

Identification	Subject	MATH 215 Linear Algebra and Mathematical Analysis, 6 ECTS
	Department	Mathematics
	Program	Undergraduate
	Term	Fall, 2026
	Instructor	Khanim Omaroglu
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	Phone:	012- 422- 24- 97
	Classroom/hours	Tuesday 08:30-10:00, Thursday 08:30-10:00
	Office hours	
Prerequisites	The prerequisites are high school algebra and geometry. Prior experience with calculus is helpful but not necessary.	
Language	English	
Compulsory/Elective	Compulsory	
Description	Linear Algebra and Mathematical Analysis is one of the main courses at School of Economics and Management. This 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, 15th edition, Addison-Wesley (2022) 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. 6th edition, 2021 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 outline	This course introduces undergraduate students to the fundamental concepts of Linear Algebra and Mathematical Analysis, with a focus on applications in economics and management sciences. Topics include matrix operations, determinants, solving systems of linear equations, and 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.		
Learning outcomes	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		
Teaching methods	Lecture	x	
	Assisted work	x	
	Assisted lab work	x	
	Others		
Evaluation	Methods	Date/deadlines	Percentage (%)
	Midterm Exam	TBA	30
	Attendance		5
	Activity		5
	Quizzes		20 (4 quizzes)
	Final Exam	TBA	40
	Total		100
Policy	• The use of generative artificial intelligence (GAI) tools is strictly prohibited in this course. The primary aim of the course is to develop students’ independent mathematical reasoning, problem-solving skills, and creative thinking. Students are therefore expected to complete all assignments and assessments independently without the use of GAI tools. If it is determined that a student has used generative artificial intelligence (GenAI) tools while completing assignments, one of the following measures may be applied: Issuing an oral or written warning; Requiring the resubmission of the assignment; Reducing the grade for the assignment or assigning a zero (0). • Quizzes may be given unannounced throughout the term and will count as one homework. There will be no make-up quizzes. • NO CELL PHONES are allowed during lectures 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. • 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!		
Week	Date/Day (Tentative)	Topics	Textbook/Assignments

1	15.09.2026 17.09.2025	- Rates of Change and Tangents to Curves - Limit of a Function and Limit Laws	[1] Ch. 2.1 [1] Ch. 2.2
2	22.09.2026 24.09.2026	- The Precise Definition of a Limit - One-Sided Limits	[1] Ch. 2.3 [1] Ch. 2.4
3	29.09.2026 01.10.2026	- Continuity - Limits Involving Infinity; Asymptotes of Graphs. Quiz-1	[1] Ch. 2.5 [1] Ch. 2.6
4	06.10.2026 08.10.2026	- Tangents and the Derivative at a Point - The Derivative as a Function	[1] Ch. 3.1 [1] Ch. 3.2
5	13.10.2026 15.10.2026	- Differentiation Rules - The Derivative as a Rate of Change	[1] Ch. 3.3 [1] Ch. 3.4
6	20.10.2026 22.10.2026	- Derivatives of Trigonometric Functions - The Chain Rule	[1] Ch. 3.5 [1] Ch. 3.6
7	27.10.2026 29.10.2026	- Implicit Differentiation - Derivatives of Inverse Functions and Logarithms. Quiz-2	[1] Ch. 3.7 [1] Ch. 3.8
8	03.11.2026 05.11.2026	- Inverse Trigonometric Functions Midterm Exam	[1] Ch. 3.9
9	10.11.2026 12.11.2026	- Holiday - Systems of linear equations: Basic Concepts, Gaussian Elimination, Homogeneous Systems of Linear Equations	[2] p. 43-53
10	17.11.2026 19.11.2026	- Matrices: Basic definitions, Matrix operations, Types of matrices, Kronecker Delta Symbol, Properties of Matrix Operations - Matrix Calculation	[2] p. 7-19
11	24.11.2026 26.11.2026	- Determinants: Permutations and Transpositions, Determinant General Definition, Properties of Determinants - Determinant Calculation	[2] p. 20-30 [2] p. 31-35

12	01.12.2026	• Inverse matrices: Three Lemmas, Theorem of Inverse Matrix, Calculation of Inverse	[2] p. 36-42
	03.12.2026	• Matrices by Elementary Transformations. Quiz-3	[2] p. 36-42
13	08.12.2026	• Matrix Rank	[2] p. 43-53
	10.12.2026	• Rank Calculation	
14	15.12.2026	• Cramer's Rule, Cramer's General Rule	[2] p. 54-59
	17.12.2026	• Problem solving.	
15	22.12.2026	• Cramer's Rule, Cramer's General Rule. Quiz-4	[2] p. 54-59
	24.12.2026	• Problem solving	
	TBA	Final Exam	

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