



Subject card

Subject name and code	Mathematics III, PG_00059248						
Field of study	Civil Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
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 Nikodem Mrozek				
	Teachers		mgr Danuta Beger mgr Małgorzata Kula dr inż. Renata Zakrzewska mgr Katarzyna Kiepiela mgr Małgorzata Suchecka				
Lesson types	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		5.0		60.0	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 compute multiple integrals and use them in geometry and mechanics. Student gives definition of notions from field theory. Student studies convergence of number series. Student uses power series in order to compute sums of number series. Student calculates the probability of random events. Student describes the basic types of distributions of random variables.	[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 compute multiple integrals and use them in geometry and mechanics. Student gives definition of notions from field theory. Student studies convergence of number series. Student uses power series in order to compute sums of number series. Student calculates the probability of random events. Student describes the basic types of distributions of random variables. Student compute multiple integrals and use them in geometry and mechanics. Student gives definition of notions from field theory. Student studies convergence of number series. Student uses power series in order to compute sums of number series. Student calculates the probability of random events. Student describes the basic types of distributions of random variables.	[SU1] Assessment of task fulfilment
Subject contents	Course content – lecture 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			
Assessment methods and criteria	Subject passing criteria		Percentage of the final grade
	written exam		40.0%
	midterm colloquium		60.0%

Recommended reading	Basic literature	J. Dymkowska, D. Beger, Rachunek całkowity 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	

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 $\int_L x \, dl$, $L: y=x, 0 \leq x \leq 1$ 3. Check whether the given series is convergent with general term $a_n = 1/n \cdot \lg(1/n^3)$, $b_n = n!/n^n$, $c_n = 1/n \ln n$, 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 $y^2 = 4+x$ and $x+3y=0$. 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: $x^2 + y^2 + z^2 = 4$, $3z^2 = x^2 + y^2$.
Practical activities within the subject	Not applicable

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