



Subject card

Subject name and code	Mathematics I, PG_00050157						
Field of study	Economics						
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			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Mathematics Center -> Vice-Rector for Education						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Adam Gnatek				
	Teachers		dr Adam Gnatek				
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: 30.0						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18350 Adresy na platformie eNauczanie:						
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		10.0		55.0	125
Subject objectives	The aim of this subject is to obtain the students competence in the range of using methods of linear algebra and mathematical analysis. Furthermore, the student is able to use this knowledge to solve theoretical and practical problems that can be found in economy and social sciences.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U02] can use theoretical knowledge in practice to solve basic micro and macroeconomic problems	Student mentions basic properties of elementary functions. Student solves equations and inequalities with elementary functions. Student defines basic notions of differential calculus of one variable functions. Student examines functions of one variable, using the concept of limit, continuity and derivatives. Student defines basic notions of matrix calculus and uses matrix calculus in solving systems of linear equations Student specifies eigenvalues and eigenvectors of a matrix.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_W01] has a basic knowledge of economic and related sciences and their place in the whole system of social sciences and relations with other sciences	Student combines knowledge of mathematics with knowledge in economic and social sciences..			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		

Subject contents	<p>Introduction to mathematics: elements of logic, set theory, induction, complex numbers. Linear systems. Solving linear systems, Gauss' method. Reduced echelon form, Gauss-Jordan reduction. Determinants, properties of determinants. Cramer's rule, Kronecker-Capelli theorem. Vector space, subspaces. Linear dependence of vectors, base and dimension. Matrices, matrix operations. Eigenvalues and eigenvectors.</p> <p>Functions of one variable and their properties. Elementary functions: absolute value, polynomials, rational, power, exponential, logarithmic, trigonometric, cyclometric - properties, graphs, solving equations and inequalities. Infinite sequences - properties, limits. The limit and continuity of a function. Derivatives and differentials of first and higher orders. Rolle, Lagrange, de l'Hospital, Taylor-Maclaurin theorems. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. Asymptotes.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1" data-bbox="451 470 1487 600"> <thead> <tr> <th data-bbox="451 470 794 501">Subject passing criteria</th> <th data-bbox="794 470 1137 501">Passing threshold</th> <th data-bbox="1137 470 1487 501">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 501 794 533">Midterm colloquium</td> <td data-bbox="794 501 1137 533">50.0%</td> <td data-bbox="1137 501 1487 533">68.0%</td> </tr> <tr> <td data-bbox="451 533 794 564">Class tests</td> <td data-bbox="794 533 1137 564">50.0%</td> <td data-bbox="1137 533 1487 564">20.0%</td> </tr> <tr> <td data-bbox="451 564 794 600">Class activity</td> <td data-bbox="794 564 1137 600">50.0%</td> <td data-bbox="1137 564 1487 600">12.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Midterm colloquium	50.0%	68.0%	Class tests	50.0%	20.0%	Class activity	50.0%	12.0%
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Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Wikieł B., Matematyka, Podstawy z elementami matematyki wyższej, Wydawnictwo PG, Gdańsk 2009 2. Jurlewicz T, Gewert M., Algebra liniowa 1, Definicje, twierdzenia wzory, Wydawnictwo GiS, Wrocław 3. K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG Gdańsk. 													
	Supplementary literature	<ol style="list-style-type: none"> 1. Gewert M., Skoczylas Z., Wstęp do analizy i algebry, Wydawnictwo GiS, Wrocław 2. Batóg B., i in., Matematyka dla kierunków ekonomicznych, Wydawnictwo Difin, Warszawa, 3. Banaś J., Podstawy matematyki dla ekonomistów, Wydawnictwa Naukowo-Techniczne, Warszawa. 4. Dymkowska J., Beger D., Rachunek różniczkowy w zadaniach, Wydawnictwo PG, Gdańsk. 5. Teaching resources on the moodle platform. 													
	eResources addresses														

<p>Example issues/ example questions/ tasks being completed</p>	<p>Find the derivatives of the following functions .</p> <p>Find local extremes and intervals of monotonicity of the following function $f(x)=$.</p> <p>Sketch the graph of the function $f(x)$. Identify any local extrema and points of inflection</p> <p>Find the rank of the matrix A .</p> <p>Check linear dependence of given system of vectors.</p> <p>Solve the systems of linear equations using the back substitution method.</p> <p>Solve the systems of linear equations by Cramer rule.</p> <p>Formulate the Kronecker-Capelli theorem.</p> <p>Find eigenvalues and eigenvectors of symmetric matrix A.</p>
<p>Work placement</p>	<p>Not applicable</p>