



Subject card

Subject name and code	Linear algebra, PG_00021020						
Field of study	Mathematics						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2022/2023		
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		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Nonlinear Analysis and Statistics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Zdzisław Dzedzej				
	Teachers		mgr inż. Tomasz Gzella dr hab. Zdzisław Dzedzej dr inż. Anita Zgorzelska				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	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	Basic notions of linear algebra						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U08		complex numbers, determinants, matrices,		[SU4] Assessment of ability to use methods and tools		
	K6_W07		linear properties in calculus and other parts of mathematics		[SW1] Assessment of factual knowledge		
	K6_U03		proper use of algebraic objects		[SU3] Assessment of ability to use knowledge gained from the subject		
	K6_U01		proving simple properties of matrices, linear independence of vectors,		[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		
	K6_W04		formulates theorems and definitions		[SW1] Assessment of factual knowledge		
Subject contents	linear equation systems- Gauss elimination, Cramer's method: matrices and their algebra; determinants - definitions , properties and applications; invertibility of matrices, matrix equations; rank of matrices; rational, real and complex numbers- geometric interpretation, powers, the field of complex numbers, Euler formulas; basic algebraic notions: groups, rings, fields, vector spaces. Linear dependence of vectors; Bases of and dimension of vector spaces. General theory of linear systems- Kronecker- Capelli theorem.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	2 written tests		50.0%		80.0%		
	homeworks and activity		10.0%		20.0%		

Recommended reading	Basic literature	A. Romanowski, Linear Algebra, Wyd. PG 2003. T. Jurlewicz , Z. Skoczylas, Linear Algebra , GiS 2005
	Supplementary literature	J. Rutkowski, Linear Algebra liniowa in problems, PWN 2008 G. Banaszak, W. Gajda, Elements of linear algebraj, WNT 2002.
	eResources addresses	Adresy na platformie eNauczenie: Algebra liniowa 1 (2022/23) - Moodle ID: 24472 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=24472
Example issues/ example questions/ tasks being completed	1. Draw the set $2 < z + 1 - 2i < 3$. 2. Solve the system $\begin{aligned} x - y + z &= 1 \\ 2x - y &= -1 \\ -x + 3y - z &= 1 \\ -2y - z &= -4 \end{aligned}$ 3. Define the dimension of a linear space.	
Work placement	Not applicable	

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