

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Linear Algebra, PG_00058913							
Field of study	Informatics							
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026			
Education level	first-cycle studies		Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Part-time studies		Mode of delivery			at the university		
Year of study	1		Language of instruction			Polish		
Semester of study	2		ECTS credits			8.0		
Learning profile	general academic profile		Assessment form		assessment			
Conducting unit	Mathematics Center -> Vice-Rector For Education							
Name and surname of lecturer (lecturers)	Subject supervisor		dr Anna Niewulis					
	Teachers		mgr Katarzyna Kiepiela					
		dr Anna Niewulis						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0		0.0	60
	E-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity	Participation i classes incluc plan	n didactic led in study	Participation in consultation hours		Self-study		SUM
	Number of study hours	60		15.0		125.0		200
Subject objectives	Students obtain competence in using methods of linear algebra and knowledge how to solve simple problems that can be found in the field of engineering.							

Learning outcomes	Course outcome	Subject outcome	Method of verification				
	[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Student is able to determine whether a given set with binary operations is an algebraic structure, performs binary operations using modular arithmetic, determines the real and complex roots of polynomials, and performs operations on polynomials using modular arithmetic. Student solves problems in matrix algebra: calculates the determinants, solves matrix equations and systems of linear equations - using various methods. Student is able to use scientific software to solve problems from analytical three-dimensional geometry. Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions.	[SU4] Assessment of ability to use methods and tools				
	[K6_W01] knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	Student names the basic algebraic structures, uses the basic operations on complex numbers, knows various methods to solve problems in matrix algebra, is able to determine the number of solutions of a system of equations. Student analyses problems from analytical three- dimensional geometry. Student uses the basic methods of linear algebra to formulate and solve simple problems in the field of informatics	[SW1] Assessment of factual knowledge				
Subject contents	Binary operations. Algebraic structures: groups, rings and fields. Modular arithmetic. Complex numbers. Geometric interpretation. Basic operations. Polar and exponential form. Natural power and n-th root of complex number. The polynomial ring. Roots of polynomials. Horners scheme. Fundamental theorem of algebra. Matrices and determinants. Matrices operations. Invertible matrices. Laplaces formula for determinants. Properties of determinants. Methods of matrix inversion. Systems of linear equations. Cramers theorem. Rank of matrix. Kronecker-Capelly theorem. Gauss-Jordan elimination. Three-dimensional geometry. Cartesian coordinate system. Dot, cross and scalar triple products. Lines and planes in three-dimensional space. Basic geometric tranformations on a plane and space.						
Prerequisites and co-requisites							
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Tests	50.0%	100.0%				
Recommended reading	Basic literature	T. Jurlewicz, Z. Skoczylas - Algebra i geometria analityczna. Definicje, twierdzenia i wzory., Oficyna wydawnicza GiS, 2006; T. Jurlewicz, Z. Skoczylas - Algebra i geometria analityczna. Przykłady i zadania., Oficyna wydawnicza GiS, 2006 J. Topp - Algebra liniowa, Wydawnictwo PG, 2005					
	Supplementary literature J. Długosz - Funkcje zespolone, GiS, 2002						
	eResources addresses						

Example issues/ example questions/ tasks being completed	
	1. Discuss the existence of the solution for the given system of linear equations.
	2. Discuss the relation between two given lines I1 and I2.
	3. Find all roots of the equation z3 - 8i=0. Give their algebraic form.
	4. Show that the points A, B, C, D do not lie in a plane.
	5. Solve the matrix equation AX=B, where A i B are given matrices.
	6. Find the remainder of the division of two polynomials over the field modulo 5
Work placement	Not applicable

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