GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics 2, PG_00042017		
Field of study	Power Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
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 Hanna Guze	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	45.0	0.0	0.0	0.0	90

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	90	15.0	45.0	150

Subject objectives

Students obtain competence in using methods of mathematical analysis and differential equations, and knowledge
how to solve simple problems that are found in the field of engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] has basic knowledge of mathematics necessary to describe the phenomena related to the processes of energy conversion and transfer; uses information technology to solve mathematical problems	Student analyses properties of a given function of two variables using differential calculus of multivariable functions. Student evaluates the limits of sequences, radius and interval of convergence of a power series. Student is able to determine the type of convergence of a number series. Student evaluates double and triple integrals and explains the methods of change of variables. Student knows various types of differential equations and selects the appropriate methods to solve them. Students explains the definition of the cross product. Student evaluates line integrals.	[SW1] Assessment of factual knowledge
[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems	Student combines knowledge of mathematics with knowledge from other fields.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_K01] is aware of the need for training and self-improvement in the profession of energy and the possibility of further education; can think and act in a creative and entrepreneurial manner; can define priorities for the implementation of an individual or group task	Student understands that to use a specific math tool, he needs to reach for additional knowlege in given subject. Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem.	[SK2] Assessment of progress of work

Subject contents	Indefinite integral. Definite anad improper integral and their applications. Complex numbers: algebraic and trigonometric form, complex conjugate, modulus, arithmetic operations, root of complex numbers, solving equations. Infinite number series: necessary condition for convergence, criteria for convergence, alternating series, conditional and absolute convergence. Power series. Analytic Geometry: vectors (dot product, cross product, mixed product, and their application), equations of line and planes in space. Conic sections and graphs of selected surfaces. Multivariable Functions: limits and continuity, partial derivatives with applications. Integrals of multivariable functions: double integrals (definition, polar coordinates, application in geometry and physics), triple integrals (definition, cylindrical and spherical coordinates, application in geometry and physics). Ordinary Differential Equations: separable, homogeneous, Bernoulli, first order linear equations, linear of order n with constant coefficients, variation of parameters and undetermined coefficients method. Line integral of a scalar field and a vector field.
Prerequisites and co-requisites	Working knowledge of the concepts of the first semester of mathematics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Tests and activity in classes	0.0%	50.0%
Final Exam	40.0%	50.0%

Recommended reading	Basic literature	Sherman K. Stein, Calculus and analytic geometry, McGraw - Hill Book Company, 4th edition, 1987. Howard Anton, Calculus. A new horizon., John Wiley and Sons Publishing Company, 6th edition, 1999. D.J. Hartfiel, Arthur M. Hobbs, Elementary linear algebra, Prindle, Weber & Schmidt, Boston, 1987. T. Jankowski, Linear algebra, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2001. K. Jankowska, T. Jankowski, "Zbiór zadań z matematyki", cz. 2 i 3, PG Gdańsk.

	Supplementary literature	M.Gewert, Z.Skoczylas, Analiza matematyczna II, wzory, Oficyna Wydawnicza GiS E.Łobos, B.Sikora, Calculus and differential equations in exercises, The Publishing House of the Silesian University of Technology, Gliwice, 2006. J.Polking, A.Boggess, D.Arnold, Differential Equations, Pearson
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Find the general solution of the differential equation. 2. Determine convergence of the series. 3. Find local extreme values of the function f(x,y)=... . 4. Find the volume of the given solid by means of double or triple integral. 5. Find the roots of the given complex number. 6. Sketch the graph of the following surface.	
Work placement	Not applicable	