



Subject card

Subject name and code	Mathematics III, PG_00044170									
Field of study	Civil Engineering									
Date of commencement of studies	October 2021		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	Full-time studies		Mode of delivery		at the university					
Year of study	2		Language of instruction		Polish					
Semester of study	3		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		dr Jolanta Dymkowska mgr Małgorzata Kula mgr inż. Renata Zakrzewska mgr Danuta Beger							
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		10.0		55.0	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] 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 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.							
	[K6_U02] is able to define basic calculation models used in computer calculations		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.							

Subject contents	Double and triple integrals. Applications of multiple integrals. Elements of field theory: Scalar and vector fields, the gradient of a scalar field, divergence and rotation of a vector field, a potential field. Line integrals with applications. Number series and function series: Number series. Convergent and divergent series. Convergence tests of the number series. Power series. Radius and interval of convergence. Calculus of probability: Discrete and continuous random variables, distribution function, expected value and variance of a random variable. Basic distribution of random variables.		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written exam	50.0%	40.0%
	midterm colloquium	50.0%	60.0%
Recommended reading	Basic literature	J. Dymkowska, D. Beger, Rachunek całkowy w zadaniach, PG, Gdańsk 2015 K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, PG, Gdańsk 1999 K. Jankowska, T. Jankowski, Funkcje wielu zmiennych, całki wielokrotne, geometria analityczna, PG, Gdańsk 2005. W. Krysicki, ... Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach I, Wydawnictwo Naukowe PWN, Warszawa 2005 A. Plucińska, E. Pluciński, Elementy probabilistyki, Wydawnictwo Naukowe PWN, Warszawa 1981 W. Stankiewicz, Zadania z matematyki dla wyższych uczelni technicznych, Wydawnictwo Naukowe PWN, Warszawa 1995	
	Supplementary literature	M. Gewert, Z. Skoczylas, Elementy analizy wektorowej, Oficyna Wydawnicza GiS, Wrocław 2003 R. Leitner, J. Zacharski, Zarys matematyki wyższej II, Wydawnictwa Naukowo-Techniczne, Warszawa 2005. R. Leitner, J. Zacharski, Zarys matematyki wyższej III, Wydawnictwa Naukowo-Techniczne, Warszawa 2005. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej II, Wydawnictwa Naukowo-Techniczne, Warszawa 1999. W. Krysicki, L. Włodarski Analiza matematyczna w zadaniach II, Wydawnictwo Naukowe PWN, Warszawa 1998. B. Gdowski, Elementy geometrii różniczkowej w zadaniach, Wydawnictwo Naukowe PWN, Warszawa 1982 . W. Żakowski, M. Kołodziej, Matematyka - część III, Wydawnictwa Naukowo-Techniczne, Warszawa 1963.	
	eResources addresses	Adresy na platformie eNauczanie: WILiŚ - Bud. sem.3 - Matematyka 2022/2023 (J.Dymkowska) - Moodle ID: 23351 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23351	
Example issues/ example questions/ tasks being completed	1. Find a potential field for $F(x,y,z)=[2x+yz, 2y+xz, 2z+xy]$. 2. Calculate line integral $\int_L \mathbf{F} \cdot d\mathbf{r}$, $L: y=x$, $0 \leq x \leq 1$ 3. Check whether the given series is convergent with general term $a_n = 1/n \operatorname{tg}(1/n^3)$, $b_n = n!/n^n$, $c_n = 1/n \ln n$, using the ratio test, the root test, the comparison test or the integral test. 4. Give the probability distribution and cumulative distribution function for the given discrete random variable X : $x_1=-1$, $p_1=0.4$, $x_2=2$, $p_2=0.6$. 5. Compute the expectation and variation of the given continuous random variable $f(x)=2x$ dla $0 \leq x \leq 2$ i $f(x)=0$ dla $x<0$, $x>2$. 6. Find the area between the two curves $y_1=4+x$ and $y_2=3x$. 7. Using cylindrical or spherical coordinates evaluate the triple integral of the given function $f(x,y,z)=x^2+y^2+z^2$ over the region V : $x^2+y^2+z^2=4$, $z \geq x+y$.		
Work placement	Not applicable		