



Subject card

Subject name and code	Linear algebra and geometry, PG_00063331						
Field of study	Nanotechnology						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Obligatory subject group 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	1	ECTS credits			5.0		
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	dr Anna Niewulis mgr Katarzyna Kiepiela					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	45.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
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	The aim of this subject is to obtain the students competence in the range of using the basic methods of linear algebra and analytic geometry. Furthermore, the student should be able to use this knowledge to solve simple theoretical and practical problems that can be found in the field of engineering.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W02] has systematic knowledge of higher mathematics, including calculus, linear algebra with elements of geometry, numerical methods, the basics of probability theory.	Student defines the basic concepts of linear algebra Student uses basic notions and formulas of matrix calculus in solving systems of linear equations Student analyses a given problem from analitic geometry			[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects		
	[K6_U01] can learn independently, obtain information from literature, databases and other properly selected sources	The student recognizes the importance of proper handling basic mathematical apparatus in the context of studies in technical fields.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		

Subject contents	<p>Elements of linear algebra:</p> <p>Matrices (definition, types of matrices, matrix operations).</p> <p>Determinants and their properties.</p> <p>Inverse matrix of non-singular matrix.</p> <p>Matrix equations.</p> <p>Systems of linear equations.</p> <p>Cramer's theorem.</p> <p>Rank of the matrix.</p> <p>Kronecker-Capelli's theorem</p> <p>Basic definitions and properties of vectors.</p> <p>Eigenvalues and eigenvectors of an matrix.</p> <p>Elements of analytic geometry:</p> <p>Scalar and vector product and their applications.</p> <p>Triple product and its use.</p> <p>Equation of a line and a plane in the space.</p> <p>Distance of the point from the plane.</p> <p>The angle between planes and lines.</p> <p>Complex numbers:</p> <p>Operations on complex numbers.</p> <p>Algebraic, trigonometric and exponential form of a complex number.</p> <p>Exponentiation and roots of complex numbers.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria scores of two tests	Passing threshold 50.0%	Percentage of the final grade 100.0%
Recommended reading	Basic literature	<p>T. Jurlewicz, Z. Skoczylas <i>Algebra liniowa 1</i>, Oficyna Wydawnicza GiS</p> <p>T. Jurlewicz, Z. Skoczylas <i>Algebra liniowa 2</i>, Oficyna Wydawnicza GiS</p> <p>K. Jankowska, T. Jankowski, <i>Zbiór zadań z matematyki</i>, Wyd. PG, Gdańsk</p>	
	Supplementary literature	<p>K. Jankowska, T. Jankowski, <i>Zadania z matematyki wyższej</i>, Wyd. PG, Gdańsk</p>	
	eResources addresses	Adresy na platformie eNauczenie:	
Example issues/ example questions/ tasks being completed	<p>Solve the matrix equation.</p> <p>Determine the rank of a matrix</p> <p>Determine all eigenvalues and corresponding eigenvectors of the matrix</p> <p>Determine the roots of the nth degree of a complex number</p>		
Work placement	Not applicable		