

GDAŃSK UNIVERSITY

Subject card

Subject name and code	Mathematics I, PG_00044682								
Field of study	Civil Engineering								
Date of commencement of studies	October 2020		Academic year of realisation of subject			2020/2021			
Education level	first-cycle studies		Subject group			Obligatory subject group in the field of study			
Mode of study	Part-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 Krzysztof Radziszewski						
	Teachers		mgr inż. Krystyna Dąbrowska						
			Kacper Radziszewski						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	t	Seminar	SUM	
	Number of study hours	30.0	30.0	0.0	0.0		0.0	60	
	E-learning hours included: 0.0								
	Adresy na platformie eNauczanie: WILiŚ - Bud. IŚ niestacjonarne - Matematyka 2020/2021 (K.Radziszewski) - Moodle ID: 6130 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=6130								
Learning activity and number of study hours	Learning activity Participation ir classes include plan		didactic Participation in ed in study consultation hours		Self-study		SUM		
	Number of study hours	60		7.0		183.0		250	
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_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 id needed to formulate and solve typical problems of civil engineering		Student defines basic notions of matrix calculus. Student calculates determinants of any degree . Student describes methods of solving systems of linear equations Student analyses a tasks from analitycal geometry. Student solves equations and inequalities with elementary functions. Student determines intervals of monotonicity of a given functions and its extrema. Student geometrically interprets the results of an examinations of a graph of a functions using concept of limit, continuity and derivatives of functions. Student applies the basic rules and techniques of integration to calculate indefinite integrals			[SW1] Assessment of factual knowledge			
	[K6_U02] is able to define basic calculation models used in computer calculations		Student solves problems using mathematical virtual laboratories.			[SU1] Assessment of task fulfilment			

Subject contents	Matrices (definition, types of matrices, matrix operations). Determinants and their properties. Rank of a matrix. Inverse of a square non-singular matrix. Systems of linear equations. Cramer's theorem. Kronecker-Capelly theorem. Gauss-Jordan elimination. Basic vectors definitions and properties. Dot product, cross product, their properties and its applications. The triple scalar product and applications. Equations of lines and planes in 3-space. The distance from a point to a plan. Angles between planes and lines. 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 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 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.						
Prerequisites and co-requisites							
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Written exam	50.0%	60.0%				
	Midterm colloquium	50.0%	40.0%				
Recommended reading	Basic literature 1. Praca zbiorowa pod redakcją B. Wikieł, Matem elementami matematyki wyższej, PG, Gdańsk 20 T. Jankowski, Zbiór zadań z matematyki, PG, Gd zbiorowa pod red. E. Mieloszyka, Matematyka – I do ćwiczeń, PG, Gdańsk 2004. 4. R. Leitner, Zary I i II, Wydawnictwo Naukowo-Techniczne, Warsza Leitner, W. Matuszewski, Z. Rojek, Zadania z ma Wydawnictwo Naukowo-Techniczne, Warszawa Skoczylas, Analiza matematyczna 1 – Definicje, t Oficyna Wydawnicza GiS, Wrocław 2001.		Vikieł, Matematyka - Podstawy z S, Gdańsk 2007. 2. K. Jankowska, atyki, PG, Gdańsk 1997. 3. Praca atematyka – Materiały pomocnicze . Leitner, Zarys matematyki wyższej iczne, Warszawa 2001. 5. R. Zadania z matematyki wyższej I i II, , Warszawa 1999. 6. M. Gewert, Z. – Definicje, twierdzenia, wzory, 2001.				
	Supplementary literature	 T. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 – Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2001. 8. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998. 9. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 – Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002. 10. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 – Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2002. 11. E. Mieloszyk, Macierze, wyznaczniki i układy równań, PG, Gdańsk 2003. 					
	eResources addresses	WILiŚ - Bud. IŚ niestacjonarne - Matematyka 2020/2021 (K.Radziszewski) - Moodle ID: 6130 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=6130					
Example issues/ example questions/ tasks being completed	 Find the domain and the set of values of the function f(x)=arcsin(3x-2)+π. Determine the inverse function of f. Find the derivative of y=4x(3x²+5)⁵. Sketch the graph of the function f(x)=x-lnx. Identify any local extrema and points of inflection. Find the absolute extrema of f(x)=4x-36x⁻¹ on the interval [1,6]. Calculate ∫4x⁻¹ lnx dx. Find A⁻¹ if the matrix A is a 2x2 matrix of the elements a_{ij} = 3i - j. Find the distance between lines <i>l</i>: (x-9)/4 =(y+2)/(-3)=z and <i>k</i>: x/(-2)=(y+7)/9=(z-2)/2. 						
Work placement	Not applicable						