Identification	**Subject**	MATH 231, Applied Linear Algebra, 6 ECTS	
	Department	Mathematics	
	Program	Undergraduate	
	Term	Fall, 2024	
	Instructor	Rza Mustafayev	
	E-mail:	rzamustafayev@gmail.com	
	Phone:	(+994) 50 634 26 16	
	Classroom/hours	Thursday 17:00-18:30, 18:40-20:10	
	Office hours		
Prerequisites	MATH 102		
Language	English		
Compulsory/Elective	Compulsory		
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	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. Vectors in n-space, systems of linear equations, Gaussian elimination, matrix algebra, determinants, subspaces of n-space, basis and dimension, eigenvalues and eigenvectors, diagonalization of a matrix, geometry of vectors, projections, orthogonal sets of vectors, symmetric matrices.		
Course objectives	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.		
Learning outcomes	o Solving square systems by elimination o Complete solution of system of linear equation o Least squares solutions o Orthogonalization o Calculations of determinants o Calculation of Eigenvalues and eigenvectors o Symmetric matrices and positive definite matrices o Basis and dimensions for linear transformations and change of basis o Applications of linear algebra in engineering		
Teaching methods	**Lecture**		x

<table>
<tr><td></td><td colspan="2">Assisted work</td><td>x</td></tr>
<tr><td></td><td colspan="2">Assisted lab work</td><td>x</td></tr>
<tr><td rowspan="7">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>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.
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	19.09.24 19.09.24	Systems of linear equations. Row reduction and Echelon forms.	1.1, 1.2
2	26.09.24 26.09.24	Vector equations. The matrix equation Ax $= b$.	1.3, 1.4
3	03.10.24 03.10.24	Solution sets of linear systems. Applications of linear systems.	1.5, 1.6
4	10.10.24 10.10.24	Linear independence. Introduction to linear transformations.	1.7, 1.8
5	17.10.24 17.10.24	The matrix of a linear transformations. Matrix operations.	1.9, 2.1 Quiz-1 (10 pts)
6	24.10.24 24.10.24	The inverse of a matrix. Characterizations of invertible matrices.	2.2, 2.3
7	31.10.24 31.10.24	Partitioned matrices. Matrix factorizations.	2.4, 2.5
8	07.11.24 07.11.24	**Midterm Exam** Subspaces of R^n	
9	14.11.24 14.11.24	Characterizations of invertible matrices Introduction to determinants. Dimension and rank.	2.8, 2.9 3.1, 3.2
10	21.11.24 21.11.24	Cramer`s rule, volume and linear transfor-mations. Vector spaces and subspaces.	3.3, 4.1 Quiz-2 (10 pts)
11	28.11.24 28.11.24	Null spaces, column spaces and liner transformations. Linearly independent sets; bases.	4.2, 4.3
12	05.12.24 05.12.24	Coordinate systems. The dimension of a vector space equations.	4.4, 4.5

13	12.12.2024 12.12.2024	Rank. Change of bases.	4.6, 4.7
14	19.12.2024 19.12.2024	Eigenvectors and eigenvalues. The characteristic equation.	5.1, 5.2
15	26.12.2024 26.12.2024	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.