



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 Fidytka mgr Anetta Brękiewicz-Sieg dr Robert Fidytka					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar		
	Number of study hours	30.0	30.0	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		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:- 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 tools		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	<p>Course content – lecture</p> <p>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.</p> <p>Course content – exercises</p> <p>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.</p>									
Prerequisites and co-requisites	<p>Knowledge of subject: "Elementary Mathematics".</p> <p>Knowledge of subject: "Calculus".</p> <p>Knowledge of subject: "Linear Algebra".</p>									
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="446 752 790 788">Subject passing criteria</th><th data-bbox="790 752 1135 788">Passing threshold</th><th data-bbox="1135 752 1487 788">Percentage of the final grade</th></tr> </thead> <tbody> <tr> <td data-bbox="446 788 790 824">Midterm tests</td><td data-bbox="790 788 1135 824">50.0%</td><td data-bbox="1135 788 1487 824">40.0%</td></tr> <tr> <td data-bbox="446 824 790 864">Final cumulative test</td><td data-bbox="790 824 1135 864">50.0%</td><td data-bbox="1135 824 1487 864">60.0%</td></tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	Midterm tests	50.0%	40.0%	Final cumulative test	50.0%	60.0%
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Recommended reading	<p>Basic literature</p> <p>1. Gewert M., Skoczyłas Z., "Analiza matematyczna 2. Definicje, twierdzenia, wzory", Oficyna Wydawnicza GiS</p> <p>2. Gewert M., Skoczyłas Z., "Elementy analizy wektorowej. Teoria, przykłady, zadania", Oficyna Wydawnicza GiS</p> <p>3. Gewert M., Skoczyłas Z., "Równania różniczkowe zwyczajne. Teoria, przykłady, zadania", Oficyna Wydawnicza GiS</p> <p>4. Jankowska K., Jankowski T., "Zadania z matematyki wyższej", Wydawnictwo Politechniki Gdańskiej</p> <p>Supplementary literature</p> <p>1. McQuarrie D., "Matematyka dla przyrodników i inżynierów", tomy 1-3, Wydawnictwo Naukowe PWN</p> <p>2. Stankiewicz W., Wojtowicz J., "Zadania z matematyki dla wyższych uczelni technicznych", Wydawnictwo Naukowe PWN</p> <p>eResources addresses</p>									
Example issues/ example questions/ tasks being completed	<p>1. Find the gradient of the scalar field $F(x,y,z) = x e^{yz}$.</p> <p>2. Check if the vector field $W = [2xy+z^2, x^2, 2xz + \cos z]$ is potential.</p> <p>3. Check whether the given series with general term $a = (n! 3^n) / (n^n)$ is convergent.</p> <p>4. Find a particular solution of the differential equation $(x+1) y' + y = \ln x$ satisfying the initial condition $y(1)=10$.</p> <p>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 $y'(0) = 1$.</p>									
Practical activites within the subject	Not applicable									

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