

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ ЕКОНОМІЧНИЙ УНІВЕРСИТЕТ
ІМЕНІ СЕМЕНА КУЗНЕЦЯ

"ЗАТВЕРДЖУЮ"

Проректор з навчально-методичної роботи

Карпа ЛЮДМИЛА ІВАНІВНА



ВИЩА МАТЕМАТИКА

робоча програма навчальної дисципліни

Галузь знань **07 Управління та адміністрування**

Спеціальність **075 Маркетинг**
Освітній рівень **перший (бакалаврський)**
Освітня програма **Маркетинг**

Статус дисципліни **обов'язкова**
Мова викладання, навчання та оцінювання **англійська**

Завідувач кафедри
вищої математики та
економіко-математичних методів

Людмила МАЛЯРЕЦЬ

Харків
2021

APPROVED

At the meeting of the Department of *Higher Mathematics*

Economic and Mathematical Methods

Protocol № 1 dated 27.08.2021

Completed by:

I. Lebedeva, PhD, 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

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ЗАТВЕРДЖЕНО

на засіданні кафедри кафедри *вищої математики та економіко-математичних методів*
Протокол № 1 від 27.08.2021 р.

Розробник:

Лебедєва 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 activity. The application of mathematical methods and models for 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; to conduct multivariate economic researches, to define and substantiate optimum decisions; deepen the quantitative analysis of economic problems; to solve fundamentally new economic problems.

Today there is a noticeable 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, enterprise modernization, environmental forecasting, urban planning and so on. Methods and means of computational mathematics play a decisive role in solving these managerial problems. Therefore, every future specialist economist and business leader 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 purposes of the discipline are: 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 allow to study and predict processes and phenomena in the future activities of students; development of logical and algorithmic thinking; assistance in formation of abilities and skills of the independent analysis of research of economic problems; development of aspiration to scientific search of ways of improvement of the work.

Characteristics of the academic discipline

Academic year	1
Term	1
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)	Probability Theory and Mathematical Statistics
Geometry (Mathematics)	Operations Research and Optimization Methods
	Econometrics
	Statistics

Competences and result of mastering the academic discipline

Competences	Learning outcomes
3K3. Ability to abstract thinking, analysis and synthesis	PH7. Use digital information and communication technologies, as well as software products that are necessary for the proper conduct of marketing activities and the practical application of marketing tools

Competences	Learning outcomes
3K7. Ability to apply knowledge in practical situations	PH4. Collect and analyze the necessary information, calculate economic and marketing indicators, justify management decisions based on the use of the necessary analytical and methodological tools
3K8. Ability to perform research at the appropriate level	PH4. Collect and analyze the necessary information, calculate economic and marketing indicators, justify management decisions based on the use of the necessary analytical and methodological tools
CK1. The ability to logically and consistently reproduce the knowledge of the subject area of marketing, which were obtained	PH12. Demonstrate skills of independent work, flexible thinking, openness to new knowledge, be critical and self-critical

The syllabus of the academic discipline The themes of lectures

Thematic module 1. Linear algebra and analytic geometry

- Theme 1. Elements of the theory of matrices and determinants.
 Theme 2. General theory of systems of linear algebraic equations.
 Theme 3. Elements of vector algebra. Elements of analytical geometry.

Thematic module 2. Елементи математичного аналізу

- Theme 4. Limit of function. Continuity of function.
 Theme 5. Differential calculus of the function of one variable.
 Theme 6. Analysis of the function of several variables.
 Theme 7. Integral calculus.
 Theme 8. Differential equations.
 Theme 9. Series.

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 discipline "Higher Mathematics" in order to enhance the educational and cognitive activities of students such interactive forms of teaching provides for the use. There are presentations, computer simulations, visual support banks, "Flipped classroom", interactive distance learning, creative independent work. The application of these technologies is aimed at the formation of competencies that are defined for each topic of the discipline.

Presentations are speeches to the audience, used to present the results of individual tasks (for each theme of the discipline), a report on the implementation of creative independent work. Presentations can be individual or collective (a group of two to five students).

Computer simulation (game) is a method of learning based on the use of special computer programs that can be used to virtually simulate the process. It is used in teaching theme 5. The purpose of using this method is to develop students' systematic thinking, the formation of skills to recognize and analyze problems, evaluate alternatives, make optimal decisions.

Visual support banks help to intensify the learning process on the discipline with the help of clarity (for each theme of the discipline).

"*Flipped classroom*" is a principle of learning, according to which the main assimilation of new material by students takes place at home, and classroom time is allocated for tasks, exercises, laboratory and practical research, individual teacher consultations and more.

Interactive distance learning is a set of pedagogical technologies based on the principles of communication in the information educational space, serving to organize the education of users, distributed in space and time (for each theme of the discipline, if classes on this theme are on-line).

Creative independent work involves writing a scientific article or thesis report, which highlights the economic problem and demonstrates the possibilities of using mathematical tools to solve it (the topic is chosen by the student himself from the list of themes which are teaching).

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. Accordingly the minimal possible quantity of points by a current and a module control during a term equals 35 and the minimal possible quantity of points, obtained on an exam, equals 25.

The final grade in the discipline is calculated taking into account the points obtained during the exam and the points obtained during the current control of the accumulative system. 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.

The final grade is set according to the scale given in the table "Grade scale: national and ECTS". Forms of assessment and distribution of points are given in the table "Rating-plan of the discipline".

The scales of assessment: national and ECTS

Sum of points including all forms of study	Mark on the ECTS scale	Mark on the national scale	
		for an exam, a term paper, practice	for a test
90 – 100	A	excellent	passed
82 – 89	B	good	
74 – 81	C		
64 – 73	D		
60 – 63	E	satisfactory	failed
35 – 59	FX	unsatisfactory	
1 – 34	F		

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
	<i>Individual work</i>			
	Questions and tasks for self-study	Search, selection and review of literary sources on the subject of the discipline. Study of lecture material		
	<i>Classroom work</i>			
Lecture	<i>Lecture №2.</i> Elements of the theory of matrices and determinants (the end)			

	Laboratory lesson	Laboratory task №1. Calculation of determinants using elementary transformations	LW №1	2
	Individual work			
	Questions and tasks for self-study	Study of lecture material, calculations in MS Excel		
Theme 2	Classroom work			
	Lecture	Lecture №2. 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 (the 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
	Individual work			
Questions and tasks for self-study	Study of lecture material, preparation for practical classes, solving problems using MS Excel			
Theme 3	Classroom work			
	Lecture	Lecture №3. Elements of vector algebra. Elements of analytical geometry		
	Practical lesson	Practical task №3. Actions with vectors. Equation of line and plane	Homemade work	2
	Individual work			
	Questions and tasks for self-study	Study of lecture material, preparation for practical classes. Doing homework		
	Classroom work			
	Lecture	Lecture №4. Elements of vector algebra. Elements of analytical geometry (the end)	Colloquium №1	8
	Laboratory lesson	Laboratory task №3. Investigation of second-order curves	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 №5. Limit of function. Continuity of function		

	Practical lesson	Practical task №4. Calculating the limits of the function. Investigation of the function for continuity	Homemade work	2
			WT №1	7
	Individual work			
	Questions and tasks for self-study	Study of lecture material. Doing homework. Preparation for control work		
Theme 5	Classroom work			
	Lecture	Lecture №8. Differential calculus of the function of one variable		
	Laboratory lesson	Laboratory task №4. Research of function of one variable and construction of its graph	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. Analysis of the function of several variables		
	Practical lesson	Practical task №5. Investigation of the function of several variables	Homemade work	2
	Individual work			
	Questions and tasks for self-study	Study of lecture material. Doing homework		
Theme 7	Classroom work			
	Lecture	Lecture №6. Integral calculus		
	Laboratory lesson	Laboratory task №5. Solving economic problems involving the calculation of definite integrals	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	6
Theme 8	Classroom work			
	Lecture	Lecture №7. Differential equations.		
	Practical lesson	Practical task №6. Solving differential equations	Homemade work.	2
			WT №2	7
Individual work				
	Questions and tasks for self-study	Study of lecture material. Doing homework. Preparation for control work		
Theme 9	Classroom work			
	Lecture	Lecture №8. Series.	Colloquium №2	8

	Laboratory lesson	Laboratory task №6. Investigation of numerical series for convergence	LW №6	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		
				Exam
				40

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. 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.
4. 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.

Additional

5. Малярець Л. М. Математика для економістів : практ. посіб. до розв'язання задач / Л. М. Малярець, Л. Д. Широкоград. – Харків : Вид. ХНЕУ, 2008. – 476 с.
6. 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.
7. Малярець Л. М. Математика для економістів : навч. посіб. / під ред. Л. М. Малярець. – Харків : Вид. ХНЕУ, 2011. – 568 с.
8. Мацкул В.М. Вища математика для економістів : підручник. – Одеса: ОНЕУ, 2018. – 472с.

Information resources on the Internet

9. Вища математика. Методичні рекомендації до самостійної роботи за темою "Диференціальні рівняння" для студентів усіх спеціальностей першого (бакалаврського) рівня / уклад. А. В. Воронін, О. В. Гунько. – Харків : ХНЕУ ім. С. Кузнеця, 2018. – 75 с. [Електронний ресурс] – Режим доступу : <http://repository.hneu.edu.ua/handle/123456789/26217>
10. Вища математика. Методичні рекомендації до самостійної роботи за темою "Ряди" для студентів усіх спеціальностей першого (бакалаврського) рівня / укл. А. П. Рибалко, К. В. Степанова. – Харків : ХНЕУ ім. С. Кузнеця, 2019. – 63 с. [Електронний ресурс] – Режим доступу : <http://repository.hneu.edu.ua/handle/123456789/22151>
11. Освітньо-професійна програма "Маркетинг" / Уклад. Т.І. Притиченко, Н.О. Бойко, І.І. Дагли та ін. – Харків : ХНЕУ ім. С. Кузнеця, 2021. – 21 с. [Електронний ресурс] – Режим доступу : <https://www.hneu.edu.ua/wp-content/uploads/2021/07/Marketynг-OPP-2021-bakalavr.pdf>
12. Higher Mathematics (6.075.010), доц. Лебедева І.Л. [Electronic resource] – Access mode : <https://pns.hneu.edu.ua/course/view.php?id=5180>