Identification	**Subject**	MATH 231, Applied Linear Algebra
	Department	Mathematics
	Program	Undergraduate
	Term	Fall, 2023
	Instructor	MatanatMursalova
	E-mail:	matanat.mursalova@khazar.org
	Phone:	
	Classroom/hours	Tuesday11.50, Tuesday13.40
	Office hours	
Prerequisites	MATH 101	
Language	English	
Compulsory/Elective	Compulsory	
Description	The course is an introduction to matrix theory and linear algebra and its applications in different engineering fields, such as Matrices in Engineering, Graphs and Networks, Markov Matrices, Linear Programming, Fourier Series, Matrices in Statistics and Probability and Computer Graphics..	
Required textbooks and course materials	*David C. Lay, Linear Algebra and its Applications. 4th edition, 2012* *Poole, D., Linear algebra: a modern introduction. 4th Edition, 2014.*	
Course website		
Course outline	Linear Algebra is the study of vector spaces and linear transformations on vector spaces. Linear Algebra is central to both pure and applied mathematics. Techniques from Linear Algebra are also used in analytic geometry, engineering, physics, natural science, computer science, and the social sciences.Topics include: • Systems of linear equations • Row reduction and echelon forms • Matrix operations, including inverses • Block matrices • Linear dependence and independence • Subspaces and bases and dimensions • Orthogonal bases and orthogonal projections • Linear models and least-squares problems • Determinants and their properties • Cramer's Rule • Eigenvalues and eigenvectors • Diagonalization of a matrix • Symmetric matrices • Positive definite matrices	

<table>
<tr><td>Course objectives</td><td colspan="3">Upon successfully completing this course students will be able to:
Formulate and solve multi-variable systems of linear equations;
Matrices classification and computations;
Describing fundamental facts in vector spaces;
Calculation of eigenvectors and eigenvalues;
Implementing the mentioned concepts in engineering problems.</td></tr>
<tr><td>Learning outcomes</td><td colspan="3">At the end of the course the students should be able:
To solve square systems by elimination
To complete solution of system of linear equation
To know process of orthogonalization
To calculate of determinants
To calculate of eigenvalues and eigenvectors
To know symmetric matrices and positive definite matrices
To determine basis and dimensions for linear transformations
To know application of linear algebra to engineering</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</td><td></td><td>20 (2 quizzes)</td></tr>
<tr><td>Activity</td><td></td><td>5</td></tr>
<tr><td>Project</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.</td></tr>
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	• 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!

Week	Date/Day (Tentative)	Topics	Textbook/Assignments
1	19.09.23 19.09.23	Systems of linear equations. Row reduction and Echelon forms.	1.1, 1.2
2	26.09. 23 26. 09.23	Vector equations. The matrix equation $Ax = b$.	1.3, 1.4
3	03.10.23 03.10.23	Solution sets of linear systems. Applications of linear systems	1.5, 1.6
4	10.10.23 10.10.23	Linear independence. Introduction to linear transformations.	1.7, 1.8
5	17.10.23 17.10.23	The matrix of a linear transformations Quiz-1.	1.9
6	24.10.23 24.10.23	Matrix operations. The inverse of a matrix.	2.1 2.2, 2.3
7	31.10.23 31.10.23	Partitioned matrices. Matrix factorizations. Characterizations of invertible matrices	2.4, 2.5
8	07.11.23 07.11.23	**Midterm Exam**	2.8,2.9
9	14.11.22 14.11.22	Characterizations of invertible matrices Introduction to determinants. Dimension and rank.	3.1, 3.2
10	21.11.22 21.11.22	Cramer`s rule, volume and liner transformations. Vector spaces and subspaces.	3.3, 4.1
11	28.11.22 28.11.22	Null spaces, column spaces and liner transformations.Linearly independent sets;bases. Quiz-2	4.2 4.3
12	05.12.22 05.12.22	Coordinate systems The dimension of a vector space equations	4.4 4.5
13	12.12.22 12.12.22	Rank. Change of bases .	4.6 4.7

14	22.12.22 22.12.22	Eigenvectors and eigenvalues. The characteristic equation.	5.1, 5.2
15	29.19.22 29.19.22	Diagonalization. Eigenvectors and liner transformations.	5.3, 5.4
	TBA	**Final Exam**	

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