



Subject card

Subject name and code	Mathematics I, PG_00044152						
Field of study	Civil Engineering						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2021/2022		
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		9.0		
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		mgr Danuta Beger mgr inż. Krystyna Dąbrowska mgr Małgorzata Kula dr Jolanta Dymkowska mgr inż. Renata Zakrzewska mgr Małgorzata Suchecka				
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						
	Adresy na platformie eNauczanie: WILiŚ - Bud. sem.1 - Matematyka 2021/2022 (J.Dymkowska) - Moodle ID: 12873 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=12873						
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		125.0	225
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_U02] is able to define basic calculation models used in computer calculations	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] has knowledge of selected branches of mathematics, physics and chemistry, which is a base of construction subjects, such as construction theory and material technology and is needed to formulate and solve typical problems of civil engineering	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	<p>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. 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. Roll's and Lagrange's theorems. Higher derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l'Hospital's Theorem. Asymptotes. Applying differential calculus to studying the properties of functions with one variable. Integral 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 Riemann's sense: Newton-Leibniz Theorem. 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.</p>		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	50.0%	40.0%
	Written exam	50.0%	60.0%
Recommended reading	Basic literature	<p>Praca zbiorowa pod redakcją B. Wikieł, Matematyka - Podstawy z elementami matematyki wyższej, PG, Gdańsk 2007</p> <p>J. Dymkowska, D. Beger, Rachunek różniczkowy w zadaniach, PG, Gdańsk 2016</p> <p>J. Dymkowska, D. Beger, Rachunek całkowy w zadaniach, PG, Gdańsk 2015</p> <p>K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, PG, Gdańsk 1997</p>	

	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. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998
	eResources addresses	WILiŚ - Bud. sem.1 - Matematyka 2021/2022 (J.Dymkowska) - Moodle ID: 12873 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=12873
Example issues/ example questions/ tasks being completed	1. Find the domain and the set of values of the function $f(x)=\arcsin(3x-2)+\pi$. Determine the inverse function of f . 2. Find the derivative of $y=4x(3x^2+5)^5$. 3. Sketch the graph of the function $f(x)=x-\ln x$. Identify any local extrema and points of inflection. 4. Find the absolute extrema of $f(x)=4x-36x^2-1$ on the interval $[1,6]$. 5. Calculate $\int 4x^2 \ln x \, dx$. 6. Find the area between the two curves $y=e^x$ and $y=3-e^x$ from $x=-2$ to $x=0$.	
Work placement	Not applicable	