GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics, PG_00069039		
Field of study	Matematyka		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
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	Polish
Semester of study	2	ECTS credits	9.0
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 Hanna Guze	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	60.0	0.0	0.0	0.0	105

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	105	10.0	110.0	225

Subject objectives

The aim of this subject is to obtain the students competence in the range of using the basic methods of mathematical analysis and linear algebra.Furthermore, the student is able to use this knowledge to solve simple theoretical and practical problems that can be found in the field of engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] Possesses knowledge of mathematics and physics necessary to analyze and describe technological processes, including differential and integral calculus, numerical methods, statistics and elements of vector analysis.	Student examines the convergence of the number series. Student defines basic notions of matrix calculus. Student uses basic notions and formulas of matrix calculus in solving systems of linear equations. Student analisies properties of a given function of two variables using differentional calculus of several variables functions. Student uses double and triple integral in geometrical applications. Student determines gradient, divergence and rotation as well as field potential. Student demonstrates some chosen techniques of solving ordinary differential equations. Student gives the definition of basic notions of probability theory. Student describes the basic types of distributions of random variable.	[SW1] Ocena wiedzy faktograficznej
[K6_U01] Is able to independently plan the learning process and acquire, analyse and interpret information from various sources, also in English.	Student independently selects the method of solving the task, uses available methods and tools, ensures the use of reviewed sources of knowledge and presents the obtained results.	[SU4] Ocena umiejętności korzystania z metod i narzędzi [SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania

Subject contents	Course content – lecture Number series: Convergent and divergent series. Definition and other convergence tests of the number series. Alternating series. Elements of linear algebra and geometry: Matrices, their properties and operations on matrices. Determinants. Inverse of a square non-singular matrix. Dot product, cross product, their properties and its applications. The triple scalar product and applications. Systems of linear equations. Cramer formulas. The rank of the main and augmented matrix. Kronecker-Capelli theorem. Gaussian elimination method. Functions of several variables: Limit and continuity. Partial derivatives. Differential. Taylors formula. Maxima and minima of a function of several variables. Multiple integrals: Normal and regular area. Double and triple integral. Change of variables - polar, cylindrical and spherical coordinates. Examples of applications. Elements of field theory: scalar and vector fields. Gradient, divergence, rotation. Ordinary differential equations: First order linear differential equations. Linear differential equations of order n with constant coefficients. Variation of parameters and undetermined coefficients method. Calculus of probability: Discrete and continuous random variable, distribution function, expected value and variance of a random variable. Basic distribution of a random variable. Course content – exercises Convergence criteria for number series. Conditional and absolute convergence. Operations on matrices. Properties of determinants and their application. Inverse matrices and matrix equations. Application of scalar, vector, and mixed products in geometry. Systems of linear equations - application of inverse matrix, Gaussian elimination, and the Kronecker-Capelli theorem. Calculation and application of partial derivatives of functions of several variables. Analysis of the properties of functions of several variables using local and global extrema. Conversion of double and triple integrals to iterated integrals. Application of double and triple integrals in geometry. Application of polar, cylindrical, and spherical coordinates. Gradient of a scalar field, divergence and rotation of a vector field. Solving first-order and higher-order linear differential equations with constant coefficients using the method of variation of parameters and undetermined coefficients. Discrete and continuous random variables, distribution function, expected value and variance of a random variable.
Prerequisites and co-requisites	nie dotyczy
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
written and/or oral exam	50.0%	50.0%
Tests and activity during the classes	0.0%	50.0%

Recommended reading	Basic literature	- M. Gewert, Z. Skoczylas : Analiza matematyczna 2, Oficyna Wydawnicza GiS, Wrocław; - K. Jankowska, T. Jankowski : Zadania z matematyki wyższej, Wydawnictwo PG, 2010; - K. Jankowska, T. Jankowski : Funkcje wielu zmiennych - Całki wielokrotne - Geometria analityczna, Wydawnictwo PG, 2010; - K. Jankowska, T. Jankowski : Zadania z matematyki wyższej. Wydawnictwo PG, 2010; - E. Mieloszyk : Macierze, wyznaczniki i układy równań, Wydawnictwo PG, 2000; - M. Bednarczyk, A. Dąbrowicz-Tlałka, Wdawnictwo PG, 2016
	Supplementary literature	G.M. Fichtenholz : Rachunek różniczkowy i całkowy, t. 2, Wydawnictwo Naukowe PWN W. Krysicki, L. Włodarski : Analiza matematyczna w zadaniach II, Wydawnictwo Naukowe PWN W. Stankiewicz : Zadania z matematyki dla wyższych uczelni technicznych, Wydawnictwo Naukowe PWN
	eResources addresses	
Example issues/ example questions/ tasks being completed	Examine the convergence of series ... using the appropriate convergence criterion. Discuss the solvability of the given system of equations ... . Find local extrema of the given function f (x, y) = ... Using cylindrical or spherical coordinates, calculate the given triple integral ... Determine the potential of the vector field ... Using the method of undetermined coefficients, solve the second order linear differential equations. Calculate the expected value and variance of the given random variable of the continuous type ...	
Practical activites within the subject	Not applicable	

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