



Subject card

Subject name and code	Mathematics II, PG_00059245						
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	2		ECTS credits		5.0		
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	30.0	30.0	0.0	0.0	0.0	60
	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	60		6.0		59.0	125
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] 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 matrix equations and systems of linear equations. Student analyses a tasks from analytical geometry. Student computes partial derivatives and uses differential calculus to examine properties of the function of several variables. Student solves ordinary differential equations, using informations about complex numbers. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future.		[SW1] Assessment of factual knowledge		
	[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 matrix equations and systems of linear equations. Student analyses a tasks from analytical geometry. Student computes partial derivatives and uses differential calculus to examine properties of the function of several variables. Student solves ordinary differential equations, using informations about complex numbers. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future.		[SU1] Assessment of task fulfilment		

Subject contents	Elements of linear algebra: Matrices, their properties and arithmetics. Determinants. Inverse of a square matrix. Analytic geometry: Basic vectors definitions and properties. Eigenvectors and Eigenvalues. Dot product, cross product, their properties and applications. The triple scalar product and applications. Equations for lines and planes in 3-space. The distance from a point to a plane. Angles between planes and lines. Complex numbers. Functions of several variables: Limit and continuity of a function of several variables. Partial derivatives. Total differential. Taylors formula. Maxima and minima of a function of several variables. Ordinary differential equations: First order differential equations. General and particular solution. The Cauchy initial value problem. Variables separable, linear, Bernoulli, exact differential equations. Second order linear differential equations with constant coefficients. Fundamental set of solution of the homogeneous linear differential equation. Non-homogeneous linear differential equations. Higher order linear differential equations with constant coefficients.		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	60.0%
	Midterm colloquium	50.0%	40.0%
Recommended reading	Basic literature	J. Dymkowska, D. Beger, Rachunek różniczkowy w zadaniach, PG, Gdańsk 2016 E. Mieloszyk, Macierze, wyznaczniki i układy równań, PG, Gdańsk 2003 K. Jankowska, T. Jankowski, Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, PG, Gdańsk 2005 K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, PG, Gdańsk 1999	
	Supplementary literature	T. Jurliewicz, Z. Skoczylas, Algebra liniowa 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002 T. Jurliewicz, Z. Skoczylas, Algebra liniowa 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2002 E. Mieloszyk, Liczby zespolone, PG, Gdańsk 2003 M. Gewert, Z. Skoczylas, Analiza matematyczna 2 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2003 M. Gewert, Z. Skoczylas, Analiza matematyczna 2 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2003 M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne , Oficyna Wydawnicza GiS, Wrocław 2001 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 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 A-1 if the matrix A is a 2x2 matrix of the elements $a_{ij} = 3i - j$. 2. Find the distance between lines l: $(x-9)/4 = (y+2)/(-3) = z$ and k: $x/(-2) = (y+7)/9 = (z-2)/2$. 3. Sketch the graph of the function $f(x,y) = (9-x^2-y^2)^{1/2}$. 4. Identify any local extrema of the function $f(x,y) = ex - y(x^2 - 2y^2)$. 5. Find the absolute extrema of the function $f(x,y) = xy - x(x+1) - y(y+1)$ on the set $D = \{(x,y): x^2 + y^2 \leq 25, y \geq 3\}$. 6. Solve the equation $y'' + 6y' + 9y = 10\sin x$.		
Work placement	Not applicable		