University of Gdańsk

Subject card

Subject name and code	Mathematical Applications in Economics and Management, PG_00132353		
Field of study	International Business		
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 English 100%
Semester of study	1	ECTS credits	2.0
Learning profile	academic	Assessment form	
Conducting unit	Katedra Mikroekonomii -> Faculty of Economics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Leszek Czerwonka	
	Teachers	dr hab. Leszek Czerwonka	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15	10.0	10.0	35

Subject objectives	Acquainting students with the introduction to higher mathematics and its applications in economics and management. Use of academic English language, references and vocabulary.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[IBL3_U02] can formulate and solve complex and nonstandard issues in international business by employing quantitative and qualitative research methods and tools, as well as advanced communication and information techniques applicable in the field of international business, economics and finance	The student is able to formulate and solve complex and unusual problems related to international business, using mathematical methods and tools as well as advanced information techniques also applied in the field of international business, economics and finance.	[SU4] test/exam - oral or written
[IBL3_W03] knows and understands selected research methods and tools, including IT tools and data acquisition techniques, which are applicable to international business issues	The student is acquainted with selected methods and tools, including IT tools and data acquisition techniques, as well as mathematical methods that make it possible to describe and analyse economic entities operating on the international market.	[SW4] test/exam - oral or written
[IBL3_K05] is ready to perform professional role in responsible manner, abide business ethics and business standards in working environment	The student is prepared to carry out their professional role in a responsible manner, adhering to business ethics and business standards in the working environment, including the use of quantitative methods.	[SK4] test/exam - oral or written
[IBL3_W08] knows and understands principles of economic decision making by individuals acting within social and business structures	The student knows and understands the principles of economic decision-making, with the support of mathematical methods, by individuals operating in social and business structures.	[SW4] test/exam - oral or written
[IBL3_K04] is ready to think and act in an entrepreneurial manner	The student is prepared to think and act in an entrepreneurial manner, bearing in mind the financial performance of the enterprise.	[SK4] test/exam - oral or written

Subject contents

1. Matrix algebra
Matrix operations, basic properties of determinants, finding the inverse matrix, Cramer's formula, application to market and national income models (matrix notation and model solution)
2. Sequences and series
Concept of a numerical sequence, arithmetic and geometric sequences, convergence of a sequence, operations on the limits of sequences, concept of a numerical series, sum of a series, application to the calculation of the present value of cash flows (elements of financial mathematics)
3. Functions of one and many variables
Basic elementary functions, graph of a function, inverse representation, monotonicity, limit of a function, continuity of a function, convexity and concavity of a function
4. Elements of differential calculus
Rules of differentiation for functions of one variable, local extrema of functions of one variable, elasticity of functions, marginal calculus, maximisation of economic result, rules of differentiation for functions of many variables, optimisation of functions of many variables, conditional extremum, minimisation of costs by Lagrange multipliers method
5. Integral calculus
Concept of primary function, definite and indefinite integral, method of integration by parts, method of integration by substitution, applications in marginal calculus and financial mathematics
6. Differential equations
Differential equations, application of differential equations in economic growth models.

Prerequisites and co-requisites

Recommended knowledge in mathematics: Functions of One Variable, Functions of Many Variables, Foundations of Differential Calculus, Solving Systems of Linear Equations

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	51.0%	100.0%

Recommended reading

Basic literature	1. Babula E., Czerwonka L. (ed.), Zastosowanie matematyki w ekonomii i zarządzaniu-Mathematical Applications in Economics and Management, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2015. 2. Bradley T., Essential mathematics for economics and business, Wiley, 2013. 3. Wisniewski M., Mathematics for economics, Palgrave Macmillan, 2013. 4. Barnett R.A., Ziegler M.R., Byleen K.E., College Mathematics for Business, Economics, Life Sciences, and Social Sciences, Pearson Prentice Hall, Upper Saddle River, New Jersey 2008. 5. Werner F., Sotskov Y., Mathematics of Economics and Business, Routledge, Abingdon 2006.
Supplementary literature	1. Czerwonka L., Mathematical Models of Mergers: Conditions of Application and Conclusions [in:] Market Concentration and Economy, Series of Monographs, Vol. 7, Macro & Microeconomics Case Studies, T. Bernat (ed.), Publishing House Volumina.pl Daniel Krzanowski, Szczecin 2010, pp. 206-219.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	The determinant of matrix of order (*n* 1) obtained by deleting row *i* and column *j* of matrix A of order *n* is called ...
Work placement	Not applicable

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