

# SYLLABUS

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**INTERNATIONAL EUROPEAN  
UNIVERSITY**



**EUROPEAN SCHOOL  
OF BUSINESS**

**Higher and applied mathematics  
Educational programs “Psychology”,  
“Management”, “Marketing”, “Software  
engineering”, “Information systems and  
technology”, “Tourism”**

**2024**



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1	Name of the course and educational program
	Higher and applied mathematics Educational programs “Psychology”, “Management”, “Marketing”, “Software engineering”, “Information systems and technology”, “Tourism”
2	Course description
	The discipline "Higher and applied mathematics" forms the ability to use mathematical tools for researching economic processes, solving applied economic and optimization problems; apply economic and mathematical methods and models to solve economic problems; work in a team and autonomously; the formation of abstract thinking, the ability to analyze, synthesize and apply knowledge in practical situations; formation of the ability to make informed decisions; apply computer technologies and data processing software to solve economic problems, analyze information and prepare analytical reports. The knowledge acquired by students of higher education during the study of the discipline "Higher and Applied Mathematics" is the basis for mastering the disciplines of the professional training cycle, and can also be applied during industrial practice, preparation of coursework and qualification papers in the specialty
3	Study prerequisites
	The academic discipline is related to the following disciplines: "Economics of enterprises of various forms of ownership", "Marketing", "Management", "Economic planning and forecasting", "Economic theory", "Marketing", "Computer discrete mathematics", "Organization of databases and knowledge", "theory probabilities and mathematical statistics", "Theory of decision-making", "Physics", "Mathematical methods in psychology", "Economics of tourism".
4	Amount of credits/hours
	8 ECTS credits/ 240 hours
5	Training format
	Blended learning
6	Classroom location
	Audience 405. <a href="https://dist.ieu.edu.ua/course/index.php?categoryid=495">https://dist.ieu.edu.ua/course/index.php?categoryid=495</a>
7	Information about the teacher
	<b>Maryna Semenyuta , Ph.D. , associate professor</b>
8	Department

Department of Information Technologies





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## 9 Office location

Kyiv, Akademika Glushkova Ave., 42 B, room 505

## 10 Schedule of counseling

Every Wednesday from 2:00 p.m. to 3:30 p.m. by appointment via corporate mail

## 11 E-mail of the teacher

marian\_semenyuta @ieu.edu.ua

## 12 The role of academic discipline in achieving program results

### Specialty 053 "Psychology"

PRN 13. To interact, to enter into communication, to be understandable, to be tolerant towards persons with other cultural or gender -age differences.

PR16. Know, understand and adhere to the ethical principles of the psychologist's professional activity

PR17. Demonstrate socially responsible and conscious behavior, follow humanistic and democratic values in professional and public activities.

### Specialty 073 "Management"

PRN6. Demonstrate the skills of searching, collecting and analyzing information, calculating indicators to substantiate management decisions.

PRN7. Demonstrate organizational design skills.

PRN20. Demonstrate skills in the use of information, communication and innovative technologies/

### Specialty 075 "Marketing"

PR H3. Apply acquired theoretical knowledge for solving practical tasks in the field of marketing.

PRN4. Collect and analyze the necessary information, calculate economic and marketing indicators, substantiate management decisions based on the use of the necessary analytical and methodical tools

### Specialty 121 "Software Engineering"

PR05. Know and apply relevant mathematical concepts, methods of domain, system and object-oriented analysis and mathematical modeling for software development.

PR12. Apply effective software design approaches in practice.

PR18. Know and be able to apply information technologies for data processing, storage and transmission.

PR21. To know, analyze, choose, competently apply the means of ensuring information security (including cyber security) and data integrity in accordance with the applied tasks being solved and the software systems being created.

### Specialty 126 "Information systems and management technologies"

PR05. Know and apply relevant mathematical concepts, methods of domain, system and object-oriented analysis and mathematical modeling of information systems.

PR13. Know and apply methods of developing algorithms, data structures and knowledge.

PR18. Know and be able to apply information technologies for data processing, storage and transmission to support management and decision-making processes

### Specialty 242 "Tourist business and hospitality"

PR18. Adequately evaluate your knowledge and apply it in various professional situations.

PR19. It is reasonable to defend one's views in solving professional tasks.

PR20. Identify problem situations and propose ways to solve them.



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## 13 Course objectives

Formation of a complete system of theoretical knowledge of the mathematical apparatus necessary for solving problems in professional activity; development of logical and algorithmic thinking; promoting the formation of a scientific outlook; fostering in students of higher education the ability to independently improve mathematical knowledge and conduct mathematical analysis of applied problems.

## 14 Learning outcomes

Know:

- basic mathematical concepts and methods of solving typical problems of linear algebra, analytical geometry, differential and integral calculus of functions of one and many variables, numerical and differential equations;
- the role and place of mathematics in the modern information and communication space and in the professional activity of a specialist;
- methods of mathematical research of applied problems of the foundations of economic theory, microeconomics, management and other professionally oriented disciplines.

Be able:

- solve mathematical problems ;
- to study independently and get to know the mathematical apparatus found in special literature, necessary for mastering the profession ;
- to investigate applied problems mathematically;
- choose the optimal methods of solving problems, interpret and evaluate the results; choose and use the necessary computing tools.

## 15 Course content

- Topic 1. Matrices and determinants
- Topic 2. Systems of linear equations, solution methods
- Topic 3. Leontiev's model of a multi-branch economy
- Topic 4. Actions on vectors. Eigenvectors and eigenvalues of matrices
- Topic 5. Problems of economic content, which are solved using elements of analytical geometry
- Topic 6. Problems of linear programming. Graphic solution method
- Topic 7. Complex method of solving linear programming problems
- Topic 8. Duality in linear programming
- Topic 9. Transport problem
- Topic 10. The limit of a function
- Topic 11. The derivative of a function, its economic meaning
- Topic 12. Function of many variables
- Topic 13. Local and global extremum of a function of many variables
- Topic 14. The method of least squares. Economic problems reduced to the use of the function of many variables
- Topic 15. Indefinite integral. Basic methods of integration
- Topic 16. The definite integral. Improper integrals. Application of definite integrals
- Topic 17. Concept of differential equation. Differential equations of the first order
- Topic 18. Differential equations of higher orders
- Topic 19. Problems reduced to differential equations.



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## Course Books and materials

1. Bilousova S.V.. Economic and mathematical modeling. Compendium and practicum: teaching manual . / S.V. Bilousova , T.V. Kovalchuk. - Kyiv: KNTEU, 2018. – 468 p..
2. Kovalchuk T.V. Higher mathematics for economists: a textbook / T.V. Kovalchuk, V.S. Martynenko, V.I. Denisenko. - K.: KNTEU.-Part 2, 2007. - 341p.
3. Mathematics for economists. Collection of problems: teach . help / Bilousova S.V., Boryseiko V.O., Hladka Yu.A. and others. - K.: KNTEU, 2015. - 504 c.
4. Shchedinina O.K. Higher and applied mathematics in economic examples and problems. Practicum, part 1.: teaching . pos./ O.K. Shchedinina , T.V. Kovalchuk et al. - K.: KNTEU, 2017 – 229 p.
5. Shchedinina O.K. Higher and applied mathematics in economic examples and problems. Practicum, part 2.: teaching . pos./ O.K. Shchedinina , S.V. Bilousova, Yu.A. Hladka, T.V. Kovalchuk. - K.: KNTEU, 2019 – 310 p.
6. Dubovik V. P., Yurik I. AND. Higher mathematics. - K.: Higher School, 1993. - 648 p.
7. Barkovsky V.V. Higher mathematics for economists: teaching . help / V.V. Barkovskyi , N.V. Barkovska . - K.: TsUL, 2010. - 448 p.
8. Borovik O.V., Borovik L.V. Research operations in the economy. - K.: Education Center . l-ry, 2007.
9. Hryshchenko M.V. Mathematics for economists: a textbook / M.V. Hryshchenko. - K.: VPC "Kyiv University", 2008 -599 p.
10. Ya. Pasichnik AND. Mathematics for economists: a textbook / Ya. AND. Beekeeper. - Ostroh: National University "Ostroh Academy", 2010. - 432 p

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## Technical requirements for working on the course

To work on the "Higher and Applied Mathematics" course, you need regular access to a computer and the Internet.

In order to successfully study and pass the exam from the training course, you need to constantly familiarize yourself with the materials posted on the university's remote platform ( Google Class ) in the course "Higher and applied mathematics". You also need to create reporting documents for independent work and upload them to the platform. You can use the remote platform only from your corporate mail account .

If you are unable to access the platform or the course, you must notify the dean's office or headmaster, or the course instructor directly.

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## Learning process

The process of studying the course "Higher and applied mathematics" includes lectures and practical sessions.

During the lectures, such teaching methods as lecture, lecture-conversation, discussion, discussion of problematic issues, demonstration, and analysis of various situations will be used according to the topic of the lectures.

During practical classes, such teaching methods as surveys, testing, performance of individual tasks, performance of analytical and calculation works, solved specific problems and situations will be used).





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## Signs of discipline

Term of teaching	Semester	International Disciplinary integration	Course study	Cycles: general training/ professional training/ free choice
2 semesters	1-2 semester	No	1course	Cycle of professional training

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## Evaluation policies

You will have different ways to demonstrate your knowledge and skills throughout the semester. This includes how you attend class, how and what you contribute to topic discussions, how you complete and complete lab assignments and tests on time, how you complete independent work assignments, and the ability to present your work. In addition, it is possible to perform tasks that are performed individually or in a small group in the form of a student scientific work.

Activities during the semester	Maximum number of points during the semester
Current work (attendance, monitoring of lectures, Performing laboratory work)	32
Tests (8)	24
Performance of independent work	4
<b>Total current work Credit</b>	<b>60</b>
<b>Exam</b>	<b>40</b>
<b>TOTAL</b>	<b>100</b>

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## Rating scale

The grade for the discipline is defined as the sum of the points scored for the current activity in the semester. Each module includes an assessment score for the student's current work. Module control activities are carried out upon completion of the study of the taught material of this module. The minimum number of points for the current educational activity, which allows the discipline to be counted as completed, must be at least 60. The maximum point for the discipline is 100.

The total grade for studying the discipline is set according to the national and European scale (EKTS).

The overall final grade in points, according to the national scale and according to the ECTS scale, is entered in the student's assessment and examination information, study card and student's assessment book.

### Rating scale: national and ECTS

The sum of points for all types of educational activities	Evaluation on ECTS	Evaluation on a national scale	
		for an exam, course project (work), practice	for credit
90-100	A	perfectly	Enrolled
82-89	B	good	
74-81	C		
66-73	D	satisfactorily	
60-65	E		
30-59	FX	unsatisfactory with possibility reassembly	not counted with the possibility of retaking
1-29	F	unsatisfactory with mandatory repeated study of the discipline	not enrolled with mandatory repeated study of the discipline



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## How to find out your score

To check your assignment grades and read the teacher's comments, you need to check the relevant tabs on the distance learning platform (Moodle) in this course.

You can also get information about the received grades in the joint chat of the subject group (Viber or Telegram) or directly from the course instructor via corporate mail, messengers or by appointment on the days of consultations.



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## Course policies

For the productive educational and cognitive activity of the applicants when studying the discipline, thematic lectures are held and practical classes are conducted in the form of laboratory works.

In classes and during his stay at the university, the student must treat teachers, staff and other students with respect, attend classes according to the schedule, come on time and not leave the classroom without the teacher's permission. It is necessary to complete all academic tasks and their work within the specified time.

The teacher, in turn, must constantly raise his professional level, pedagogical skill, general culture, provide conditions for students to master educational programs at the level of mandatory requirements for the content, level and scope of education, promote comprehensive professional development of students. It is mandatory to follow the educational and thematic plan, not to be late for classes, not to allow any manifestations of corruption, discrimination, bullying, harassment and oppression of the rights of those seeking education.

Education is based on the application of active learning methods. Active participation is expected and the norm. Attendance and active participation make up 80% of the grade. A student who, for good reasons, documented, was not subject to current control has the right to undergo current control within a two-week period after returning to studies.

A student who was absent from classes without valid reasons, did not participate in current control activities, did not liquidate academic debt, is not allowed to take the final semester control of knowledge in this discipline, and on the day of the exam in the examination information by a scientific and pedagogical employee the grade "not admitted" is issued. Retaking the exam in the discipline is prescribed on the condition that all types of educational, independent (individual) work provided for in the work curriculum of the discipline are performed, and is carried out in accordance with the liquidation schedule approved by the directorate.

The academic integrity of any institution of higher education requires integrity in teaching and research, so academic integrity is required of all MEU students. Academic dishonesty is prohibited in all programs at our university. All participants in the educational process are guided by the principles of academic integrity.





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## 24 Completing the task late, correcting grades, working out

Assignment reports must be uploaded to Moodle by the due dates specified in the course schedule. Best practice would be to complete assignments as soon as possible after receipt to allow enough time to actively participate in class. If more time is needed to complete the task, flexible deadlines are available. Completed assignments are accepted for full credit until the last class in the discipline on the schedule, after which 40% partial credit based on the grade received will be awarded within a week of the last day of class. Assignments that were not submitted at all will receive 0.

If classes are missed for more than one week due to illness or other reasons, it is necessary to contact the teacher to agree on alternative options for completing tasks. Deadlines work both ways, and meeting them ensures that your instructor provides timely feedback on your assignments to ensure you stay on course.

## 25 Teacher's response time (about checking assignments)

Via corporate mail (within 24 hours), via messengers (within 1-2 hours).

## 26 Effective communication

Effective communication is essential to success in this course, we recommend using the following channels:  
Forum of questions and answers: for general course questions, you need to check the FAQ section in Moodle and then post your question in the Q&A forum to ask your colleagues or the instructor (guaranteed to receive a notification by e-mail every time a new publication or an answer to a question appears);  
E-mail: have a personal question related to studying the course, write to the teacher directly;  
Social networks, messengers: personal communication with classmates, teacher;  
Face-to-face meeting: communication with classmates during classes and with the teacher on consultation days.

## 27 Policy of publication and distribution of course materials

Students may not post, publish, sell, or otherwise publicly distribute course materials without written permission the teacher. Such materials include: lecture notes, slides (presentations) of lectures, video or audio recordings, tasks, problem sets, tests, other students' works and answers, etc. Students who sell, post, publish, or distribute course materials without written permission or otherwise may be subject to disciplinary action, up to and including withdrawal.

The use of generative AI is permitted subject to adherence to the principles of academic integrity.

## 28 Expected workload and involvement of students

Approximately 2-3 hours per week should be allocated to work in this course. If circumstances arise that force you to spend more time on one of the tasks, you must inform the teacher by e-mail (messenger).

An extension of the submission deadline is possible only under the condition that the teacher is informed in advance that it is impossible to submit the assignment by the specified time. Students are expected to have a backup plan in case of computer malfunctions or Internet outages.

## 29 Support services

Electronic schedule: <https://rozklad.ieu.edu.ua>

Online library: <https://onlinelibrary.ieu.edu.ua>

Repository: <https://sed.ieu.edu.ua/index.php/sed/index>

Educational Ombudsman: <https://ieu.edu.ua/pro-mieu/ombudsmen>



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Course schedule

Topic name	Content of practical class
Topic 1. Matrices and determinants	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Test 1</li></ol>
Topic 2. Systems of linear equations, solution methods	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Independent work 1</li><li>5. Control work 1</li></ol>
Topic 3. Leontiev's model of multi-branch economy	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Independent work 2</li></ol>
Topic 4. Actions on vectors. Eigenvectors and eigenvalues	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Test 2</li><li>5. Control work 2</li></ol>
Topic 5. Problems of economic content, which are solved using elements of analytical geometry	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Independent work 3</li></ol>
Topic 6. Problems of linear programming. Graphic solution method	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Independent work 4</li></ol>
Topic 7. Simplex method of solving linear programming problems	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Control work 3</li></ol>
Topic 8. Duality in linear programming	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Test 3</li></ol>
Topic 9. Transport problem	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Independent work 5</li><li>5. Control work 4</li></ol>
Topic 10. The limit of a function	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Independent work 1</li></ol>
Topic 11. The derivative of a function, its economic meaning	<ol style="list-style-type: none"><li>1. Oral survey</li><li>2. Solving exercises</li><li>3. Questions that are submitted for independent study</li><li>4. Test 1</li><li>5. Independent work 2</li></ol>



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Topic 12. Function of many variables	6. Oral survey 7. Solving exercises 8. Questions that are submitted for independent study 9. Test 3
Topic 13. Local and global extremum of a function of many variables	10.
Topic 14. The method of least squares. Economic problems reduced to the use of the function of many variables	11.
Topic 15. Indefinite integral. Basic methods of integration	12. 5
Topic 16. The definite integral. Improper integrals. Application of definite integrals	13.
Topic 17. Concept of differential equation. Differential equations of the first order	14.
Topic 18. Differential equations of higher orders	15.
Topic 19. Problems reduced to differential equations	16.



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## Tips for successful study

The goal is unique to everyone, but its correct setting greatly affects the result, as well as the learning process. For example,

- processing the materials of the theoretical component (lectures) of the discipline will provide insight and knowledge about the
- development process and the architecture of the OS itself, and the implementation of the practical component - the acquisition
- of practical skills in the use of methods and tools for creating system software. After all, any training that follows a clear plan and
- with a serious attitude to the material will always be successful.

So, if you want to successfully master this subject, you must be:

- persistent, attentive and inquisitive;
- creative and cheerful, open to communication and discussions
- ready to receive information and knowledge on the subject not only during lectures, but also during extracurricular hours

**See you soon!**