



SYLLABUS OF AN ACADEMIC DISCIPLINE
«Higher mathematics»

Academic degree: Bachelor's
Specialty: 073 “Management”
Academic programme: Management

Year of study: I, semester: I
Form of study: full-time
Number of ECTS credits: 4
Languages of instruction: Ukrainian, English

Lecturer of the discipline

Lyudmila Mykolaivna Artemchuk,
Andrii Lyubomyrovych Shydlich

Lecturer’s contact information (e-mail)

artemchuklm@gmail.com, shidlich@gmail.com

URL of the e-learning course on the NULES e-learning portal

<https://elearn.nubip.edu.ua/course/view.php?id=2.109>

ACADEMIC DISCIPLINE DESCRIPTION

“**Higher Mathematics**” is a basic discipline necessary for the development of students' intellect and the development of their abilities to logical and algorithmic thinking, self-learning skills. The purpose of teaching the discipline is to master students with the mathematical apparatus necessary for analyzing, modeling and solving theoretical problems and practical problems in the management activities of the future manager.

The main **objectives** of the discipline “Higher Mathematics”:

- mastering the basics of the mathematical apparatus necessary for solving theoretical and practical management problems;
- ability to independently find, study and apply scientific literature and other information sources and resources in higher mathematics;
- development of skills in mathematical research of applied problems, namely the ability to translate a specific management problem into mathematical language with the following building its mathematical model;
- the ability to study the built mathematical models of certain economic processes;
- mastering the methods of processing and analyzing the results obtained in the study of the developed mathematical models.

Competences of the discipline:

Integral competence (IC):

The ability to solve complex specialized tasks and practical problems characterized by complexity and uncertainty of conditions in the field of management or in the learning process, which involves the application of theories and methods of social and behavioral sciences.

General competence (GC):

GC 8. Skills in the use of information and communication technologies.

Special (professional) competences (SC):

SC 10. Ability to evaluate the work performed, ensure its quality and motivate the staff of the organization.

SC 12. Ability to analyze and structure the problems of the organization, to formulate to formulate reasonable solutions.

Expected Learning Outcomes (ELO):

ELO 6. To demonstrate skills in searching, collecting and analyzing information, calculating indicators to justify management decisions.

ACADEMIC DISCIPLINE STRUCTURE

Topic	Hours (lectures/laboratory, practical, seminars)	Learning outcomes	Tasks	Assessment
1 semester				
Module 1				
Topic 1. Determinants.	1/2	To know and to be able to calculate determinants of the 2nd and 3rd order.	C.W. Determinant of the fourth order	10
Topic 2. Matrices.	1/4	To know the definition and properties of matrices. To apply matrices to solve problems.	C.W. Matrix multiplication	20
Topic 3. Systems of linear equations, their application in solving economic and management tasks.	2/4	To use SLAE to solve economic and management problems	C.W. Systems of linear equations	30
Topic 4. Linear economic models: -Leontiev model (balance analysis) - model of equilibrium prices -linear model of equilibrium trade.	2/4	To apply elements of linear algebra to solve economic problems.	C.W. Module No.1	40
Total for the module				100
Module 2				
Topic 1. Application of functions in economic theory.	1/1	To know: definition of a function, domains of definition, methods of defining functions; inverse, composite, even, odd, periodic functions.	C.W. Function	5
Topic 2. The limit of a function. Continuity of function.	3/3	To know the basic theorems about limits. To apply the first and second excellent limits. To understand breakpoints and their classification. To use local and global properties of functions	C.W. Limit	10
Topic 3. The derivative of a function. Differential function	2/2	To know the table of derivatives, geometric, economic, and mechanical meaning of a derivative. To be able to find the derivatives of a composite, inverse,	C.W. Derivative	10

		implicit function. To use the logarithmic differentiation.		
Topic 4. The application of the derivative for the study of the function when solving problems of an economic and managerial nature.	2/2	To be able to study functions and build their graphs. To analyze the company's indicators	C.W. Function research	10
Topic 5. Definition of antiderivative and indefinite integral.	2/4	To know the definitions, properties, and table of integrals. To know the simplest methods of integration.	C.W. Integral	10
Topic 6. The definite integral. Application of the definite integral to geometric and economic problems	4/4	Use the definite integral to calculate the average values of functions of economic content, to determine the capital gains from known investments	I.W. Integral	20
Topic 7. Definition of DE of the 1st order.	2/2	To know the problem and Cauchy's theorem, three types of DEs of the first order: with separable variables, homogeneous, linear.	C.W. DEs of the 1 st order	5
Topic 8. Linear DEs of the 2nd order with constant coefficients	2/2	To know and understand linear second-order DEs	C.W. Module No. 2	30
Total for Module 2				100
$((M1+M2)/2)*0.7$				70
Examination				30
Total for the course				100

ASSESSMENT POLICY

<i>Deadlines and Rescheduling Policy:</i>	<i>Assignments submitted after the deadline without valid reasons will be graded lower. Modules can be rearranged with the permission of the lecturer if there are good reasons (for example, sick leave).</i>
<i>Academic Integrity Policy:</i>	<i>Cheating during tests and exams is strictly prohibited (including the use of mobile devices).</i>
<i>Attendance Policy:</i>	<i>Class attendance is mandatory. In case of objective reasons (such as illness or international internships), individual learning may be allowed (in online format by the approval of the dean of the faculty).</i>
<i>Deadlines and exam retaking policy:</i>	<i>EXAMPLE</i> Works that are submitted late without valid reasons will be assessed with a lower grade. Module tests may be retaken with the permission of the lecturer if there are valid reasons (e.g. a sick leave).
<i>Academic integrity policy:</i>	<i>EXAMPLE</i> Cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
<i>Attendance policy:</i>	<i>EXAMPLE</i> Attendance is compulsory. For good reasons (e.g. illness, international internship), training can take place individually (online by the faculty dean's consent)

SCALE FOR ASSESSING STUDENTS 'KNOWLEDGE AND SKILLS

Student's rating, points	National grading of exams and credits	
	exams	credits
90-100	excellent	pass
74-89	good	
60-73	satisfactorily	
0-59	unsatisfactorily	fail

RECOMMENDED SOURCES OF INFORMATION

1. Yeremina T. O., Povarova O. A. Higher mathematics. Elements of linear algebra and analytic geometry: a textbook. Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2021. 115 pp. URL: <https://ela.kpi.ua/handle/123456789/41267>
2. Higher mathematics: a textbook. Ostroh: Publishing House of the National University of Ostroh Academy, 2021. 432 pp.
3. Higher mathematics: a textbook. P.1. Kharkiv: UkrDUZT, 2022. 232 pp. URL: <http://lib.kart.edu.ua/handle/123456789/10149>.
4. Batechko N.G., Pantalienko L.A., Shostak S.V., Tsypiy T.I., Ruzhylo M.Y. Higher mathematics. Collection of tasks. Kyiv: NUBiP Publishing House, 2021. 352 pp.
5. Batechko N.G., Pantalienko L.A., Khaidurov V.V., Tsyupiy T.I., Shostak S.V. Mathematics textbook for students of preparatory courses. Kyiv: FOP. Yamchynskyi O.V., 2020. 248 pp.