GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Linear algebra and geometry, PG_00061892		
Field of study	Materials Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
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	4.0
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	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	30.0	0.0	0.0	0.0	45

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	45	5.0	50.0	100

Subject objectives

The aim of this subject is to obtain the students competence in the range of using the basic methods of algebra.Furthermore, the student is 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_W01] has advanced knowledge of mathematics, useful for formulating and solving complex problems in materials science	Student uses methods of mathematical description of phenomena in the physical / mechanical / chemical processes.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

Elements of linear algebra:
Matrices (definition, types of matrices, matrix operations).
Determinants and their properties.
Rank of a matrix.
Matrices, their properties and operations on matrices.
Inverse of a square non-singular matrix.

Systems of linear equations :
Systems of linear equations. Cramers theorem.
Rank of matrix. Kronecker-Capelly theorem.

Analytic geometry:
Basic vectors definitions and properties. Eigenvectors and eigenvalues.
Dot product, cross product, their properties and its applications.
The triple scalar product and applications.
Equations of lines and planes in 3-space.
The distance from a point to a plan.
Angles between planes and lines.

Complex numbers.
Algebraic, trigonometric, exponential form, operations, exponentiation (Moivre formula), finding roots of complex numbers.
Operations on complex numbers.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Colloquium	50.0%	100.0%

Recommended reading

Basic literature

1. Gewert M., Skoczylas Z., Algebra liniowa 1, Definicje, twierdzenia wzory, Wydawnictwo GiS, Wrocław
2. Gewert M., Skoczylas Z., Algebra liniowa 2, Definicje, twierdzenia wzory, Wydawnictwo GiS, Wrocław
3. K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG Gdańsk
4. Banaś J., Podstawy matematyki dla ekonomistów, Wydawnictwa Naukowo-Techniczne, Warszawa
5. Matłoka M., Wojcieszyn B., Matematyka z elementami zastosowań w ekonomii, Wydawnictwo Wyższej Szkoły Bankowej w Poznaniu

Supplementary literature

1. K. Jankowska, T. Jankowski "Zbiór zadań z matematyki wyższej", Wyd. PG, Gdańsk 1999,
2. B. Gdowski, E. Pluciński "Zadania z rachunku wektorowego i geometrii analitycznej", PWN, Warszawa 1982
3. I. Dziubiński, L. Siewierski Matematyka dla wyższych szkół technicznych , PWN, Warszawa 1984,

eResources addresses

Example issues/ example questions/ tasks being completed

1. Find an equation for the plane satisfying the given conditions:
a) passes through the z- axis and the point P,
b) passes through the point P and is perpendicular to the line l.
2. Discuss the relation between the line l and the plane S.
3. Find the rank of the matrix A .

Practical activites within the subject

Not applicable

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