



Subject card

Subject name and code	Mathematical Analysis II, PG_00047364						
Field of study	Biomedical Engineering						
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			blended-learning		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			5.0		
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 Barbara Wikieł				
	Teachers		mgr inż. Wojciech Dąbrowski dr Barbara Wikieł				
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: 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	5.0		60.0	125	
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	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. First order differential equations. Variables separable, linear, Bernoulli, exact differential equations. Higher order linear differential equations with constant coefficients. 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.						

Prerequisites and co-requisites	Knowledge of subject: "Basic Mathematics". Knowledge of subject: "Calculus". Knowledge of subject: "Linear Algebra".														
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="451 315 794 349">Subject passing criteria</th> <th data-bbox="794 315 1137 349">Passing threshold</th> <th data-bbox="1137 315 1487 349">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 349 794 383">Final colloquium</td> <td data-bbox="794 349 1137 383">50.0%</td> <td data-bbox="1137 349 1487 383">60.0%</td> </tr> <tr> <td data-bbox="451 383 794 416">Tests</td> <td data-bbox="794 383 1137 416">50.0%</td> <td data-bbox="1137 383 1487 416">30.0%</td> </tr> <tr> <td data-bbox="451 416 794 450">Activity</td> <td data-bbox="794 416 1137 450">0.0%</td> <td data-bbox="1137 416 1487 450">10.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Final colloquium	50.0%	60.0%	Tests	50.0%	30.0%	Activity	0.0%	10.0%
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Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> Find the gradient of the scalar field $F(x,y,z) = x e^{yz}$. Check if the vector field $W = [2xy+z^2, x^2, 2xz + \cos z]$ is potential. Check whether the given series with general term $a_n = (n! 3^n) / (n^n)$ is convergent. Find a particular solution of the differential equation $(x+1)y' + y = \ln x$ satisfying the initial condition $y(1)=10$. Applying Laplace transform find a solution of the differential equation $y'' + 2y' = 2e^{-2x}$ satisfying the given initial conditions $y(0) = 0$ i $y'(0) = 1$. 														
Work placement	Not applicable														