University of Gdańsk

Subject card

Subject name and code	Mathematics for EconomicsMathematics for Economics, PG_00195007		
Field of study	Sport Management		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's 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	credit
Conducting unit	Department of Econometrics -> Faculty of Management -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	mgr Tomasz Jastrzębski	
	Teachers		

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	2.0	88.0	150

Subject objectives

Leveling the knowledge of students and then developing knowledge of mathematical methods necessary for further education. Learning about the possibilities of using mathematical methods in economics. Learning about the principles of calculating the value of capital over time and using them to: determine the value of capital at any time, update the payment sequence at any time, draw up a debt repayment plan.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[ZSSML3_U02] Can identify problems related to the functioning of an organisation, especially the sports market, the processes carried out within it, and its relations with the environment, and propose appropriate solutions.	The student presents quantitative problems related to the functioning of an organization using the tools of linear algebra (in particular systems of equations and matrices) and mathematical analysis tools (in particular, knows and applies the concepts of: function, limit of a function, derivative of a function, monotonicity of a function and local extremum of a function), and knows and applies methods of solving these problems.	[SU4] test/exam - oral or written
[ZSSML3_W02] Has advanced knowledge and understanding of the nature and functioning of various types of organisations (with particular emphasis on sports-market organisations), their attributes, functional areas, and processes, as well as their links with the environment.	The student recognizes and analyzes various models of changes in the value of capital over time using appropriate sequences, indicating the significance of these changes for the functioning of the organization and its relations with financial market entities.	[SW4] test/exam - oral or written

Subject contents

Elements of linear algebra:

1. Matrices: the concept of a matrix, types of matrices, operations on matrices and their properties, determinant of a matrix and its properties, elementary operations on matrices, 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. Examples of systems of linear equations in economic problems.

Elements of mathematical analysis:

1. Number sequences: arithmetic and geometric sequences, limits of sequences, convergent and divergent sequences, sequences convergent to the number *e*.
2. Functions of one variable: examples of functional dependencies in economics, limit of a function. Differential calculus of a function 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 a function and the sign of the derivative, necessary and sufficient condition for the existence of a local extremum of a function, the largest and smallest value of a function. Examples of the use of differential calculus in economics.

Financial mathematics:

1. Simple interest: capital revaluation, average interest rate, account in hundred and from hundred, simple real discount, simple commercial (bank) discount.
2. Compound interest: capital revaluation, equivalence of capitals, equivalence of interest terms, nominal interest rate, effective interest rate, interest intensity, average interest rate, compound real discount, compound commercial discount, condition of equivalence of interest and discount rates. The impact of inflation on the purchasing power of capital: periodic inflation rate, average inflation rate, real value of capital.
3. Annuity account: temporary and perpetual annuities, annuities payable in arrears and in advance, deferred annuities, annuities with fixed installments, annuity value at any time.
4. Installment repayment of debts: interest and principal payments, debt repayment plan with fixed principal installments and fixed payment amounts, loans with delayed repayment period, cost of debt.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
2 or 3 written tests	51.0%	100.0%

Recommended reading

Basic literature

1. Bażańska T., Nykowska M., *Matematyka w zadaniach dla wyższych zawodowych uczelni ekonomicznych*, Wydawnictwo Branta 2003
2. Podgórska M., Klimkowska J., *Matematyka finansowa*, PWN, Warszawa 2000.
3. Wycinka E., Szreder M. (red.), *Zastosowanie metod ilościowych w ubezpieczeniach*, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2020 (rozdz. 8-11).

Supplementary literature

1. Bednarski T., *Elementy matematyki w naukach ekonomicznych*, Oficyna Ekonomiczna, Kraków 2004
2. Chiang A. C., *Podstawy ekonomii matematycznej*, PWN, Warszawa 1994
3. Krysicki W., Włodarski L., *Analiza matematyczna w zadaniach*, część I i II, PWN, Warszawa 2003
4. Matłoka M. (red), *Matematyka dla ekonomistów*, Wydawnictwo AE w Poznaniu, Poznań 2000
5. Piszczała J., *Matematyka i jej zastosowanie w naukach ekonomicznych*, Wydawnictwo AE w Poznaniu, Poznań 1998
6. Piszczała J., Piszczała M., Wojcieszyn B., *Matematyka z zadaniami* , PWN, Warszawa 1981
7. Sadowski M, Spanily T., *Matematyka w zadaniach dla studentów kierunków ekonomicznych*, Wydawnictwo UG, Gdańsk, 1999
8. Dobija M., Smaga E., *Podstawy matematyki finansowej i ubezpieczeniowej*, PWN 1995.
9. Bieszk-Stolorz B., *Matematyka finansowa z arkuszem kalkulacyjnym*, CEDEWU, Warszawa 2021.
10. Kozubski J., *Matematyczne modelowanie wybranych procesów finansowych*, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk, 2002.
11. Redo M., Prewszyn-Kwitno P., *Matematyka finansowa. Teoria i praktyka*, PWN, Warszawa 2021.
12. Sobczyk M., *Matematyka finansowa*, Agencja Wydawnicza Placet, Warszawa 2000.

eResources addresses

Example issues/ example questions/ tasks being completed

Work placement

Not applicable