GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Linear algebra with geometry, PG_00034519				
Field of study	Technical Physics				
Date of commencement of studies	October 2021		Academic year of realisation of subject		2021/2022
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	Full-time studies		Mode of delivery		at the university
Year of study	1		Language of instruction		Polish
Semester of study	2		ECTS credits		5.0
Learning profile	general academic profile		Assessment form		exam
Conducting unit	Department of Probability Theory and Biomathematics -> Faculty of Applied Physics and Mathematics				
Name and surname of lecturer (lecturers)	Subject supervisor		dr Joanna Cyman		
	Teachers		dr Joanna Cyman		

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie: Algebra liniowa 2022 - Moodle ID: 18617 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18617						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	60	5.0	60.0	125

Subject objectives	Getting to know the basic knowledge in the field of linear algebra and analytic geometry.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W03	Student has basic knowledge in the field of linear algebra and analytical geometry; knows complex numbers, matrix calculus, vector algebra. He knows different methods of solving problems with complex numbers, matrices, solving systems of linear equations and methods of analytic geometry in space R^3, in the scope necessary in the work of an engineer.	[SW1] Assessment of factual knowledge
	K6_U01	A student understands the value independent development of knowledge. He independently solves exercises that consolidate knowledge.	[SU2] Assessment of ability to analyse information

Subject contents	**Complex numbers**. Operations on complex numbers. Solving algebraic equations in the complex space. Different forms of a complex number. Geometric interpretation, Gaussian plane. Exponentiation, nth root. The basic theorem of algebra.
	Matrix calculus. Matrix operations.. Determinants. Laplace expansion. Inverse matrix. Row of matrices, elementary transformations of matrix. Systems of linear equations. Cramer's rule. The existence of solutions of the system of linear equations, the Kronecker-Capelli theorem.
	Analytic geometry in space. Vectors. Scalar product, orthogonal vectors. Vector product, mixed product and its geometric interpretation. Equations of plane and line in R^3. Conical curves.
	Vector space. The base and dimension of space. Linear transformations. The kernel and image of transformation. Linear transformation matrix. Values and eigenvectors. Euclidean spaces. Gram–Schmidt process.

Prerequisites and co-requisites	Basic knowledge of mathematics in the field of secondary school.

Assessment methods and criteria			
	Subject passing criteria	Passing threshold	Percentage of the final grade
	egzamination	50.0%	40.0%
	colloquia	50.0%	54.0%
	exercises	50.0%	6.0%

Recommended reading	Basic literature	1. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 i 2. Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2012.
		2. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 i 2. Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2012.
		3. J. Topp, Algebra liniowa, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2015.
		4. Donald A. McQuarrie, Matematyka dla przyrodników i inżynierów Tom 1, Wydawnictwo Naukowe PWN, Warszawa 2018.
	Supplementary literature	1. L. Kowalski, Elementy algebry liniowej z geometrią analityczną dla informatyków, Bel Studio, 2005.
		2. G. Banaszak, W. Gajda, Elementy algebry liniowej I, II, WNT, Warszawa 2002.
	eResources addresses	Algebra liniowa 2022 - Moodle ID: 18617 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18617

Example issues/ example questions/ tasks being completed	1.Mark on the complex plane the set described by inequality: $2 < \|(3+4i)z+i\| < 3$. 2.Solve a system of equations: 4x+y+3z-t=5 2x-y+3z+2t=2 3x+y+2z-t=1 5x+y+4z+2t=0.

Work placement	Not applicable