Identification	Subject	MATH 235, Applied linear algebra and analytic geometry, 6 ECTS
	Department	Mathematics
	Program	Undergraduate
	Term	Fall, 2025
	Instructor	Rza Mustafayev
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	Phone:	
	Classroom/hours	Monday: 18:40-20:10, 20:20-21:00
Prerequisites		*Applied linear algebra and analytic geometry* is a second-year, first-semester course. The prerequisite is Calculus 2 course.
Language		English
Compulsory/Elective		Required
Required textbooks and course materials		**Core Textbooks:** V.V. Konev. Linear Algebra, Vector Algebra and Analytical Geometry,Textbook. Tomsk: TPU Press, 2009, 114 pp.
Course website		
Course outline		Applied linear algebra and analytic geometry is a major course at School of Science and Engineering of Khazar University; it plays a role in the understanding of science, engineering, economics, and computer science, among other disciplines. This introductory course covers three content areas: Linear Algebra, Vector Algebra and Analytical Geometry. Each part contains basic mathematical conceptions and explains new mathematical terms. Many useful examples and exercises are presented in the textbook. explained and illustrated by examples and exercises.
Course objectives		1. **Understand and apply vector operations** • Perform operations with vectors in two and three dimensions, including addition, scalar multiplication, dot product, and cross product. • Interpret geometric meaning of vector operations. 2. **Solve systems of linear equations using multiple methods** • Apply Gaussian and Gauss-Jordan elimination techniques. • Use matrix methods, including row reduction and inverse matrices, to solve linear systems. 3. **Understand the theory and application of matrices** • Perform basic matrix operations (addition, multiplication, transpose, inverse). • Apply concepts of matrix rank, determinants, and elementary matrices. • Understand special types of matrices (symmetric, orthogonal, diagonal, etc.). 4. **Apply geometric interpretations in analytic geometry** • Analyze lines, planes, and surfaces in two and three dimensions. • Use vector and parametric equations to represent geometric objects. • Understand conic sections and quadric surfaces using algebraic and geometric techniques.

Learning outcomes	By the end of the course the students should be able:		
	1. To do matrix operations 2. To compute determinants 3. To solve systems of linear equations 4. To solve problems about geometrical applications of vector operations		
Teaching methods	**Lecture**		x
	Group discussion		x
	Experiential exercise		x
	Simulation		
	Case analysis		
	Course paper		x
	Others		
Evaluation	Methods	Date/deadlines	Percentage (%)
	Midterm Exam		30
	Case studies		
	Class Participation		5
	Quizzes		20 (2 quizzes)
	Activity		5
	Project		
	Laboratory work		
	Final Exam		40
	Others		
	Total		100
Policy	▪ **Preparation for class** The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. After the lecture, you should study your notes and work relevant problems and cases from the end of the chapter and sample exam questions. Throughout the semester we will also have a large number of review sessions. These review sessions will take place during the regularly scheduled class periods. ▪ **Attendance** Students who do not attend more than 25 % of online classes will not be allowed to take the exam. ▪ **Quizzes and examinations** Quizzes may be given unannounced throughout the term. There will be		

no make-up quizzes.

- **Withdrawal (pass/fail)**

  This course strictly follows grading policy of the School of Science and Engineering. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year.

- **Cheating/plagiarism**

  Cheating or other plagiarism during the Quizzes, Mid-term and Final Examinations will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations.

- **Professional behavior guidelines**

  The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited.

- **Ethic**
  Use of any electronic devices is prohibited in the classroom. All devices should be turned off before entering class.
  This is a university policy and violators will be reprimanded accordingly!
  Students should not arrive in late to class!

Tentative Schedule

Week	Date/Day (tentative)	Topics	Textbook/ Assignments
1	15.09.2025 15.09.2025	Matrices: Basic definitions, Matrix operations, Types of matrices, Kronecker Delta Symbol, Properties of Matrix Operations	p. 7 - 19
2	22.09.2025 22.09.2025	Determinants: Permutations and Transpositions, Determinant General Definition, Properties of Determinants	p. 20 - 30
3	29.09.2025 29.09.2025	Determinant Calculation	p. 31 - 35
4	06.10.2025 06.10.2025	Inverse matrices: Three Lemmas, Theorem of Inverse Matrix, Calculation of Inverse Matrices by Elementary Transformations	p. 36 - 42

5	13.10.2025 13.10.2025	Systems of linear equations: Matrix Rank, Basic Concepts, Gaussian Elimination, Homogeneous Systems of Linear Equations	p. 43 - 53
6	20.10.2025 20.10.2025	Cramer's Rule, Cramer's General Rule	p. 54 - 59
7	27.10.2025 27.10.2025	Vectors: Basic Definitions, Geometrical Interpretation	**Quiz (10 pts)** p. 60 - 65
8	03.11.2025 03.11.2025	Resolution of Vectors into Components, Scalar Product of Vectors	p. 65 - 71
9	10.11.2025 10.11.2025	**Midterm Exam** Vector Product, The Scalar Triple Product,	p. 72 - 77
10	17.11.2025 17.11.2025	Transformation of Coordinates Under Rotation of the Coordinate System	p. 79 - 81
11	24.11.2025 24.11.2025	Straight lines: Equations of lines, Lines in a Plane, Angle Between Two Lines	p. 82 - 89
12	01.12.2025 01.12.2025	Distance From a Point to a Line, Relative Position of Lines	p. 89 - 90
13	08.12.2025 08.12.2025	Planes: General Equation of a Plane, Equation of a Plane Passing Through Three Points, Other Forms of Equations of a Plane	**Quiz (10 pts)** p. 91 - 95
14	15.12.2025 15.12.2025	Angle Between Two Planes, Distance Between a Point and a Plane	p. 95 - 97
15	22.12.2025 22.12.2025	Relative Position of Planes, Relative Position of a Plane and a Line, Angle Between a Plane and a Line	p. 97 - 98
	TBA	**FINAL EXAM**	

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