GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematical Analysis, PG_00061887		
Field of study	Materials 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	Polish
Semester of study	1	ECTS credits	7.0
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 Anna Niewulis	
	Teachers	mgr Dorota Grott dr Anna Niewulis	

Lesson types and methods of instruction

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	15.0	85.0	175

Subject objectives

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

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K01] Understands the need to improve professional and personal competencies; is conscious of own limitations and knows when to turn to experts, properly establishes priorities helping to accomplish tasks defined by oneself or others.	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem.	[SK5] Assessment of ability to solve problems that arise in practice
[K6_W01] Has knowledge of selected branches of mathematics, useful for formulating and solving problems and describing mechanical and physical phenomena, and chemical processes.	Student uses methods of mathematical description of phenomena in the physical / mechanical / chemical processes.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	**Functions of one variable and their properties:** Power functions solving power and polynomial equations and inequalities. Rational functions solving rational equations and inequalities. Exponential function properties and graphs, solving exponential equations and inequalities. Logarithmic functions properties and graphs, solving logarithmic equations and inequalities. Trigonometric and cyclometric functions properties and graphs, solving trigonometric equations and inequalities. **Limits and continuity:** Infinite sequences. Fundamental definitions of a limit of a sequence, convergence and divergence, limit theorems. Applications to solving equation. **Differential calculus of one variable functions and its applications:** Definition of a first derivative and differential. Rolls and Lagranges theorems. Higher derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De lHospitals Thorem. Asymptotes. Applying differential calculus to studying the properties of one variable functions. Inegral calculus of one variable functions antiderivatives: The process of finding antiderivatives and integration formulas the substitution method of integration and integration by parts. **Integration of rational, trigonometric and irrational functions.** Definite integrals in Riemanns sense: Newton-Leibniz Thorem. Integration formulas, the substitution method of integration and integration by parts for definite integrals. Applications of integral calculus in computing areas of plane figures, lengths of arcs, volumes of solids of revolution.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Colloquium	50.0%	50.0%
Exam	50.0%	50.0%

Recommended reading

Basic literature	1. G.M.Fichtenholz "Rachunek różniczkowy i całkowy tom I, II, PWN, Warszawa 1964; 2. H. Rasiowa Wstęp do matematyki współczesnej, PWN, Warszawa 3. W. Jankowski Matematyka. Podręcznik dla wydziałów elektrycznych i mechanicznych politechnik, PWN, Warszawa 1967 4. W. Leksiński, I. Nabiałek, W. Żakowski Matematyka. Definicje, twierdzenia, przykłady, zadania-podręczniki akademickie, Wyd. NT, Warszawa 1994 5. W. Krysicki, L. Włodarski Analiza matematyczna w zadaniach część I, PWN, Warszawa 1986 6. W. Stankiewicz Zadania z matematyki dla wyższych uczelni technicznych, cz.I, PWN, Warszawa 1980 L. Maurin, M. Mączyński, T. Traczyk Matematyka, podręcznik dla studentów wydziałów chemicznych, Tom I, PWN, Warszawa 1975 7. K. Dobrowolska, praca zbiorowa Matematyka dla studiów technicznych dla pracujących Tom I, PWN, Warszawa 1981
Supplementary literature	1. I. A. Ławrow, Ł. L. Maksimowa Zadania z teorii mnogości, logiki matematycznej i teorii algorytmów, PWN, PWN, Warszawa 2004 2. W. Marek, J. Onyszkiewicz Elementy logiki i teorii mnogości w zadaniach, PWN, Warszawa 3. R. Grzymkowski Matematyka, zadania i odpowiedzi, podręczniki akademickie, Wyd. Pracowni Komputerowej Jacka Skalmierskiego, Gliwice 2002 4. B. Wikieł, praca zbiorowa, Matematyka. Podstawy z elementami matematyki wyższej, Wyd. PG, Gdańsk 2009 5. M. Gewert, Z. Skoczylas Analiza matematyczna 1, Przykłady i zadania, Oficyna Wydawnicza Gis, Wrocław 2005 6. K. Jankowska, T. Jankowski Zbiór zadań z matematyki, Wyd. PG, Gdańsk 2000 7. K. Jankowska, T. Jankowski Zadania z matematyki wyższej, Wyd. PG, Gdańsk 1999 8. J. Głazunow Matematyka wyższa, zbiór zadań z analizy funkcji jednej zmiennej, Wyd. Elbląskiej Uczelni Humanistyczno-Ekonomicznej, Elbląg 2006 9. M. Lassak Zadania z analizy matematycznej, Wyd. Wspierania Procesu Edukacji, Warszawa 2003
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Find the domain and the set of values of the function . Determine the inverse function of f. 2. Find the derivative of the function 3. Find local extremes and intervals of monotonicity of the following function 4. Determine indefinite integrals of the following functions 5. Give three applications of the definite integral with appropriate rules. 6. Find the volume of a solid obtained by rotating around the axis OX the graph of the function 7. Solve the logarithmic equation (exponential) 8. Find the area between the two curves
Work placement	Not applicable

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