

Subject code	ECTS credits
MAT2002	6

Course title in Lithuanian

ALGEBRA

Course title in English

ALGEBRA

Short course annotation in Lithuanian (up to 500 characters)

Matricos apibrėžimas, veiksmi su matricomis. Determinantas. Tiesinių lygčių sistemų sprendimas Kramerio ir atvirkštinės matricos metodais. Matricos rangas. Tiesinės vektorinės erdvės. Tiesinių lygčių sistemų sprendimas Gauso metodu. Tiesiniai funkcionalai. Koordinačių transformacijos. Tiesiniai operatoriai. Norma. Unitariosios ir Euklido erdvės. Gramo determinantas. Tikrinės reikšmės ir tikriniai vektoriai. Paprastos struktūros matricos. Kvadratinės formos. Laukai. Grupės. Žiedai.

Short course annotation in English (up to 500 characters)

This course aims to develop understanding in algebra. The content includes: matrix definition and operations; determinant; matrix rank; linear vector space; solving of linear equations systems; linear transformations; Euclidean space; Gramm determinant; least square method; eigenvalues and eigenvectors; diagonal matrices; quadrant structures; groups; rings; fields; polynomials. Teaching methods are: lectures and practical works.

Prerequisites for entering the course

High school mathematics knowledge.

Course aim

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

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 matrices and to operate with them	Student recognizes main types of matrices, is able to perform linear operations with matrices.	Lectures, practical works, individual work, consulting	Mid-term exam, assessment of practical works
2	Knowledge to calculate determinants and ranks of matrix	Student demonstrates the ability to calculate determinant and rank of different order matrix.	Lectures, practical works, individual work, consulting	Mid-term exam, assessment of practical works
3	Knowledge on solving systems of linear equations using different methods	Student demonstrates the the ability to solve systems of linear equations using Krammer, inverse matrix and Gaussian methods.	Lectures, practical works, individual work, consulting	Mid-term exam, assessment of practical works
4	Knowledge and understanding on eigenvalues and eigenvectors of matrices	Student demonstrates the ability to calculate eigenvalues and eigenvectors of matrices	Lectures, practical works, individual work, consulting	Final exam, assessment of practical works
5	Knowledge and understanding of different algebraic structures	Student recognizes main types of algebraic structures	Lectures, practical works, individual work, consulting	Final exam, assessment of practical works
6	Perform the ability to formulate and prove the main	Operating on basic terms and propositions, student proves	Lectures,	Mid-term exam, final exam

	propositions of algebra course.	main propositions of algebra course.	Literature analysis, individual work, consulting	
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Links between study programme outcomes and course outcomes

Study programme outcomes	Running number of course outcome					
	1	2	3	4	5	6
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.	Matrix definition and operations. Determinant.
2.	Solving of linear equations systems by using Krammer and inverse matrix methods.
3.	Matrix rank. Linear vector space.
4.	Solving of linear equations systems by using Gaussian method.
5.	Linear functionals. Linear transformations. Linear operator.
6.	Norm. Unitary and Euclidean spaces.
7.	Gramm determinant. Least square method.
8.	Eigenvalues and eigenvectors.
9.	Diagonal matrices.
10.	Quadrant structures.
11.	Fields.
12.	Groups.
13.	Rings.

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
<i>Basic materials</i>						
1	1999	Kvedaras B. Matricų teorija I d. (Matrix Theory I)	Kaunas: VDU leidykla	29	2	
2	1985	Matuliauskas A. Algebra.	Vilnius: Mintis	2	2	

3	2012	Lay D.C. Linear Algebra and its Applications	Addison Wesley	2	0	
4	1989	Bulota K., Survila P. Algebra ir skaičių teorija. (Algebra and Number Theory)	Vilnius: Mokslas	11	2	
<i>Supplementary materials</i>						
1	1997	Markauskas R. Tiesinės algebros uždavinynas. (Tasks for Linear Algebra)	Kaunas: Technologija.			
2	1985	Lang S. Introduction to Linear Algebra				
3	1991	Mathews K. Elementary Linear Algebra. Lecture notes				http://www.numbertheory.org/book/

Course programme designed by

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