GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00022416						
Field of study	MATEMATYKA I						
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	1		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 Anita Dąbrowicz-Tlałka					
	Teachers	dr Anita Dąbrowicz-Tlałka					

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

eNauczanie source addresses:

Moodle ID: 959 WEiA - TWiE (w) s1: 2025/26 Matematyka (A.Tlałka)
https://enauczanie.pg.edu.pl/2025/course/view.php?id=959

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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	10.0	80.0	150

Subject objectives

Students obtain competence in the range of using methods of mathematical analysis and linear algebra and knowledge to solve simple problems that can be found in the field of engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] has knowledge of mathematics – including linear algebra, mathematical analysis, numerical methods – necessary to describe physical and chemical phenomena, as well as the analysis of electrical circuits and automation and robotics systems	Student defines the basic concepts of differential calculus of one variable function. Student uses the first and second derivatives of a function to analyze its properties. Student determines intervals of monotonicity of a given function and its extrema. Student applies the basic rules and techniques of integration to calculate indefinite integrals. Student lists geometrical applications of definite integrals. Student uses definite integral to solve geometrical problems. Student distinguishes between the types of improper integrals. Student explains the definition of the cross product. Student uses the triple scalar product to give the volume of solids.	[SW1] Ocena wiedzy faktograficznej
[K6_U01] Is able to obtain information from literature, databases and other sources, integrate them, interpret them and draw conclusions and formulate opinions; has the ability to self-educate m.in. in order to improve professional competences	Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future. Student recognizes the importance of self-expanding knowledge.	[SU1] Ocena realizacji zadania

Subject contents

Definition of a first derivative. Derivatives of elementary functions. Applications of derivatives - Taylors theorem, de lHospitals theorem, monotonicity and local extrema, convexity, concavity and inflexion points of a function, asymptotes. Applications of differential calculus to studying the properties of one variable functions. The process of finding antiderivatives - integration formulas, integration by parts and the substitution method of integration. Integration of rational, trigonometric and irrational functions. Definite integrals in Riemanns sense - Newton-Leibniz theorem, improper integrals, applications to geometry.
Vectors in 3-space. Dot product, cross product, triple scalar product.

Calculating derivatives and using their geometric interpretation. Determining the domain of a function and its derivative, and noting the significance of the set on which the function and derivative are defined. Solving examples involving the derivative of a single-variable function: expanding a function into a Taylor series, calculating limits of a function using the derivative, examining the properties of a function using the first and second derivatives.
Calculating indefinite integrals. Using various methods of integration - by substitution and by parts. Linking characteristic methods of integration for appropriate groups of functions (rational, trigonometric, and irrational). Tasks for solving definite integrals. Examples of the geometric interpretation of definite integrals and the significance of the values taken by the integrand. Examples of calculating improper integrals with reference to the geometric interpretation of integrals. Tasks in the field of geometric applications of definite integrals. Inclusion of non-standard examples such as Gabriel's horn.
Examples of operations on vectors. Solving problems in the field of geometric interpretation of vectors and operations on vectors.

Prerequisites and co-requisites

Additional: Ability to use Desmos 2D and Desmos 3D applications.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Activity in classes	0.0%	10.0%
Midterms	50.0%	40.0%
Final exam	40.0%	50.0%

Recommended reading

Basic literature	1. Gewert M., Skoczylas Z.: Analiza matematyczna 1. GiS, Wrocław, 2004. 2. Jurewicz T., Skoczylas Z.: Algebra liniowa 1. GiS, Wrocław, 2004. 3. Krysicki W., Włodarski L.: Analiza matematyczna w zadaniach, cz.I. PWN, Warszawa 2006. 4. Leksiński W., Nabiałek I., Żakowski W.: Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa, 2003.
Supplementary literature	1. Jankowska K., Jankowski T.: Zbiór zadań z matematyki. Wyd. PG, Gdańsk, 1998. 2. Praca zbiorowa pod redakcją Wikieł B.: Matematyka. Podstawy z elementami matematyki wyższej. Wyd. PG, Gdańsk, 2009. 3. Żakowski W., Decewicz G.: Matematyka, cz.I. WNT, Warszawa, 1995.
eResources addresses	

Example issues/ example questions/ tasks being completed	1. Using the rules of differentiation find the derivative of the following function f(x)= . 2. Find local extremes and intervals of monotonicity of the following function f(x)= . 3. Determine indefinite integrals of the following functions using methods of integration by parts or by substitution. 4. Give three applications of the definite integral with appropriate rules. 5. Find the area between the two curves y= and y= from x= to x=
Practical activites within the subject	Not applicable

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