GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematical Analysis II, PG_00067030		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
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 Anetta Brękiewicz-Sieg mgr Jolanta Fidytek dr Magdalena Musielak	

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 canvergence 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 Wydaw-nicza 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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