

Subject card

Subject name and code	Mathematics for Economics, PG_00154861						
Field of study	Finance and Accounting						
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 Subject group related to scientific research in the field of study		
Mode of study	part-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		dr Anna Gierusz-Matkowska mgr Tomasz Jastrzębski dr Agnieszka Pobłocka dr Lech Kujawski				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	20.0	0.0	0.0	0.0	40
	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	40		30.0		80.0	150
Subject objectives	Leveling the knowledge base of students and then developing their understanding of mathematical methods essential for further education. Gaining insight into the applications of mathematical methods in economics. Learning the principles of calculating capital value over time and using them to: determine the value of capital at any given moment, adjust a series of payments to any specific point in time, and create debt repayment plans.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FiRL3_K05] Responsibility: - meets deadlines - is able to properly identify priorities for the implementation of the task set by him - consistently strives to achieve the set goal - is able to work systematically and independently - observes the rules and norms of social coexistence.	Understands the concept of a function and its limit, and is able to apply limits of functions in economic sciences.	[SK4] test/exam - oral or written
	[FiRL3_W08] The student knows the principles of evaluating projects in the field of finance (profitability of investment projects, assessment of the financial situation of the organization, risk assessment, threat of bankruptcy).	Knows what a difference quotient is, understands the concept of its limit, and is able to interpret it economically.	[SW4] test/exam - oral or written
	[FiRL3_K06] Creativity: - thinks creatively, is able to go beyond the usual patterns, - is able to think and act in an entrepreneurial manner, - is able to adapt flexibly to the requirements of the environment.	Understands the concept of a derivative of a function and is able to use it to analyze the monotonicity of functions.	[SK4] test/exam - oral or written
	[FiRL3_U03] The student can properly analyse the causes, course and effects of specific processes and phenomena in finance and accounting, using advanced theories and relevant social sciences methods. Can identify stakeholders of processes and phenomena from the disciplines of management and quality sciences and economics and finance.	Understands the concept of an integral and is able to use a definite integral to calculate areas.	[SU4] test/exam - oral or written
	[FiRL3_K01] Self-development: - understands the need for development and lifelong learning - is able to supplement and improve the acquired knowledge and skills - knows his strengths and weaknesses, sets ambitious goals to the best of his ability - knows how to accept failure and admit mistakes.	Is able to independently perform operations on matrices.	[SK4] test/exam - oral or written
	[FiRL3_U02] The student can acquire data from various sources to analyze specific economic processes and phenomena related to finance. Is able to use information technologies.	Is able to independently formulate and solve systems of equations.	[SU4] test/exam - oral or written
	[FiRL3_W06] The student has advanced knowledge of methods and tools, including data acquisition and analysis techniques, appropriate to management science and quality, which allow describing economic structures and institutions and the processes within and between them.	Understands the applications of sequences in economic sciences.	[SW4] test/exam - oral or written

Subject contents	Elements of Linear Algebra Matrices: Definition of matrices, types of matrices, operations on matrices and their properties, determinant of a square matrix and its properties, elementary operations on matrices, finding the inverse matrix. Examples of applications of matrices in economic problems. Systems of Linear Equations: Matrix form of a system of linear equations, solving systems of linear equations. Examples of systems of linear equations in economic problems. Elements of Mathematical Analysis Number Sequences: Arithmetic and geometric sequences, limits of sequences, convergent and divergent sequences, sequences converging to the number e. Functions of One Variable: Examples of functional relationships in economics, limits of functions. 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, higher-order derivatives, monotonicity of functions and the sign of the derivative, necessary and sufficient conditions for the existence of a local extremum, the greatest and least value of a function. Examples of the use of differential calculus in economics. Financial Mathematics Simple Interest: Updating the value of capital, average interest rate, calculations with percent and per mille, true simple discount, commercial (bank) simple discount. Compound Interest: Updating the value of capital, equivalence of capitals, equivalence of interest conditions, nominal interest rate, effective interest rate, intensity of interest, average interest rate, true compound discount, commercial compound discount, equivalence condition of interest and discount rates. The impact of inflation on capital purchasing power: periodic inflation rate, average inflation rate, real value of capital. Annuity Calculations: Temporary and perpetual annuities, annuities payable in arrears and in advance, deferred annuities, annuities with fixed payments, value of an annuity at any point in time. Debt Repayment in Installments: Repayment of interest and principal, debt repayment plans with fixed principal installments and fixed payment amounts, loans with a deferred repayment period, cost of debt.		
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		
		A1 Mathematics Bażańska T., Nykowska M., <i>Matematyka w zadaniach dla wyższych zawodowych uczelni ekonomicznych</i>, Wydawnictwo Branta 2003 A2 Financial Mathematics Podgórska M., Klimkowska J., <i>Matematyka finansowa</i>, PWN, Warszawa 2000. Wycinka E., Szreder M. (red.), <i>Zastosowanie metod ilościowych w ubezpieczeniach</i>, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2020 (rozdz. 8-11).	

	Supplementary literature	B1 Mathematics Bednarski T., <i>Elementy matematyki w naukach ekonomicznych</i>, Oficyna Ekonomiczna, Kraków 2004 Chiang A. C., <i>Podstawy ekonomii matematycznej</i>, PWN, Warszawa 1994 Krysicki W., Włodarski L., <i>Analiza matematyczna w zadaniach</i>, część I i II, PWN, Warszawa 2003 Małłoka M. (red), <i>Matematyka dla ekonomistów</i>, Wydawnictwo AE w Poznaniu, Poznań 2000 Piszczała J., <i>Matematyka i jej zastosowanie w naukach ekonomicznych</i>, Wydawnictwo AE w Poznaniu, Poznań 1998 Piszczała J., Piszczała M., Wojcieszyn B., <i>Matematyka z zadaniami</i>, PWN, Warszawa 1981 Sadowski M., Spaniły T., <i>Matematyka w zadaniach dla studentów kierunków ekonomicznych</i>, Wydawnictwo UG, Gdańsk, 1999 B2 Financial Mathematics Dobija M., Smaga E., <i>Podstawy matematyki finansowej i ubezpieczeniowej</i>, PWN 1995. Bieszk-Stolorz B., <i>Matematyka finansowa z arkuszem kalkulacyjnym</i>, CEDEWU, Warszawa 2021. Kozubski J., <i>Matematyczne modelowanie wybranych procesów finansowych</i>, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, 2002. Redo M., Prewszyn-Kwitno P., <i>Matematyka finansowa. Teoria i praktyka</i>, PWN, Warszawa 2021. Sobczyk M., <i>Matematyka finansowa</i>, Agencja Wydawnicza Placet, Warszawa 2000.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	All tasks from the textbook: Bażańska T., Nykowska M., <i>Matematyka w zadaniach dla wyższych zawodowych uczelni ekonomicznych</i>, 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	