



## Subject card

Subject name and code	Mathematical Analysis II, PG_00067030						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		blended-learning		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Mathematics Center -> Vice-Rector For Education						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Magdalena Musielak				
	Teachers		mgr Jolanta Fidytek mgr Anetta Brękwicz-Sieg dr Robert Fidytek				
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: 2.0						
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		4.0		36.0	100
Subject objectives	Students obtain competence in the range of using methods of full range mathematical analysis 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] knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study		Student defines basic notions of some elements of field theory, line and surface integrals, infinite, function and trigonometric Fourier series, differential and partial differential equations.		[SW1] Assessment of factual knowledge		
	[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n-selection and application of appropriate methods and toolsn		Student computes some basic elements of field theory. Student calculates line and surface integrals. Student studies convergence of infinite and function series. Student determines general and particular solutions of some types of the first order differential equations and nth order linear differential equations with constant coefficients.		[SU4] Assessment of ability to use methods and tools		

Subject contents	Course content – lecture Line integrals of scalar field. Line integrals of vector field. Path independence. Greens Theorem. Surface integrals of scalar fields. Surface integrals of vector fields. Stokes Theorem. GaussOstrogradsky Theorem. Applications of line and surface integrals. Some elements of field theory. Orthogonal coordinate systems. Vector and integro-differential operations in orthogonal coordinate systems. Operational calculus. Differential operators: gradient, divergence, rotation, Laplacian. Vector and scalar fields. Infinite series. Convergence tests. Alternating series test. Absolute and conditional convergence. Function and power series. Radius and interval of convergence of a power series. Taylor and Maclaurin series. Trigonometric Fourier series. First order differential equations. Variables separable, linear, Bernoulli, exact differential equations. Higher order linear differential equations with constant coefficients. Partial differential equations of second order. Course content – exercises Calculating line and surface integrals, also using Green's, Stokes' and Gauss-Ostrogradsky's theorems. Applications of line and surface integrals. Elements of field theory: calculating gradient, divergence, rotation, Laplacian, study of vector and scalar fields. Examination of the convergence of numerical series. Determination of convergence intervals for power series. Calculation of power series sums using Taylor and McLaurin series, as well as integration and differentiation of series. Determining the trigonometric Fourier series. Solving first-order differential equations - separable, linear, Bernoulli, complete - and higher-order linear differential equations with constant coefficients.		
Prerequisites and co-requisites	Knowledge of subject: "Elementary Mathematics".  Knowledge of subject: "Calculus".  Knowledge of subject: "Linear Algebra".		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm tests	50.0%	40.0%
	Final cumulative test	50.0%	60.0%
Recommended reading	Basic literature	1. Gewert M., Skoczylas Z., "Analiza matematyczna 2. Definicje, twierdzenia, wzory", Oficyna Wydawnicza GiS  2. Gewert M., Skoczylas Z., "Elementy analizy wektorowej. Teoria, przykłady, zadania", Oficyna Wy-dawnicza GiS  3. Gewert M., Skoczylas Z., "Równania różniczkowe zwyczajne. Teoria, przykłady, zadania", Oficyna Wydawnicza GiS  4. Jankowska K., Jankowski T., "Zadania z matematyki wyższej", Wydawnictwo Politechniki Gdańskiej	
	Supplementary literature	1. McQuarrie D., "Matematyka dla przyrodników i inżynierów", tomy 1-3, Wydawnictwo Naukowe PWN  2. Stankiewicz W., Wojtowicz J., "Zadania z matematyki dla wyższych uczelni technicznych", Wydawnictwo Naukowe PWN	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Find the gradient of the scalar field $F(x,y,z) = x e^{yz}$ .  2. Check if the vector field $W = [ 2xy+z^2, x^2, 2xz + \cos z ]$ is potential.  3. Check whether the given series with general term $a = (n! 3^n) / (n^n)$ is convergent.  4. Find a particular solution of the differential equation $(x+1) y' + y = \ln x$ satisfying the initial condition $y(1)=10$ .  5. Applying Laplace transform find a solution of the differential equation $y'' + 2 y' = 2 e^{-2x}$ satisfying the given initial conditions $y(0) = 0$ i $y'(0) = 1$ .		
Practical activites within the subject	Not applicable		

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