



Subject card

Subject name and code	Linear algebra, PG_00021020						
Field of study	Mathematics						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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 Joanna Cyman					
	Teachers	dr Joanna Cyman mgr inż. Tomasz Gzella					
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_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_W07	linear properties in calculus and other parts of mathematics			[SW1] Assessment of factual knowledge		
	K6_U08	complex numbers, determinants, matrices,			[SU4] Assessment of ability to use methods and tools		
	K6_W04	formulates theorems and definitions			[SW1] Assessment of factual knowledge		
	K6_U03	proper use of algebraic objects			[SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>Complex numbers. Operations on complex numbers. Solving algebraic equations in the complex domain. Different forms of a complex number. Geometric interpretation, Gaussian plane. powers of numbers, n-th root. The field of complex numbers. Complex polynomials. Fundamental theorem of algebra.</p> <p>Matrix calculus. Operations on matrices. Determinants. Laplace expansion. Inverse matrix. Matrix order, elementary matrix transformations.</p> <p>Systems of linear equations. Cramer's system of equations. The existence of solutions to a system of linear equations, the Kronecker-Capelli theorem. Gauss Jordan method.</p> <p>Basic algebraic structures. Groups, rings, bodies. Definitions and examples.</p> <p>Vector space. Definition of vector space and subspace. Testing the linear independence of vectors.</p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="451 719 794 752">Subject passing criteria</th> <th data-bbox="794 719 1137 752">Passing threshold</th> <th data-bbox="1137 719 1487 752">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 752 794 786">2 written tests</td> <td data-bbox="794 752 1137 786">50.0%</td> <td data-bbox="1137 752 1487 786">80.0%</td> </tr> <tr> <td data-bbox="451 786 794 819">activity</td> <td data-bbox="794 786 1137 819">30.0%</td> <td data-bbox="1137 786 1487 819">20.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	2 written tests	50.0%	80.0%	activity	30.0%	20.0%
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Example issues/ example questions/ tasks being completed	<p>1. Draw the set $2 < (3+4i)z+i < 3$</p> <p>2. Solve the given system of equations:</p> $\begin{cases} 4x+y+3z-t=5 \\ 2x-y+3z+2t=2 \\ 3x+y+2z-t=1 \\ 5x+y+4z+2t=0 \end{cases}$ <p>3. Define the vector space.</p>											
Work placement	Not applicable											