GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Linear algebra and geometry, PG_00063331		
Field of study	Nanotechnology		
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
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	mgr Katarzyna Kiepiela dr Anna Niewulis	

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_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.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[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 analises a given problem from analitic geometry	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation

<table>
<tr><td>Subject contents</td><td>

Elements of linear algebra:

Matrices (definition, types of matrices, matrix operations).

Determinants and their properties.

Inverse matrix of non-singular matrix.

Matrix equations.

Systems of linear equations.

Cramer's theorem.

Rank of the matrix.

Kronecker-Capelli's theorem

Basic definitions and properties of vectors.

Eigenvalues and eigenvectors of an matrix.

Elements of analytic geometry:

Scalar and vector product and their applications.

Triple product and its use.

Equation of a line and a plane in the space.

Distance of the point from the plane.

The angle between planes and lines.

Complex numbers:

Operations on complex numbers.

Algebraic, trigonometric and exponential form of a complex number.

Exponentation and roots of complex numbers.

</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>

Subject passing criteria	Passing threshold	Percentage of the final grade
scores of two tests	50.0%	100.0%

</td></tr>
<tr><td>Recommended reading</td><td>

Basic literature	T. Jurlewicz, Z. Skoczylas *Algebra liniowa 1,* Oficyna Wydawnicza GiS T. Jurlewicz, Z. Skoczylas *Algebra liniowa 2,* Oficyna Wydawnicza GiS K. Jankowska, T. Jankowski, *Zbiór zadań z matematyki,* Wyd. PG, Gdańsk
Supplementary literature	K. Jankowska, T. Jankowski, *Zadania z matematyki wyższej*, Wyd. PG, Gdańsk
eResources addresses	Adresy na platformie eNauczanie:

</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>

Solve the matrix equation.

Determine the rank of a matrix

Determine all eigenvalues and corresponding eigenvectors of the matrix

Determine the roots of the nth degree of a complex number

</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>