

Subject card

Subject name and code	Mathematics, PG_00156733						
Field of study	Information Science and Econometrics						
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		6.0		
Learning profile	academic		Assessment form				
Conducting unit	Katedra Ekonometrii -> Faculty of Management						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Lech Kujawski				
	Teachers		mgr Tomasz Jastrzębski mgr Agata Majkowska dr Marta Chylińska				
Lesson types	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		20.0		70.0	150
Subject objectives	Equalizing the level of students' knowledge, followed by the development of their understanding of mathematical methods necessary for further education. Learning about the potential applications of mathematical methods in economics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[IiEL3_U07] The student can build formal models of complex economic phenomena and processes, estimate them, carry out their verification, and apply them to modelling, forecasting and optimization of the resources of low-complexity economic institutions, their structure and the course of processes in them.	Understands the concept of an integral and is able to use a definite integral to calculate areas.	[SU4] test/exam - oral or written
	[IiEL3_W04] The student has advanced knowledge of mathematical, statistical, econometric and computer methods of obtaining, processing and analysing data depicting the functioning and development of the national economy and its elements, as well as the phenomena and processes occurring in their environment.	Understands the concept of a derivative of a function and is able to use it to analyze the monotonicity of functions.	[SW4] test/exam - oral or written
	[IiEL3_K01] The student understands the need to constantly supplement and deepen acquired knowledge; is open to new ideas and teaching methods.	Is able to independently perform operations on matrices.	[SK4] test/exam - oral or written
	[IiEL3_K02] The student can communicate with the public on computer science and econometrics topics in and outside the workplace, communicate his knowledge and share his skills through various media.	Is able to independently formulate and solve systems of equations.	[SK4] test/exam - oral or written
Subject contents	1. **Matrices**: Concept of a matrix, types of matrices, operations on matrices and their properties, determinant of a square matrix and its properties, elementary operations on a matrix, determining the inverse matrix. Examples of applications of matrices in economic problems. 2. **Systems of Linear Equations**: Matrix form of a system of linear equations, solving systems of linear equations (consistent, inconsistent, undetermined). Examples of systems of linear equations in economic problems. 3. **Number Sequences**: Monotonicity of sequences, arithmetic and geometric sequences, limits of sequences, convergent and divergent sequences, sequences converging to the number e. Payment sequences in financial mathematics. 4. **Functions of One Variable**: Concept of a function, limit of a function (Heine and Cauchy definitions), continuity of functions. Examples of functional relationships in economics. 5. **Differential Calculus of Functions of One Variable**: Difference quotient, derivative of a function at a point, geometric interpretation of the derivative, properties of the derivative, Lagrange's theorem, higher-order derivatives, L'Hôpital's rule. 6. **Applications of Derivatives in Analyzing Function Properties**: Monotonicity of functions and the sign of the derivative, necessary and sufficient conditions for the existence of local extrema, maximum and minimum values of a function. Examples of using differential calculus in economics. 7. **Functions of Several Variables**: Definition of functions of several variables, limit of a function, continuity of functions, partial derivatives, local extrema, conditional extrema, maximum and minimum values of a function. Examples of using differential calculus for functions of several variables in economics. 8. **Integral Calculus**: Concept of an indefinite integral, properties of the indefinite integral, integration methods: integration by parts and substitution, concept of a definite integral, geometric interpretation of the definite integral, properties of the definite integral, calculating areas bounded by curves, improper integrals. Examples of using integral calculus in economics.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	2 to 3 written tests during the semester	51.0%	100.0%

Recommended reading	Basic literature	1. Bazańska T., M. Nykowska, Matematyka w zadaniach dla wyższych zawodowych uczelni ekonomicznych, Wydawnictwo Branta 2003 2. Bednarski T., Elementy matematyki w naukach ekonomicznych, Oficyna Ekonomiczna, Kraków 2004 3. Chiang A. C., Podstawy ekonomii matematycznej, PWN, Warszawa 1994 4. Krysiński W., Włodarski L., Analiza matematyczna w zadaniach, część I i II, PWN, Warszawa 2003
	Supplementary literature	None
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	All tasks from the textbook: Bazańska T., M. Nykowska, Matematyka w zadaniach dla wyższych zawodowych uczelni ekonomicznych, Wydawnictwo Branta 2003 1. Solve the matrix equation... 2. Solve the system of equations... 3. Calculate the limit of the sequence... 4. Calculate the limits of the function... 5. Determine the intervals of monotonicity of the function... 6. Calculate the area of the curvilinear trapezoid bounded by the curves...	
Work placement	Not applicable	

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