GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Linear Algebra, PG_00047356		
Field of study	Electronics and Telecommunications		
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 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	1	ECTS credits	3.0
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 Magdalena Musielak	
	Teachers	mgr Jolanta Fidytek mgr Małgorzata Suchecka mgr Anetta Brękiewicz-Sieg dr Magdalena Musielak	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	0.0	30

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	30	3.0	42.0	75

Subject objectives

Students obtain competence in the range of 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 uses basic notions and formulas of matrix and vector calculus. Student analyses a given problem from analitic geometry. Student uses complex numbers and studies complex functions.	[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 defines the basic concepts of linear algebra and analitic geometry necessary to solve simple engineering problems in the domain of education.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Vector calculus. Operations on vectors. Basis vectors. Matrices. Operations on matrices. Determinants and their properties. Inverse matrices, ranks of matrices. Eigenvalues and eigenvectors of matrices. Solving systems of linear equations. Lines and planes in 3D space. Complex numbers. Algebraic, trigonometric and exponential forms of complex numbers. Exponentiation and root extraction of complex numbers. Complex equations.
Course content – exercises
Vector calculus. Matrix operations. Calculating determinants and inverse matrices. Solving matrix equations. Calculating eigenvalues and eigenvectors of matrices. Solving systems of linear equations. Problems involving lines and planes in 3D space. Complex numbers. Operations on complex numbers. Calculating roots. Solving equations and inequalities with complex numbers.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Tests</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>1. Jurlewicz T., Skoczylas Z., Algebra i geometria analityczna, Oficyna Wydawnicza GiS.
2. Dymkowska J., Beger D., Geometria analityczna i różniczkowa w zadaniach, Wydawnictwo PG.</td></tr><tr><td>Supplementary literature</td><td>1. Jankowska K., Jankowski T., Zbiór zadań z matematyki, Wydawnictwo Politechniki Gdańskiej.
2. Kajetanowicz P., Wierzejewski J., Algebra z geometrią analityczną Wydawnictwo Naukowe PWN.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Solve the matrix equation AX=B, where A and B are given matrices.
2. Using the Cramer formula find the unknown x from the system of equations: 2x+y+3z+2t=3, 3x+z=1, 5y-2x+z=1, -5x+4y+2z=1.
3. Find the roots of the equation $z^4 +16i=0$. Give their algebraic form.
4. Finf the general equation of the plane passing through the point A(-1,2,4) and perpendicular to the line 2(x-1)=y+2=-3z.
5. Find the Laplace transform for the given function f(t)=1/2(sin t -t cos t).</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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