GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics II, PG_00044796		
Field of study	Geodesy and Cartography		
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	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	9.0
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 Krzysztof Radziszewski	
	Teachers	mgr inż. Dorota Żarek dr Krzysztof Radziszewski mgr Małgorzata Suchecka	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	60.0	60.0	0.0	0.0	0.0	120
	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	120	15.0	90.0	225

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_W02] has knowledge and understands mathematics concepts useful for coordinate calculus (in a set of real and complex numbers), for the purpose of field and volume calculations, mathematical statistics and vector calculus, as well as elementar topology	Student solves matrix equations and systems of linear equations. Student analyses a tasks from analitycal geometry. Student computes partial derivatives and uses differential calculus to examine properties of the function of several variables. Student solves ordinary differential equations, including the use of information about complex numbers. Student computes multiple integrals and uses integral calculus to geometric and mechanics applications. Student gives definition of notions from field theory. Student studies canvergence of number series. Student uses power series in order to compute sums of number series.	[SW1] Assessment of factual knowledge
[K6_U01] can apply the principles of physics and mathematics to a simple verification of measurement and computational methods and their results	Student solves matrix equations and systems of linear equations. Student analyses a tasks from analitycal geometry. Student computes partial derivatives and uses differential calculus to examine properties of the function of several variables. Student solves ordinary differential equations, including the use of information about complex numbers. Student computes multiple integrals and uses integral calculus to geometric and mechanics applications. Student gives definition of notions from field theory. Student studies canvergence of number series. Student uses power series in order to compute sums of number series.	[SU2] Assessment of ability to analyse information

Subject contents

Elements of linear algebra: Matrices, their properties and arithmetics. Determinants. Inverse of a square matrix. Analytic geometry: Basic vectors definitions and properties.. Dot product, cross product, their properties and applications. The triple scalar product and applications. Equations for lines and planes in 3-space. The distance from a point to a plane. Angles between planes and lines. Complex numbers. Functions of several variables: Limit and continuity of a function of several variables. Partial derivatives. Total differential. Taylors formula. Maxima and minima of a function of several variables. Implicit functions. Ordinary differential equations: First order differential equations. General and particular solution. The Cauchy initial value problem. Variables separable, linear, Bernoulli, exact differential equations. Second order linear differential equations with constant coefficients. Fundamental set of solution of the homogeneous linear differential equation. Non-homogeneous linear differential equations. Higher order linear differential equations with constant coefficients. Double and triple integrals. Applications of multiple integrals.

Elements of field theoryy: Scalar and vector fields, the gradient of a scalar field, divergence and rotation of a vector field, a potential field. Line integrals with applications. Vector functions. Limit and continuity of a vector function. The derivative of a vector function.. Number series and function series: Number series. Convergent and divergent series. Convergence tests of the number series. Power series. Radius and interval of convergence. Taylors and Maclaurins series. Integration and differentiation of power series. Examples of applications - approximate calculation of integrals.

Prerequisites and co-requisites

No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	50.0%	60.0%
Midterm colloquium	50.0%	40.0%

Recommended reading

Basic literature

E. Mieloszyk, Macierze, wyznaczniki i układy równań, PG, Gdańsk 2003. K. Jankowska, T. Jankowski, Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, PG, Gdańsk 2005. K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, PG, Gdańsk 1999. W. Stankiewicz, Zadania z matematyki dla wyższych uczelni technicznych, Wydawnictwo Naukowe PWN, Warszawa 1995.

	Supplementary literature	T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2002. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2002 E. Mieloszyk, Liczby zespolone, PG, Gdańsk 2003. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS, Wrocław 2003. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 Przykłady i zadania, Oficyna Wydawnicza GiS, Wrocław 2003. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne , Oficyna Wydawnicza GiS, Wrocław 2001. R. Leitner, Zarys matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 2001. R. Leitner, W. Matuszewski, Z. Rojek, Zadania z matematyki wyższej I i II, Wydawnictwo Naukowo-Techniczne, Warszawa 1999. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach I i II, Wydawnictwo Naukowe PWN, Warszawa 1998. 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. W. Żakowski, M. Kołodziej, Matematyka - część III, Wydawnictwa Naukowo-Techniczne, Warszawa 1963.
	eResources addresses	Adresy na platformie eNauczanie: WILiŚ - GiK sem.2 - Matematyka 2023/24 (K.Radziszewski) - Moodle ID: 35216 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35216
Example issues/ example questions/ tasks being completed	1. Discuss the existence of the solution for the given system of linear equations: 2x+y+z=2, x+3y+z=5, x+y+5z=-7, 2x+3y-3z=14. 2. Discuss the relation between two given lines l_1 : x=1+2t, y=-2-3t, z=5+4t and l_2 : x=7+3t, y=2+2t, z=1-2t . 3. Compute partial differentials of the second order for the given function f(x,y) =xe^y+cos 2x-x^2 ln y. 4. Find extreme values of the function f(x,y)=$2x^3$-xy^2+$5x^2$+y^2 . 5. Compute the double integral of the given function f(x,y)=x^2y over the region D: x=-y^2, y=1/x, y=-2. 6. 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. 7. Find a particular solution of the differential equation y' cos x - y sin x = $\cos^2$x satisfying the given initial conditions y(0)=1. 8. Find the general solution of the differential equation y'' + 2y' = 12e^{-2x}. 9. Find a potential fielf for F(x,y,z)=[2x+yz,2y+xz,2z+xy]. 10. Calculate line integral Lx dl, L:y=x, 0x1 11. Check whether the given series is convergent with general term an=1/n tg(1/n3), bn=n!/nn , cn=1/n ln n, using the ratio test, the root test. the comparison test or the integral test. 12. Compute the sum of the given power series with general term fn(x)=nx^n in interval of convergence.
Work placement	Not applicable

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