

Subject card

Subject name and code	Linear Algebra, PG_00037109							
Field of study	Economic Analytics							
Date of commencement of studies	October 2021		Academic year of realisation of subject		2021/2022			
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study			
Mode of study	Full-time studies		Mode of delivery		blended-learning			
Year of study	1		Language of instruction		Polish			
Semester of study	1		ECTS credits		6.0			
Learning profile	general academic profile		Assessmer	sment form		exam		
Conducting unit	Mathematics Center -> Vice-Rector for Education							
Name and surname	Subject supervisor		dr inż. Natalia Jarzębkowska					
of lecturer (lecturers)	Teachers		dr inż. Natalia Jarzębkowska					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	t	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0		0.0	60
	E-learning hours included: 30.0							
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18352 Adresy na platformie eNauczanie:							
	WZiE - AG - Algebra linowa 2021/2022 (N.Jarzębkowska) - Moodle ID: 18352 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18352							
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		14.0		76.0		150
Subject objectives	The aim of this subject is to obtain the students competence in the range of using the basic methods of linear algebra. Furthermore, the student is able to use this knowledge to solve theoretical and practical problems that can be found in the various fields of the economy.							

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Learning outcomes	Course outcome	Subject outcome	Method of verification				
	[K6_W02] Knows how to describe economic phenomena using quantitative methods with the use of IT tools.	Student defines the basic concepts of linear algebra. Student defines basic notions of matrix and vector calculus. Student analyzes problems of analytical geometry. Student knows and understands the concept of complex numbers. Student combines knowledge of mathematics with knowledge from other fields. Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation				
	[K6_U08] Has the ability to use mathematical and IT tools to analyse economic phenomena and make decisions by economic entities.	Student applies the basic concepts and rules of matrix calculus. Student determines eigenvalues and eigenvectors of matrices. Student solves systems of linear equations using different methods. Student examines the linear independence of vectors. Student examines the position of lines and planes in space. Student recognizes certain curves and analyzes relations between objects. Student performs calculations on complex numbers. Student uses methods of linear algebra to solve economical problems.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools				
Subject contents	LECTURES and TUTORIALS: Polynomials. Roots of a polynomial. Matrices. Matrix operations. Determinants and their properties. Linear systems. Gauss method. Reduced echelon form. Gauss-Jordan reduction. Cramer's rule, Kronecker-Capelli theorem. Eigenvalues and eigenvectors. Vectors. Vector length and angle. Linear geometry of 3-space. Vector spaces and subspaces. Linear independence. Basis and dimension. Linear maps. Complex numbers. Conics and quadrics. Quadratic forms. Sylvester's criterion. LSM.						
Prerequisites and co-requisites	Knowledge of high school mathematics.						
•			5, 5, 5, 5				
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
and ontena	Midterm tests	50.0%	30.0%				
	Class activity	50.0%	20.0%				
Recommended reading	Basic literature 1. Jurlewicz T., Skoczylas Z., Algebra liniowa 1, 2, Definicje, twierdzenia wzory, Wydawnictwo GiS, Wrocław 2. Jurlewicz T., Skoczylas Z., Algebra liniowa 1, 2, Przykłady Wydawnictwo GiS, Wrocław		S, Wrocław				
		 Jankowska K., Jankowski T., Zbiór zadań z matematyki, PG Gdańsk Gurgul H., Suder M., Matematyka dla kierunków ekonomicznych, Oficyna a Wolters Kluwer business, Warszawa 					
		5. <u>E-learning platform resources</u>					

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	Supplementary literature	Batóg B., Bieszk-Stolorz B., Foryś I., Guzowska M., Herbelein K., Matematyka dla kierunków ekonomicznych, Wydawnictwo Difin, Warszawa Banaś J., Podstawy matematyki dla ekonomistów, Wydawnictwa Naukowo-Techniczne, Warszawa Matłoka M., Wojcieszyn B., Matematyka z elementami zastosowań w ekonomii, Wydawnictwo Wyższej Szkoły Bankowej w Poznaniu				
	eResources addresses	WZiE - AG - Algebra linowa 2021/2022 (N.Jarzębkowska) - Moodle ID: 18352 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18352				
Example issues/ example questions/ tasks being completed	Discuss the relation between the line I and the plane S.					
	Find the rank of the matrix A .					
	Check linear depedence of given system of vectors.					
	Solve the systems of linear equations using the back substitution method.					
	Solve the systems of linear equations by Cramer rule.					
	Formulate the Kronecker-Capelli theorem.					
	Find eigenvalues and eigenvectors of symmetric matrix A.					
Work placement	Not applicable					

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