GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Maths I, PG_00072238		
Field of study	Mechanical Engineering		
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	Polish
Semester of study	1	ECTS credits	10.0
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 Stanisław Domachowski	
	Teachers	dr Stanisław Domachowski mgr inż. Krystyna Dąbrowska mgr Mariusz Kaczmarek dr Leszek Ziemczonek	

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

eNauczanie source addresses:
Moodle ID: 7378 WIMiO - MiBM - Matematyka I 2026/27 (S.Domachowski)
https://enauczanie.pg.edu.pl/2025/course/view.php?id=7378

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	5.0	140.0	250

Subject objectives

The aim of this subject is for the student to obtain the competence in the range of using 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_U01] is able to acquire information from professional literature, databases, and other sources, integrate and interpret it, and formulate justified conclusions and opinions for solving engineering problems	Student combines knowledge of mathematics with knowledge from other fields.	[SU2] Assessment of ability to analyse information
[K6_W01] possesses advanced knowledge of mathematics, physics, and mechanics, applied to the modeling, analysis, and description of phenomena and processes occurring in mechanical systems	Student defines the basic concepts of differential calculus of one variable. Student analyses the properties of functions on the basis of an examination of its first and second derivatives. Student geometrically interprets the results of an examination of a graph of a function using the concept of limit, continuity and derivatives of functions. Student performs calculations on complex numbers. Student defines basic notions of matrix calculus. Student calculates determinants of any degree. Student determines eigenvalues of matrices.	[SW1] Assessment of factual knowledge

Subject contents	Course content – lecture Functions of one variable and their properties. The absolute value function definition, solving equations and inequalities with absolute value, graphs of functions with absolute value. 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. Infinite sequences. Definition of a limit of a sequence, convergence and divergence, limit theorems. Limit of a function at a point, right-side limit of a function, left-side limit of a function, improper limit. Continuous function at a point, continuity of an inverse function. Differential calculus of one variable functions and its applications: Definition of a first derivative and differential. Rolls and Lagranges theorems. Higher order derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l'Hospitals Thorem. Asymptotes. Applying differential calculus to studying the properties of one variable functions. Complex numbers. Matrices, matrix operations, matrix inversion, determinants, rank of a matrix. Eigenvalues of the matrix. System of linear equations. Cramers theorem. Kronecker Capelli theorem. Gauss Jordan elimination method. Vectors in three- dimensional space. The dot , and the cross product of vectors, their properties and applications. The scalar triple product of vectors, and its applications. Equations of a line and a plane in a space. Distance from a point to a plane. Angles between planes and lines. Course content – exercises Functions of one variable and their properties. The absolute value function definition, solving equations and inequalities with absolute value, graphs of functions with absolute value. 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. Infinite sequences. Definition of a limit of a sequence, convergence and divergence, limit theorems. Limit of a function at a point, right-side limit of a function, left-side limit of a function, improper limit. Continuous function at a point, continuity of an inverse function. Differential calculus of one variable functions and its applications: Definition of a first derivative and differential. Rolls and Lagranges theorems. Higher order derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l'Hospitals Thorem. Asymptotes. Applying differential calculus to studying the properties of one variable functions. Complex numbers. Matrices, matrix operations, matrix inversion, determinants, rank of a matrix. Eigenvalues of the matrix. System of linear equations. Cramers theorem. Kronecker Capelli theorem. Gauss Jordan elimination method. Vectors in three- dimensional space. The dot , and the cross product of vectors, their properties and applications. The scalar triple product of vectors, and its applications. Equations of a line and a plane in a space. Distance from a point to a plane. Angles between planes and lines.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam 90 minutes, tests, etest, • Active participation during classes	50.0%	100.0%

Recommended reading

Basic literature	W.Żakowski, G.Decewicz , Matematyka część 1 Analiza Matematyczna, Wydawnictwa Naukowo- Techniczne, Warszawa 1991, B.Wikieł, Matematyka, Podstawy z elementami matematyki wyższej, Wydawnictwo Politechniki Gdańskiej Gdańsk 2009, W. Krysicki, L. Włodarski Analiza matematyczna w zadaniach część I, PWN, Warszawa 1986 W. Stankiewicz Zadania z matematyki dla wyższych uczelni technicznych, cz.I, PWN, Warszawa 1980,K.Jankowska, J.Jankowski, Zbiór zadn z matematyki, Wydawnictwo Politechniki Gdańskiej Gdańsk 2003. J.Dymkowska, D. Beger Rachunek całkowy w zadaniach" Wydawnictwo Politechniki Gdańskiej Gdańsk 2015, J.Dymkowska, D. Beger Rachunek różniczkowy w zadaniach" Wydawnictwo Politechniki Gdańskiej Gdańsk 2015,
Supplementary literature	A. Kiełbasa "Matematyka Matura 2009 Matura 2010 poziom podstawowy i rozszerzony" cz. I i II, Wyd. "2000", Warszawa 2008 Z. Cewe, J. Kobierowska, H. Nahorska, I. Stepuro, J. Witkowska "Matura z matematyki od roku 2010", Zbiór zadań maturalnych z zakresu kształcenia rozszerzonego, Wydawnictwo "Podkowa", Gdańsk 2010W. Jankowski Matematyka. Podręcznik dla wydziałów elektrycznych i mechanicznych politechnik, PWN, Warszawa 1967 W. Leksiński, I. Nabiałek, W. Żakowski Matematyka. Definicje, twierdzenia, przykłady, zadania-podręczniki akademickie , Wyd. NT, Warszawa 1994, K.Dobrowolska, praca zbiorowa Matematyka dla studiów technicznych dla pracujących Tom I, PWN, Warszawa 1981, R. Grzymkowski Matematyka, zadania i odpowiedzi, podręczniki akademickie, Wyd. Pracowni Komputerowej Jacka Skalmierskiego, Gliwice 2002 M. Gewert, Z. Skoczylas Analiza matematyczna 1, Przykłady i zadania, Oficyna Wydawnicza Gis, Wrocław 2005 J. Głazunow Matematyka wyższa, zbiór zadań z analizy funkcji jednej zmiennej, Wyd. Elbląskiej Uczelni Humanistyczno-Ekonomicznej, Elbląg 2006 M. Lassak Zadania z analizy matematycznej, Wyd. Wspierania Procesu Edukacji, Warszawa 2003
eResources addresses	

Example issues/ example questions/ tasks being completed	1.Find the domain and range of the function f(x)=... . Determine the inverse function of f 2.Evaluate the limit of the given sequence an=(3n2+6n)½-3½n. 3. Evaluate the limit of the given function f(x)= at the point x0= 4. Using the rules of differentiation find the derivative of the following function f(x)= . 6. Sketch the graph of the function f(x)= . Identify any local extrema and inflection points. 7. Discuss the existence of solutions of the given system of linear equations. 8.Find all eigenvalues of the matrix A
Practical activites within the subject	Not applicable

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