



## Subject card

Subject name and code	Mathematics II, PG_00050185						
Field of study	Engineering Management						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2022/2023		
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	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 Stanisław Domachowski				
	Teachers		dr Stanisław Domachowski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	16.0	16.0	0.0	0.0	0.0	32
	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	32		7.0		86.0	125
Subject objectives	The aim of this subject is to obtain the student's competence in the range of using the 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_W11] has the basic knowledge of mathematics, physics and chemistry necessary to solve technical problems		Student defines basic notions of matrix calculus. Student uses basic notions and formulas of matrix calculus in solving systems of linear equations. Student analyses properties of a given function of two variables using differential calculus of several variables functions. Student demonstrates some chosen techniques of solving ordinary differential equations and difference equations.		[SW1] Assessment of factual knowledge		
	[K6_U01] interprets and analyses the phenomena and processes taking place in the economy and organisation using basic theoretical knowledge of economics, management and science		Student defines basic notions of matrix calculus. Student uses basic notions and formulas of matrix calculus in solving systems of linear equations. Student analyses properties of a given function of two variables using differential calculus of several variables functions. Student demonstrates some chosen techniques of solving ordinary differential equations and difference equations.		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		

Subject contents	Integral calculus of one variable functions – antiderivatives, Definite integrals. Complex numbers - basic informations. Elements of linear algebra: Matrices, their properties and operations on matrices. Determinants. Inverse of a square non-singular matrix. Systems of linear equations and inequalities. Eigenvectors and eigenvalues. Functions of two variables: Partial derivatives. Total differential. Maxima and minima of a function of several variables. Ordinary differential equations: First order differential equations. General and particular solution. Second order linear differential equations with constant coefficients. Fundamental set of solution of the homogeneous linear differential equation.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	50.0%
	Midterm colloquium	50.0%	40.0%
	Class activity, homeworks	0.0%	10.0%
Recommended reading	Basic literature	M. Gewert, Z. Skoczylas : Analiza matematyczna 2, Oficyna Wydawnicza GiS M. Gewert, Z. Skoczylas, Algebra liniowa 1, Oficyna wydawnicza GiS, Wrocław, K. Jankowska, T. Jankowski : Zadania z matematyki wyższej, Wydawnictwo PG K. Jankowska, T. Jankowski, Funkcje wielu zmiennych - Całki wielokrotne - Geometria analityczna, Wydawnictwo PG, K. Jankowska, T. Jankowski, Zadania z matematyki wyższej. Wydawnictwo PG E. Mieloszyk, Liczby zespolone, Wydawnictwo PG, E. Mieloszyk, Macierze, wyznaczniki i układy równań, Wydawnictwo PG	
	Supplementary literature	W. Kryszicki, L. Włodarski : Analiza matematyczna w zadaniach II, Wydawnictwo Naukowe PWN R. Leitner, Zarys matematyki wyższej II, Wydawnictwo Naukowo-Techniczne Praca zbiorowa pod red. E. Mieloszyka : Matematyka – Materiały pomocnicze do ćwiczeń, Wydawnictwo PG W. Stankiewicz : Zadania z matematyki dla wyższych uczelni technicznych, Wydawnictwo Naukowe PWN	
	eResources addresses	Adresy na platformie eNauczanie: WZiE - ZI - Matematyka II 2022/23 (S.Domachowski) - Moodle ID: 29024 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29024">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29024</a>	
Example issues/ example questions/ tasks being completed	1. Find extreme values of the function $f(x,y)$ .  2. Discuss the existence of the solution for the given system of linear equations.  3. Find the rank of the matrix.  4. Find the total differential of the function $f$ .  5. Find a particular solution of the differential equation ... satisfying the given initial conditions ....		
Work placement	Not applicable		

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