Subject code	ECTS credits
MAT 3009	6

Course title in Lithuanian

MATRICŲ TEORIJA

Course title in English

MATRIX THEORY

Short course annotation in Lithuanian (up to 500 characters)

Paprastos struktūros matricos diagonalizavimo metodai. Normaliosios, Ermito, simetrinės, ortogonaliosios, teigiamai apibrėžtos, Jakobio matricos. Žordano forma. Matricų funkcijos. Polinomų matricos. Bitiesinės formos. Neneigiamosios ir tikimybinės matricos. Matricų teorijos taikymai matematikoje ir ekonomikoje.

Short course annotation in English (up to 500 characters)

This course aims to develop understanding in matrix theory. The content includes: transformations to diagonal matrix; types of matrices; Jordan form; matrix functions; bilinear structures; probabilistic matrices; matrix theory applications in mathematics and economics.

Prerequisites for entering the course

Algebra. Geometry.

Course aim

Course aim is to provide students with main theoretical and practical knowledge and skills of matrix theory.

Links between course outcomes, criteria of learning achievement evaluation, study methods and methods of learning achievement assessment

No	Course outcomes	Criteria of learning achievement evaluation	Study methods	Methods of learning achievement assessment
1	Provide knowledge to recognize advanced types of matrices and to operate with them	Student recognizes advanced types of matrices and can perform operations with them.	Lectures, practical works, individual work, consulting	Mid-term exam, assessment of practical works
2	Knowledge and understanding of matrices of polynomials and their properties	Student recognizes and explains matrices of polynomials and main their properties.	Lectures, practical works, individual work, consulting	Mid-term exam, assessment of practical works
3	Knowledge and understanding of nonnegative matrices	Student recognizes main properties of nonnegative matrices.	Lectures, practical works, individual work, consulting	Final exam, assessment of practical works
4	Applications of matrix theory in economics and other areas	Student is able to apply terms and propositions of matrix theory in mathematics, economics and other areas.	Lectures, practical works, individual work, consulting	Final exam, assessment of practical works
5	Perform the ability to formulate and prove the propositions of matrix theory	Operating on terms and propositions, student proves statements of matrix theory.	Lectures, Literature analysis, individual work, consulting	Mid-term exam, final exam

Links between study programme outcomes and course outcomes

Study programme outcomes	Running number of course outcome				
	1	2	3	4	5

Know and comprehend concepts and propositions of fundamental mathematical subjects, recognize and apply them solving practical/theoretical tasks	+	+	+		
Identify the problem, collect and analyze real/theoretical data using various mathematical methods, tools and IT technologies				+	+
Operating with formal mathematical symbols and terms, determine mathematical connections between various mathematical quantities; conceive mathematical propositions and logical proofs, construct and prove new statements	+	+	+		+
Think logically and analytically, evaluate alternative ways of task solving and implement optimal solutions				+	+

Content

No	Content (topics)
1.	Normal matrices.
2.	Hermitian and symmetrical matrices.
3.	Orthogonal matrices.
4.	Positive-definite matrices.
5.	Jacobi matrices.
6.	Jordan form.
7.	Matrix functions. Matrices of polynomials.
8.	Bilinear forms.
9.	Nonnegative matrices. Probabilistic matrices.
10.	Matrix theory applications in mathematics and economics.

Distribution of workload for students (contact and independent work hours)

Lectures	**45 hours**
Practical work	**30 hours**
Individual students work	**85 hours**
Total:	**160 hours**

Structure of cumulative score and value of its constituent parts

Final written exam (50%), mid-term written exam (25%), assessment of practical work (25%).

Recommended reference materials

No	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	*Self study rooms*	*Other libraries*
Basic materials						
1.	2000	Kvedaras B. Matricų teorija. II d. (Matrix Theory II)	Vilnius: MII	29	2	
2.	1999	Kvedaras B. Matricų teorija. I d. (Matrix Theory I)	Kaunas: VDU	29	2	
3.	2013	Zhan X. Matrix Theory	American Mathematical Society	0	1	
Supplementary materials						
1.	1984	Markauskas R. Tiesinės algebros uždavinynas: tiesinės erdvės ir kvadratinės formos. (Tasks for Linear	Vilnius			

		Algebra: Linear Spaces and Quadratic Forms)		

Course programme designed by

Dr. Živilė Jokšienė