GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00059272						
Field of study	Civil 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	8.0			
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 Jolanta Dymkowska				
	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	10.0	100.0	200

Subject objectives	Students obtain competence in the range of using methods of mathematical analysis 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_U01] Apply knowledge and understanding of mathematics as well as sciences and engineering disciplines underlying civil engineering to solve engineering problems and issues.	Student solves equations and inequalities with elementary functions. Student defines basic notions of differential calculus of one variable function. Student determines intervals of monotonicity of a given functions and its extrema. Student applies the basic rules and techniques of integration to calculate indefinite. Student lists geometrical applications of definite integrals. Student distinguishes between types of improper integrals. Student uses definite integral to solve geometrical tasks. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future.	[SU1] Assessment of task fulfilment
[K6_W01] Demonstrate knowledge and understanding of mathematics as well as sciences and engineering disciplines underlying civil engineering at a level necessary to achieve the other programme outcomes.	Student solves equations and inequalities with elementary functions. Student defines basic notions of differential calculus of one variable function. Student determines intervals of monotonicity of a given functions and its extrema. Student applies the basic rules and techniques of integration to calculate indefinite. Student lists geometrical applications of definite integrals. Student distinguishes between types of improper integrals. Student uses definite integral to solve geometrical tasks. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future.	[SW1] Assessment of factual knowledge

Subject contents

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 national 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 limit of sequence, convergence and divergence, limit theorems. Applications to solving equation. Differential calculus of functions with one variable and applications of differential calculus of functions with one variable: Definition of 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 functions with one variable. Inegral calculus of functions with one variable 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 resolution.

Prerequisites and co-requisites

No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam	50.0%	60.0%
Midterm colloquium	50.0%	40.0%

Recommended reading

Basic literature

Praca zbiorowa pod redakcją B. Wikieł, Matematyka - Podstawy z elementami matematyki wyższej, PG, Gdańsk 2007

J. Dymkowska, D. Beger, Rachunek różniczkowy w zadaniach, PG, Gdańsk 2016

J. Dymkowska, D. Beger, Rachunek całkowy w zadaniach, PG, Gdańsk 2015

K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG, Gdańsk 1997

	Supplementary literature	Praca zbiorowa pod red. E. Mieloszyka, Matematyka Materiały pomocnicze do ćwiczeń, PG, Gdańsk 2004 R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001 R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999 M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2001 M. Gewert, Z. Skoczylas, Analiza matematyczna 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2001 W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998
	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 f(x)=arcsin(3x-2)+. Determine the inverse function of f. 2. Find the derivative of y=4x(3x2+5)5. 3. Sketch the graph of the function f(x)=x-lnx. Identify any local extrema and points of inflection. 4. Find the absolute extrema of f(x)=4x-36x-1 on the interval [1,6]. 5. Calculate 4x2 lnx dx. 6. Find the area between the two curves y=ex and y=3-ex from x=-2 to x=0.	
Work placement	Not applicable	