



Subject card

Subject name and code	Linear Algebra, PG_00047356						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject				2020/2021	
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				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 Barbara Wikieł				
	Teachers		mgr inż. Wojciech Dąbrowski mgr Anetta Brękwicz-Sieg dr Barbara Wikieł				
Lesson types and methods of instruction	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							
WETI - IBM sem. 1 grupy 2, 3 - Matematyka 2020/2021 (W.Dąbrowski) - Moodle ID: 7990 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=7990							
WETI - IBM 1 ; ACiR 3 sem.1 - Matematyka 2020/2021 (A.Brękwicz-Sieg) - Moodle ID: 8122 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8122							
WETI - IBM - Elementy Algebry Liniowej 2020/2021 (B.Wikieł) - Moodle ID: 8305 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8305							
WETI - IBM - Liczby zespolone 2020/2021 (B.Wikieł) - Moodle ID: 8304 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8304							
WETI - ACiR, IBM - Matematyka 2020/2021 (B.Wikieł) - Moodle ID: 6222 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=6222							
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.			[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		
[K6_K02] is ready to critically assess possessed knowledge and acknowledge the importance of knowledge in solving cognitive and practical problems	Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future.			[SK4] Assessment of communication skills, including language correctness			

Subject contents	Calculus of vectors. Basis vectors. Matrices. Calculus of matrixes. Determinants and their properties. Inverse matrix. Rank of a matrix. Eigenvalues and eigenvectors of a square matrix. Systems of linear equations. Line and plane in space. Complex numbers. Operations on complex numbers.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test	50.0%	80.0%
	Activity	0.0%	20.0%
Recommended reading	Basic literature	1. Długosz J., „Funkcje zespolone. Teoria, przykłady, zadania”, Oficyna Wydawnicza GiS 2. Jurlewicz T., Skoczylas Z., „Algebra i geometria analityczna. Definicje, twierdzenia, wzory”, Oficyna Wydawnicza GiS 3. Jurlewicz T., Skoczylas Z., „Algebra i geometria analityczna. Przykłady i zadania”, Oficyna Wydawnicza GiS 4. Jurlewicz T., Skoczylas Z., „Algebra i geometria analityczna. Kolokwia i egzaminy”, Oficyna Wydawnicza GiS	
	Supplementary literature	1. Jankowska K., Jankowski T., „Zbiór zadań z matematyki”, Wydawnictwo Politechniki Gdańskiej 2. Kajetanowicz P., Wierzejewski J., „Algebra z geometrią analityczną”, Wydawnictwo Naukowe PWN	
	eResources addresses		
Example issues/ example questions/ tasks being completed	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. Find the general equation of the plane passing through the point $A(-1,2,4)$ and perpendicular to the line $2(x-1)=y+2=-3z$.		
Work placement	Not applicable		