Identification	**Subject**	MATH215, Linear algebra and mathematical analysis, 6 ECTS
	Department	Mathematics
	Program	Undergraduate
	Term	Fall, 2025
	Instructor	Safarova Vafa
	E-mail:	vefa-seferova-91@bk.ru
	Phone:	
	Classroom/hours	Thursday: 08:30-10:00, 10:10-11:40
	Office hours	
Prerequisites	The prerequisites are high school algebra and trigonometry. Prior experience with calculus is helpful but not necessary.	
Language	English	
Compulsory/Elective	Compulsory	
Description	Linear algebra and analytic geometry is a major course at School of Economics and Management. This introductory course covers two content areas: Linear Algebra and Mathematical analysis. This introductory course covers differentiation, matrix operations, determinants and systems of linear equations.	
Required textbooks and course materials	1. George Thomas, et al, Thomas' Calculus: Early Transcendental, 12th edition, Addison-Wesley (2010), (http://libgen.org/) 2. V.V. Konev. Linear Algebra, Vector Algebra and Analytical Geometry, Textbook. Tomsk: TPU Press, 2009, 114 pp. 3. David C. Lay, Linear Algebra and its Applications. 4th edition, 2012 **Supplementary book** 1. James Stewart, Essential calculus. Early transcendentals, Second Edition, Brooks/Cole (2013) (http://libgen.org/) 2. Poole, D., Linear algebra: a modern introduction. 4th Edition, 2014.	
Course website		
Course outline	This course introduces undergraduate students to the fundamental concepts of Linear Algebra and Mathematical Analysis, with an emphasis on applications in economics and management sciences. Topics covered include matrix operations, determinants, solutions of systems of linear equations, as well as core calculus concepts such as limits, continuity, and differentiation.	
Course objectives	By the end of this course, students will be able to: • Understand and apply the fundamental principles of matrix algebra, including matrix operations and their role in solving systems of linear equations. • Calculate determinants and utilize them to analyze properties of matrices relevant to economic models. • Solve systems of linear equations effectively using methods such as Gaussian elimination. • Comprehend the concept of functions with a focus on trigonometric functions and their applications. • Develop a thorough understanding of limits and continuity as foundational concepts in mathematical analysis. • Apply differentiation techniques, including the chain rule, to analyze and interpret the behavior of functions. • Utilize derivatives to solve practical problems involving rates of change and tangents to curves, relevant to economic contexts.	

<table>
<tr><td>Learning outcomes</td><td colspan="3">Upon successfully completing this course students will be able to:
• To find limit of functions at points
• To find derivatives of functions
• To apply theorems to solve real world problems
• Calculations of determinants
• Matrix operations
• Solve systems of linear equations</td></tr>
<tr><td rowspan="5">Teaching methods</td><td colspan="2">Lecture</td><td>x</td></tr>
<tr><td colspan="2">Experiential exercise</td><td></td></tr>
<tr><td colspan="2">Assisted work</td><td>x</td></tr>
<tr><td colspan="2">Assisted lab work</td><td>x</td></tr>
<tr><td colspan="2">Others</td><td></td></tr>
<tr><td rowspan="8">Evaluation</td><td>Methods</td><td>Date/deadlines</td><td>Percentage (%)</td></tr>
<tr><td>Midterm Exam</td><td></td><td>30</td></tr>
<tr><td>Class Participation</td><td></td><td>5</td></tr>
<tr><td>Quizzes (4-5)</td><td></td><td>20 (2 quizzes)</td></tr>
<tr><td>Activity</td><td></td><td>5</td></tr>
<tr><td>Project (3 phases)</td><td></td><td>-</td></tr>
<tr><td>Final Exam</td><td></td><td>40</td></tr>
<tr><td>Total</td><td></td><td>100</td></tr>
<tr><td>Policy</td><td colspan="3">• NO CELL PHONES are allowed during lecture and lab sessions. PLEASE turn them off before lecture! (Not silent or vibrating mode). This is a university policy and violators will be reprimanded accordingly.
• No late assignments will be accepted without prior arrangement with the instructor for acceptable excuses. Medical and family emergency will be considered on case-by-case basis.
• No late homework will be accepted. Homework is to be completed on an individual basis. Students may discuss homework with classmates, but students are responsible for your own work. If students have consulted classmates, please note the individuals name on the top of students' assignment.
• Quizzes may be given unannounced throughout the term and will count as one homework. There will be no make-up quizzes.
• Students will be divided into groups of 3 individuals for study group sessions and will be assigned some problems to solve together in the class.
• No make-up exams. If students miss an exam, a zero score will be assigned to the missed exam.
• If students should miss class due to personal emergency or medical reasons, please notify the instructor by email immediately. A doctor's note will be required for make-up work.
• Students are responsible for completing the reading assigned from the textbook related to the covered topics and for checking email regularly for important information and announcements related to the course.
• University policy on academic honesty concerning exams and individual work will be strictly enforced.
• BE ON TIME!</td></tr>
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Week	Date/Day (Tentative)	Topics	Textbook/ Assignments
1	18.09.25 18.09.25	• Rates of Change and Tangents to Curves • Limit of a Function and Limit Laws	**[1] Ch.2.1, 2.2**
2	25.09.25 25.09.25	• The Precise Definition of a Limit • Practice	**[1] Ch. 2.3**
3	02.10.25 02.10.25	• One-Sided Limits • Continuity	**[1] Ch. 2.4, 2.5**
4	09.10.25 09.10.25	• Limits Involving Infinity; Asymptotes of Graphs • Tangents and the Derivative at a Point	**[1] Ch. 2.6, 3.1**
5	16.10.25 16.10.25	• The Derivative as a Function • Differentiation Rules	**[1] Ch. 3.2, 3.3**
6	23.10.25 23.10.25	• The Derivative as a Rate of Change • Derivatives of Trigonometric Functions	**[1] Ch. 3.4, 3.5**
7	30.10.25 30.10.25	• The Chain Rule • Implicit Differentiation	**[1] Ch. 3.6, 3.7, Quiz 1 (10 pts)**
8	06.11.25 06.11.25	• Derivatives of Inverse Functions and Logarithms	**[1] Ch.3.8**
9	13.11.25 13.11.25	• **Midterm Exam** • Inverse Trigonometric Functions	**[1] Ch. 3.9**
10	20.11.25 20.11.25	• Systems of linear equations: Basic Concepts, Gaussian Elimination, Homogeneous Systems of Linear Equations • Matrices: Basic definitions, Matrix operations, Types of matrices, Kronecker Delta Symbol, Properties of Matrix Operations	**[2] p. 43-53** **[2] p. 7-19**
11	27.11.25 27.11.25	• Determinants: Permutations and Transpositions, Determinant General Definition, Properties of Determinants	**[2] p. 20-30**
12	04.12.25 04.12.25	• Determinant Calculation • Practice	**[2] p. 31-35**
13	11.12.25 11.12.25	• Inverse matrices: Three Lemmas, Theorem of Inverse Matrix, Calculation of Inverse Matrices by Elementary Transformations	**[2] p. 36-42** **Quiz-2 (10 pts)**
14	18.12.25 18.12.25	• Matrix Rank • Problem solving	**[2] p. 43-53**

15	25.12.25 25.12.25	• Cramer's Rule, Cramer's General Rule • Problem solving	**[2] p.54-59**
	TBA	**Final Exam**	

This syllabus is a guide for the course and any modifications to it will be announced in advance.