

Subject card

Subject name and code	Mathematical Applications in Economics and Management, PG_00044154						
Field of study	Economics						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
Education level	undergraduate 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			5.0		
Learning profile	academic	Assessment form					
Conducting unit	Katedra Mikroekonomii -> Faculty of Economics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Elżbieta Babula				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	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	30		0.0		0.0	30
Subject objectives	Acquainting students with the introduction to higher mathematics and its applications in economics and management.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[EKONL3_W06] have an advanced knowledge of selected methods and tools, including statistical and econometric techniques, for describing economic agents and structures as well as social institutions and the processes taking place in them	The student has knowledge in the field of single and multivariable functions, elements of differential and integral calculus, unconditional and conditional optimization methods and their applications in business decision modeling, and has basic knowledge related to modeling the dynamics of economic processes	[SW4] test/exam - oral or written
	[EKONL3_K05] correctly identifies, diagnoses and resolves professional dilemmas and different options for solutions	The student correctly identifies, diagnoses and solves dilemmas and possibilities regarding economic problems related to the use of mathematical methods	[SK4] test/exam - oral or written
	[EKONL3_U04] can predict and forecast the course of economic and social processes and phenomena	The student has the ability to apply mathematics in economics and management and to use mathematical methods in modeling and interpreting economic phenomena. Using elements of differential calculus, she/he can optimize functions of one and many variables in issues related to the theory of enterprise choice and market organization.	[SU4] test/exam - oral or written
[EKONL3_U02] is able to use the knowledge of theory and data to analyse concrete economic and social processes and phenomena and to analyse these phenomena using methods developed in economics, finance and management sciences	The student is able to analyze the causes and course of economic processes based on basic economic models.	[SU4] test/exam - oral or written	
Subject contents	<p>1. Completion of knowledge of selected topics Learning content: sigma notation in writing the sum of a sequence; solving equations using logarithms; inverse function 2. Algebra of matrices Learning content: operations on matrices, basic properties of determinants, finding the inverse matrix, Cramer's formula, linear dependence and independence of vectors and systems of equations; order of matrices; determining the number of degrees of freedom of a system of equations, checking the solvability of the system; solving systems with redundant equations - solutions with parameters; application to market models; performing analysis (solving systems of equations in matrix form) using Excel. 3. Elements of differential calculus Learning content: rules of differentiation for functions of one variable, local extrema of functions of one variable, elasticity of functions, Taylor's formula and its applications; marginal calculus in economics and maximization of the economic result; rules of differentiation of functions of many variables, optimization of functions of many variables, conditional extremum, minimization of costs method of Lagrange multipliers 4. Integral calculus Learning content: concept of prime function, definite and indeterminate integral, method of integration by parts, method of integration by substitution, applications in marginal calculus 5. Difference and differential equations Learning content: first-order difference equations, cobweb model, differential equations, application of differential equations in economic growth models 6. Elements of probability calculus Learning content: Bayes' rule and its use in determining probability</p>		
Prerequisites and co-requisites	Knowledge and skills in mathematics from high school		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		51.0%	100.0%
Recommended reading	Basic literature	<p>1. E. Babula, L. Czerwonka (red.), Zastosowanie matematyki w ekonomii i zarzadzaniu, Wydawnictwo Uniwersytetu Gdanskiego, Gdansk 2015 2. A. Blajer-Golebiewska, L. Czerwonka, E. Pankau, M. Zielenkiewicz, Ekonomia matematyczna w zadaniach, red. T. Kaminska, Wyd. UG, Gdansk 2010 3. M. Wisniewski, Mathematics for economics, Palgrave Macmillan, 2013</p>	

	Supplementary literature	<p>1. K. Sydsaeter, P. Hammond, A. Seierstad, A. Strom, Further mathematics for economic analysis, FT Prentice Hall, Harlow 2005</p> <p>2. B. Batog, B. Bieszk-Stolorz, I. Forys, M. Guzowska, K. Heberlein, Mathematics for students of economics, finance and management, Difin, Warszawa 2021</p> <p>3. T. Bradley, Essential mathematics for economics and business, Wiley, 2013</p> <p>4. A.C. Chiang, Podstawy ekonomii matematycznej, PWE, Warszawa 1994</p> <p>5. L. Czerwonka, Matematyczne modele polaczen przedsiebiorstw uwzgledniajace czynniki menedzerskie, Pieniadze i Wiesz. Kwartalnik Naukowy, Nr 3/2009, s. 81-88</p> <p>6. L. Czerwonka, Zastosowanie matematycznych modeli fuzji egzogenicznych, Pieniadze i Wiesz. Kwartalnik Naukowy, Nr 1/2008, s. 133-140</p> <p>7. M. Matłoka, Matematyka dla ekonomistow, Wyd. AE w Poznaniu, Poznan 2008</p> <p>8. A. Ostoja-Ostaszewski, Matematyka w ekonomii. Modele i metody t. 1 i 2, Wydawnictwo Naukowe PWN, Warszawa 2006</p> <p>9. J. Piszczala, Matematyka i jej zastosowanie w naukach ekonomicznych, Wydawnictwo AE w Poznaniu, Poznan 2008</p> <p>10. R.A. Barnett, M.R. Ziegler, K.E. Byleen, College Mathematics for Business, Economics, Life Sciences, and Social Sciences, Pearson Prentice Hall, Upper Saddle River, New Jersey 2008</p>
	eResources addresses	<p>Adresy na platformie eNauczenie: WE-EKON-L3DZ-(2024/2025) Zastosowanie matematyki Wyklad - Moodle ID: 12339 https://mdl.ug.edu.pl/course/view.php?id=12339</p>
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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