information systems by organizing them, identifying shortcomings in existing information and developing requirements for the preparation of new information or its adjustment; increase the accuracy of economic calculations; conduct research that suggests the existence of several alternatives; identify and justify optimal solutions; deepen the quantitative analysis of economic problems; to solve fundamentally new economic problems.

Today it is noticeable the transition to new areas of application of mathematical methods in the development of socio-economic solutions that will determine the future of our country, namely: investment policy planning, modernization of enterprises, forecasting environmental processes, determining both state and private interests in development international projects and so on. In solving these management problems, the leading place is occupied by the methods and means of computational mathematics. Therefore, every future economist, business leader, business owner needs a thorough mathematical training that forms analytical and research competencies, as well as the ability to apply mathematical tools to solve a wide range of problems in their professional activities.

The main purpose of this discipline is: the formation of a holistic system of theoretical knowledge of the mathematical apparatus, which helps to model, analyze and solve economic problems; assistance in mastering mathematical methods that make it possible to study and predict processes and phenomena in the field of future professional activity; development of logical and algorithmic thinking; promoting the formation of skills and abilities of independent analysis of the study of economic problems, the development of the desire for scientific search for ways to improve their work.

Characteristics of the academic discipline

Academic year	1st
Term	1st
Number of credits ECTS	5
Form of final control	Exam

Structural and logical scheme of studying the academic discipline

Previous academic disciplines	Next academic disciplines
Algebra (Mathematics)	Information and analytical tools of international business
Geometry (Mathematics)	International trade in goods, services, technologies
	Economic diplomacy

Competences and result of mastering the academic discipline

Competences	Learning outcomes
CK 11. Ability to conduct research on economic phenomena and processes in the international sphere, taking into account causal and spatiotemporal relationships	PH3. Use modern information and communication technologies, software packages of general and special purpose
CK5. Ability to carry out a comprehensive analysis and monitoring of world markets, assess changes in the international environment and be able to adapt to them	PH4. Systematize and organize the received information on processes and phenomena in the world economy; assess and explain the impact of endogenous and exogenous factors on them; formulate conclusions and develop recommendations taking into account the peculiarities of the national and international environment
3K 8. Ability to abstract thinking, analysis and synthesis	PH12. Carry out a comprehensive analysis of complex economic systems, compare and contrast their components, evaluate and justify evaluations of the effectiveness of their functioning.
3K 8. Ability to abstract thinking, analysis and synthesis	PH13. To select and skillfully apply analytical tools to study the state and prospects of development of certain segments of international markets for goods and services using modern knowledge of methods, forms and tools for regulating international trade
CK 11. Ability to conduct research on economic phenomena and processes in the international sphere, taking into account causal and spatiotemporal relationships	PH18. To study economic phenomena and processes in the international sphere on the basis of understanding of categories, laws; highlighting and summarizing trends, patterns of functioning and development of the world economy, taking into account causal and spatio-temporal relationships.
3K2. Ability to preserve and increase moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technology, use different types and forms of physical activity for active recreation and a healthy lifestyle. 3K 8. Ability to abstract thinking, analysis and synthesis CK 11. Ability to conduct research on economic phenomena and processes in the international sphere, taking into account causal and spatiotemporal relationships	PH24. To substantiate the choice and apply information-analytical tools, economic-statistical methods of calculation, complex analysis techniques and methods of monitoring the situation on world markets.

Competences	Learning outcomes
CK 12. Ability to use regulatory documents and reference materials in carrying out professional activities in the field of international economic relations	PH27. Apply the acquired knowledge to solve applied problems in the areas of planning, analysis, organization and control of international business

The syllabus of the academic discipline

The themes of lectures

Thematic module 1. Linear algebra and functions

Theme 1. Elements of the theory of matrices and determinants.

Theme 2. General theory of systems of linear algebraic equations.

Theme 3. Functions and graphics.

Thematic module 2. Elements of probability theory and mathematical statistics

Theme 4. Empirical and logical foundations of probability theory. The classical definition of probability.

Theme 5. Conditional probability, dependent and independent events. Full group of events. The formula of total probability. Bayesian formula.

Theme 6. Bernoulli's scheme. Discrete random variables, distribution law, basic characteristics.

Theme 7. Continuous random variables. Uniform, exponential and normal distribution laws.

Theme 8. Selective method. Numerical characteristics of the sample.

Theme 9. Elements of correlation-regression analysis. Correlation of qualitative indicators.

The list of practical and laboratory classes, as well as questions and tasks for independent work is given in the table "Rating-plan of the discipline"

Teaching and learning methods

During the teaching of the academic discipline "Higher Mathematics in International Business" in order to activate the educational and cognitive activity of students, it is envisaged to use interactive forms of teaching the material, in particular such teaching methods as: lectures of a problem nature (Themes 2, 4, 8, 9), mini-lectures (Themes 3, 5), work in small groups (Themes 3, 9), discussions and brainstorming (Themes 6, 9), presentations (Themes 1–9), computer simulations (Themes 2, 6-9), individual research work (Themes 2, 8, 9). During the lecture, practical and laboratory classes, the following teaching methods are used: explanatory and illustrative, partly research and research methods.

The order of assessment of studying results

The system of assessment of formed competencies of students during the study of this discipline takes into account the types of classes that, according to the curriculum of the discipline, include lectures, practical classes, laboratory work, as well as students' independent work. Assessment of competencies formed in students is carried out on a cumulative 100-point system.

Control measures include:

current control, carried out during the semester during lectures, practical classes and laboratory works and evaluated by the amount of points scored. In the first semester, the maximum amount is 100 points; the minimum amount that allows a student to get a credit of 60 points. In the second semester, the maximum amount is 60 points; the minimum amount that allows a student to take the exam is 35 points;

final / semester control, carried out in the form of a semester exam, according to the schedule of the educational process.

Current control is carried out within a term during:

lectures – in the form of colloquia (during the semester students write two colloquia; the maximum number of points for both colloquia is 16 points);

practical classes – in the form of tasks of written tests in practical classes (during the semester students perform two written tests; the maximum number of points for two tests is 14 points);

laboratory classes – in the form of defense of the report on laboratory work (during the semester students perform 6 laboratory works; the maximum number of points for the performance of six laboratory works is 12 points);

independent work:

in the form of homework (during the semester, students complete six homework assignments – the maximum number of points for completing six homework assignments is 12 points);

in the form of creative work (during the semester students perform one creative work – the maximum number of points is 6).

Final control of knowledge and competencies of students in the discipline is carried out on the basis of a semester exam, the task of which is to test students' understanding of the program material in general, logic and relationships between individual sections, ability to creatively use accumulated knowledge, ability to formulate their attitude to a particular problems of academic discipline, etc.

The examination ticket covers the program of the discipline and provides for the determination of the level of knowledge and the degree of mastery of competencies by students.

Each exam ticket consists of 5 practical situations (two stereotypical, two diagnostic and one heuristic task), which provide for the solution of typical and professional tasks and allow to diagnose the level of theoretical training of the student and his level of competence in the discipline. The result of the semester exam is evaluated in points (maximum number – 40 points, minimum number of credits – 25 points) and is affixed in the appropriate column of the examination "Information of success".

It should be assessed student's progress, if a sum of points, obtained as the total result of an assessment by all forms of a control, equals or exceeds 60. The total result in points for the semester is: "60 or more points – credited", "59 or less points – not credited" and is entered in the "Statement of performance" of the discipline.

Forms of assessment and distribution of points are given in the table "Rating-plan of the discipline"

Rating-plan of the discipline

Theme	Forms and types of teaching		Forms of evaluation	Max points
Theme 1	<i>Classroom work</i>			
	Lecture	<i>Lecture №1.</i> Elements of the theory of matrices and determinants	–	–
	Practical lesson	<i>Practical task №1.</i> Actions on matrices on the example of problems of economic content	Homemade work	2

	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on the subject of the discipline. Study of lecture material	–	–
	Classroom work			
	Lecture	Lecture №2. Elements of the theory of matrices and determinants (end)	–	–
	Laboratory lesson	Laboratory task №1. Calculation of determinants using elementary transformations	LW №1	2
Theme 2	Individual work			
	Questions and tasks for self-study	Study of lecture material, calculations in MS Excel	–	–
	Classroom work			
	Lecture	Lecture №3. General theory of systems of linear algebraic equations	–	–
	Practical lesson	Practical task №2. Solving systems of linear equations	Homemade work	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Doing homework	–	–
	Classroom work			
Lecture	Lecture №4. General theory of systems of linear algebraic equations (end)	–	–	
Laboratory lesson	Laboratory task №2. Investigation of the system of linear equations in MS Excel. Determining the general solution of a system of linear algebraic equations	LW №2	2	
Theme 3	Individual work			
	Questions and tasks for self-study	Study of lecture material, preparation for practical classes, solving problems using MS Excel	–	–
	Classroom work			
	Lecture	Lecture №5. Functions and graphics		
	Practical lesson	Practical task №3. Investigation of the function of one variable. Plotting functions	Homemade work	2
			RT №1	7
	Individual work			
Questions and tasks for self-study	Study of lecture material, preparation for practical classes. Doing homework. Preparation for writing test	–	–	
Classroom work				
Lecture	Lecture №6. Functions and graphics (end)	Colloquium №1	7	

	Laboratory lesson	Laboratory task №3. Graphical interpretation of empirical data	LW №3	2
	Individual work			
	Questions and tasks for self-study	Search, selection and review of literary sources on a given topic. Execution of practical tasks. Preparation for the colloquium	–	–
Theme 4	Classroom work			
	Lecture	Lecture №7. Empirical and logical foundations of probability theory. The classical definition of probability	–	–
	Practical lesson	Practical task №4. Determining the probability of a random event by the classical definition	Homemade work	2
	Individual work			
	Questions and tasks for self-study	Study of lecture material. Doing homework	–	–
Theme 5	Classroom work			
	Lecture	Lecture №8. Conditional probability, dependent and independent events. Full group of events. The formula of total probability. Bayesian formula	–	–
	Laboratory lesson	Laboratory task №4. Determining the probability of the probability formula and the Bayesian formula in MS Excel	LW №4	2
	Individual work			
	Questions and tasks for self-study	Study of lecture material. Preparation for laboratory work. Execution of practical tasks	–	–
Theme 6	Classroom work			
	Lecture	Lecture №9. Bernoulli's scheme. Discrete random variables, distribution law, basic characteristics	–	–
	Practical lesson	Practical task №5. Calculation of numerical characteristics of the distribution of a discrete random variable	Homemade work	2
	Individual work			
	Questions and tasks for self-study	Review of literature on the subject; doing homework using MS Excel	–	–
Theme 7	Classroom work			
	Lecture	Lecture №10. Continuous random variables. Uniform, exponential and normal distribution laws	–	–

	Laboratory lesson	Laboratory task №5. Determination of numerical characteristics of a continuous random variable	LW №5	2
	Individual work			
	Questions and tasks for self-study	Study of lecture material; performance of practical tasks. Preparation for the presentation of an independent creative task	Creative work	8
Theme 8	Classroom work			
	Lecture	Lecture №11. Selective method. Numerical characteristics of the sample	–	–
	Practical lesson	Practical task №6. Evaluation of numerical characteristics of random variable for the sample	Homemade work.	2
			RT №2	7
	Individual work			
Questions and tasks for self-study	Study of lecture material. Do your homework. Preparation for writing test	–	–	
Theme 9	Classroom work			
	Lecture	Lecture №12. Elements of correlation-regression analysis. Correlation of qualitative indicators	Colloquium №2	7
	Laboratory lesson	Laboratory task №6. Research of correlation of qualitative indicators, construction of regression model	LW №6	2
	Individual work			
	Questions and tasks for self-study	Study of lecture material. Execution of practical tasks. Preparation for the colloquium	–	–

Recommended reading

Main

1. Вища математика : базовий підручник для вузів / під ред. В. С. Пономаренка. – Харків : Фоліо, 2014. – 669 с.
2. Вища математика : підручник / Л. М. Малярець, Л. М. Афанасьєва, Т.В. Денисова та ін. – Харків : Вид. ХНЕУ, 2012. – 772 с.
3. Малярець Л. М., Математика для економістів. Теорія ймовірностей та математична статистика: навчальний посібник. Ч. 3 / Л. М. Малярець, І. Л. Лебедева, Л.Д. Широкоград. – Харків : Вид. ХНЕУ, 2011. – 568 с.
4. Малярець Л. М. Теорія ймовірностей та математична статистика: навчальний посібник / Л.М. Малярець, Е.Ю. Железнякова, І.Л. Лебедева та ін. – Харків. : Вид. ХНЕУ, 2010. – 404 с.
5. Математика для економістів: практ. посіб. до розв'язання задач економічних досліджень в MatLab / Л. М. Малярець, Є. В. Резнік, О. Г. Тижненко. – Харків : Вид. ХНЕУ, 2008. – 212 с.
6. Методичні рекомендації до самостійної роботи з навчальної дисципліни "Вища та прикладна математика" розділ "Вища математика" для студентів напряму підготовки

6.030601 "Менеджмент" спеціалізації "Бізнес-адміністрування" денної форми навчання / Е. Ю. Железнякова, Т. В. Сілічова. – Харків : Вид. ХНЕУ ім. С. Кузнеця, 2014. – 102 с.

Additional

7. Вища математика для економістів : підручник / під ред. О. І. Ляшенка, О. І. Черняка. – Київ: Видавничо-поліграфічний центр "Київський університет", 2008. – 497 с.
8. Малярець Л. М. Вища математика для економістів у прикладах, вправах і задачах : навч. посіб. / Л. М. Малярець, А. В. Ігначкова. – Харків : ВД "ІНЖЕК", 2006. – 544 с.
9. Малярець Л. М. Математика для економістів : практ. посіб. до розв'язання задач / Л. М. Малярець, Л. Д. Широкоград. – Харків : Вид. ХНЕУ, 2008. – 476 с.
10. Малярець Л. М. Математика для економістів : навч. посіб. / під ред. Л. М. Малярець. – Харків : Вид. ХНЕУ, 2011. – 568 с.
11. Малярець Л. М. Математика для економістів : навч. посіб. у 2-х ч. Ч. 1. / Л. М. Малярець, Л. М. Афанасьєва, А. В. Ігначкова. – Харків : Вид. ХНЕУ, 2011. – 393 с.

Information resources on the Internet

12. Вища математика: опорний конспект [Електронний ресурс] – Режим доступу : <https://pns.hneu.edu.ua/course/index.php?categoryid=321>
13. Железнякова Е.Ю. Теорія ймовірностей та математична статистика : методичні рекомендації до самостійної роботи з теми "Емпіричні та логічні основи теорії ймовірностей. Основні теореми теорії ймовірностей" для студентів усіх спеціальностей / Е.Ю. Железнякова, І.Л. Лебедева, С.С. Лебедев. [Електронний ресурс] – Режим доступу : <http://ebooks.git-elt.hneu.edu.ua/tvms>
14. Железнякова Е.Ю. Теорія ймовірностей та математична статистика : методичні рекомендації до самостійної роботи з теми "Схема незалежних випробувань. Закони розподілу та числові характеристики дискретної випадкової величини" для студентів усіх спеціальностей / Е.Ю. Железнякова, І.Л. Лебедева, С.С. Лебедев. [Електронний ресурс] – Режим доступу : <https://pns.hneu.edu.ua/mod/url/view.php?id=274068>
15. Железнякова Е.Ю. Теорія ймовірностей та математична статистика : методичні рекомендації до самостійної роботи з теми "Основні закони розподілу неперервної випадкової величини" для студентів усіх спеціальностей / Е.Ю. Железнякова, І.Л. Лебедева, С.С. Лебедев. [Електронний ресурс] – Режим доступу : <https://pns.hneu.edu.ua/course/view.php?id=8277>
16. Методичні рекомендації до виконання практичних завдань з навчальної дисципліни "Вища математика" [Електронний ресурс] – Режим доступу : <https://pns.hneu.edu.ua/course/index.php?categoryid=321>
17. Методичні рекомендації та завдання для виконання лабораторних робіт із навчальної дисципліни "Вища математика" [Електронний ресурс] – Режим доступу : <https://pns.hneu.edu.ua/course/index.php?categoryid=321>
18. Освітньо-професійна програма "Міжнародний бізнес" [Електронний ресурс] – Режим доступу : <https://www.hneu.edu.ua/wp-content/uploads/2021/07/Mizhnarodnyj-biznes-OPP-2021-bakalavr.pdf>
19. Misiura, Ie. Yu. Probability Theory and Mathematical Statistics : multimedia guidelines to independent work for Bachelor's (first) degree students of all specialties / Ie. Yu. Misiura, S. S. Lebedev // Мультимедійне видання. – Харків, ХНЕУ ім. С. Кузнеця, 2022. [Електронний ресурс] – Режим доступу : <https://pns.hneu.edu.ua/mod/url/view.php?id=468670>
20. Higher Mathematics in International Business (6.292.010), Associate Professor I.L. Lebedeva [Electronic resource] – Access mode : <https://pns.hneu.edu.ua/course/view.php?id=7877>