



Subject card

Subject name and code	Mathematics, PG_00060841						
Field of study	Chemical Technology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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			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 Anita Dąbrowicz-Tłałka					
	Teachers	dr Hanna Guze dr Anita Dąbrowicz-Tłałka					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	60.0	0.0	0.0	0.0	105
	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	105	10.0		155.0	270	
Subject objectives	The aim of this subject is to obtain the students 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_U11] individually plans and implements his/her own learning	The student deepens and applies the acquired knowledge and skills in mathematics to analyze tasks.	[SU3] Assessment of ability to use knowledge gained from the subject
	[K6_U01] is able to acquire information from literature, databases and other appropriately selected sources, also in English; is able to integrate information obtained, interpret it and make conclusions, formulate and justify opinions	Student independently selects the method of solving the task, uses available methods and tools, ensures the use of reviewed sources of knowledge and presents the obtained results.	[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
	[K6_W01] has knowledge in mathematics, including the solution of equations and inequalities involving elementary functions, differential and integral calculus, elements of vector analysis, statistics, optimisation and numerical methods, has basic knowledge in selected branches of physics, useful for the description and analysis of technological processes	Student examines the convergence of the number series. 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 uses double and triple integral in geometrical applications. Student determines gradient, divergence and rotation as well as field potential. Student demonstrates some chosen techniques of solving ordinary differential equations. Student gives the definition of basic notions of probability theory. Student describes the basic types of distributions of random variable.	[SW1] Assessment of factual knowledge
Subject contents	<p>Number series: Convergent and divergent series. Convergence tests of the number series.</p> <p>Elements of linear algebra: Matrices, their properties and operations on matrices. Determinants. Inverse of a square non-singular matrix. Dot product, cross product, their properties and its applications. The triple scalar product and applications.</p> <p>Systems of linear equations. Cramer patterns. The rank of the main and completed matrix. Kronecker-Capelli theorem. Gaussian elimination method.</p> <p>Functions of two variables: Limit and continuity of a function of several variables. Partial derivatives. Total differential.</p> <p>Taylor's formula. Maxima and minima of a function of several variables.</p> <p>Multiple integrals: Normal and regular area. Double and triple integral. Change of variables - polar, cylindrical and spherical coordinates. Examples of applications.</p> <p>Elements of field theory: scalar and vector fields. Gradient, divergence, rotation.</p> <p>Ordinary differential equations: First order linear differential equations. Linear differential equations order n with constant coefficients.</p> <p>Calculus of probability: Discrete and continuous random variable, distribution function, expected value and variance of a random variable. Basic distribution of a random variable.</p>		
Prerequisites and co-requisites	nie dotyczy		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm tests	0.0%	45.0%
		0.0%	10.0%
	written exam	50.0%	45.0%

Recommended reading	Basic literature	<p>- M. Gewert, Z. Skoczylas : Analiza matematyczna 2, Oficyna Wydawnicza GiS, Wrocław;</p> <p>- K. Jankowska, T. Jankowski : Zadania z matematyki wyższej, Wydawnictwo PG, 2010;</p> <p>- K. Jankowska, T. Jankowski : Funkcje wielu zmiennych - Całki wielokrotne - Geometria analityczna, Wydawnictwo PG, 2010;</p> <p>- K. Jankowska, T. Jankowski : Zadania z matematyki wyższej. Wydawnictwo PG, 2010;</p> <p>- E. Mieloszyk : Macierze, wyznaczniki i układy równań, Wydawnictwo PG, 2000;</p> <p>- M. Bednarczyk, A. Dąbrowicz-Tlałka, Wdawnictwo PG, 2016</p>
	Supplementary literature	<p>G.M. Fichtenholz : Rachunek różniczkowy i całkowy, t. 2, Wydawnictwo Naukowe PWN</p> <p>W. Kryszicki, L. Włodarski : Analiza matematyczna w zadaniach II, Wydawnictwo Naukowe PWN</p> <p>W. Stankiewicz : Zadania z matematyki dla wyższych uczelni technicznych, Wydawnictwo Naukowe PWN</p>
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>WCh - Bt, Ch, TCh, ZT – s2: 2023/24 (A.Tlałka) - Moodle ID: 35749 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35749</p> <p>WCh - Bt 2,3, TCh - Mat. ćw. s2: 23/24 (H.Guze) - Moodle ID: 35776 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35776</p>
Example issues/ example questions/ tasks being completed	<p>Examine the convergence of series ... using the appropriate convergence criterion.</p> <p>Discuss the solvability of the given system of equations</p> <p>Find local extrema of the given function $f(x, y) = \dots$</p> <p>Using cylindrical or spherical coordinates, calculate the given triple integral ...</p> <p>Determine the potential of the vector field ...</p> <p>Using the prediction method, solve the second order linear differential equations.</p> <p>Calculate the expected value and variance of the given random variable of the continuous type ...</p>	
Work placement	Not applicable	

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