GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	MATHEMATICS 2, PG_00071709		
Field of study	Management		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	first-cycle 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	English
Semester of study	2	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Mathematics Center -> Vice-Rector For Education		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Renata Zakrzewska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	45.0	0.0	0.0	0.0	75

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	75	3.0	72.0	150

Subject objectives

Uses the apparatus of linear algebra and mathematical analysis to solve theoretical and practical problems occurring in social sciences

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U04] develops logical solutions to complex or unstructured problems, even under conditions of uncertainty.	integrates the information obtained from solving complex problems, interpreting them, as well as drawing conclusions and formulating and justifying opinions	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_W02] possesses advanced knowledge of methods and techniques that enable precise formulation and effective problem solving.	uses mathematical apparatus to solve economic problems, combining knowledge of mathematics with knowledge of social sciences	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation

Subject contents

Course content – lecture
Intervals of concavity, points of inflection
Analysis of functions and their graphs. Examples of application of functions and derivatives in economics. Demand functions, logistic function, marginal cost, revenue and profit function. Elasticity of demand, the basic principle of economics. Infinite series. Partial sums, convergence of a series, geometric series, harmonic series. Convergence tests, p-series
Integral calculus. Antiderivatives, indefinite integrals, the basic formulae. Integration by substitution. Integration by parts. Integration of rational functions. Definite integral. Properties of definite integrals. Integration by substitution and by parts in the case of definite integrals. Applications of definite integrals. Improper integrals
Multivariable differential calculus. Functions of two or more variables, limits and continuity. Partial derivatives, differentiability and chain rules. Maxima and minima of functions of two variables. Absolute extrema on closed and bounded sets. Gradient. Lagrange method of multipliers. Repeated and double integrals.
Probability, random variables Basic concepts in probability theory: definition of probability, axioms, joint probability, independence. Discrete random variable; probability density function. Continuous random variable, probability density function. Probability distribution function, expectations, variances and standard deviations
Basic distributions of random variables The binomial distribution. Poisson distribution. Normal distribution

Course content – exercises
Intervals of concavity, points of inflection
Analysis of functions and their graphs. Examples of application of functions and derivatives in economics. Demand functions, logistic function, marginal cost, revenue and profit function. Elasticity of demand, the basic principle of economics. Infinite series. Partial sums, convergence of a series, geometric series, harmonic series. Convergence tests, p-series
Integral calculus. Antiderivatives, indefinite integrals, the basic formulae. Integration by substitution. Integration by parts. Integration of rational functions. Definite integral. Properties of definite integrals. Integration by substitution and by parts in the case of definite integrals. Applications of definite integrals. Improper integrals
Multivariable differential calculus. Functions of two or more variables, limits and continuity. Partial derivatives, differentiability and chain rules. Maxima and minima of functions of two variables. Absolute extrema on closed and bounded sets. Gradient. Lagrange method of multipliers. Repeated and double integrals.
Probability, random variables Basic concepts in probability theory: definition of probability, axioms, joint probability, independence. Discrete random variable; probability density function. Continuous random variable, probability density function. Probability distribution function, expectations, variances and standard deviations
Basic distributions of random variables The binomial distribution. Poisson distribution. Normal distribution

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Final exam	50.0%	80.0%
Homework assignments	0.0%	20.0%

Recommended reading

Basic literature	Martin Anthony, Norman Biggs, Mathematics for Economics and Finance Methods and Modelling, Cambridge University Press ISBN: 0521559138 Ken Binmore and Joan Davies , CALCULUS: Concepts and methods, Cambridge University Press ISBN: 0521775418 T. Jankowski, Linear Algebra, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2001, ISBN 83-88007-87-4
Supplementary literature	Hwei Hsu, Schaum's Outline of Probability, Random Variables, and Random Processes, Second Edition, McGraw-Hill; 2 edition ISBN: 978-0071632898
eResources addresses	

Example issues/ example questions/ tasks being completed

- Prove convergence of the series and find the sum.
- Is the given series absolutely convergent, conditionally convergent or divergent?
- Compute the improper integral or prove its divergence
- Find the area of the figure bounded by $y=e^x$, $y=e^{2x}$, $x=1$.
- Find the integral $x^3 \ln x \, dx$
- Find the points of extremum of the function $f(x,y)= x^2+xy+y^2+x-y+1$
- Find the greatest and the least value of the function $f(x,y)=x^2-y^2$ within the circle x^2+y^2 4. To find stationary points on the boundary of the domain use the method of relative extrema.
- Find the area of the indicated domain using double integration. The domain is bounded by the parabolas y=x, y=2x and straight line x=4.

Practical activites within the subject

Not applicable

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