GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics II, PG_00055816		
Field of study	Ocean Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2021/2022
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 Cezary Mrozicki	
	Teachers	mgr Justyna Woroń dr Cezary Mrozicki dr Magdalena Musielak	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	45.0	0.0	15.0	0.0	105
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie:						

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	105	20.0	100.0	225

Subject objectives	Students obtain competence in the range of using methods of mathematical analisis 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] has a basic knowledge in maths, including algebra, elements of logics, geometry, mathematical analysis, theory of probability necessary to describe and analyse the operation of machines and ocean-technology objects	A student defines the basic concepts of linear algebra. The student describes the methods of solving systems of linear equations. The student calculates the radius of convergence and determines the interval of convergence of a power series. The student applies the concept of functions of several variables to determine the extremes of the function. The student explains the method of substitution in double integral and triple integral. The student mentions applications of double integrals and triple integrals. The student distinguishes between line integrals and applies appropriate methods to calculate them. The student distinguishes between surface integrals and uses appropriate methods to calculate them. The student recognizes diferrent types of differential equations and selects the appropriate methods to solve them. The student solves linear differential equations of order n with constant coefficients using Laplace transform. The student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
[K6_U02] can work individually and in a team, communicate through various techniques in professional environment and also record, analyse, and present the results of work, can estimate the time needed to complete a given task	The student mentions applications of double integrals and triple integrals. The student distinguishes between line integrals and applies appropriate methods to calculate them. The student distinguishes between surface integrals and uses appropriate methods to calculate them. The student recognizes diferrent types of differential equations and selects the appropriate methods to solve them. The student solves linear differential equations of order n with constant coefficients using Laplace transform. The student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task

Subject contents

Elements of linear algebra: Matrices (definition, types of matrices, matrix operations), determinants (definition and properties), rank of a matrix, system of linear equations (Cramer"s rule, Kronecker-Capelli theorem, Gauss-Jordan elimination method). Number series and function series: Number series. Convergent and divergent series. Convergence tests for 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. Information on Fourier series Functions of two 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. Double integral: Definition, properties, interpretation; expressing the double integral as an iterated integral; integration by substitution (polar coordinates); applications of double integrals. Triple integral: Definition, properties, interpretation; expressing the triple integral as an iterated integral; integration by substitution (cylindrical coordinates and spherical coordinates); application of triple integrals. Line integrals: Line integrals of the first kind - definition, properties and interpretation; transforming the line integral to the corresponding definite integral. Line integrals of the second kind (along oriented curves) - definition, properties and interpretation; transforming the line integral to the corresponding definite one; Green"s theorem; path independence. Surface integrals: Integrals of the first kind - definition, properties and interpretation; transforming the surface integral to the corresponding double integral. Integrals of the second kind (surface-oriented) - definition, properties and interpretation; transforming the surface integral to the corresponding double integral; Gauss-Ostrogradski"s theorem; Stoke"s theorem. Applications of surface integrals. 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. Laplace Transform: Definition, properties, inverse Laplace transform, solving differential equations using Laplace transform.

Prerequisites and co-requisites	Knowledge of the subject: MATHEMATICS I.	
Assessment methods and criteria		

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	50.0%	35.0%
Midterm colloquium	50.0%	65.0%

Recommended reading	Basic literature	W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach 1, Wydawnictwo Naukowe PWN, Warszawa 2008 W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach 2, Wydawnictwo Naukowe PWN, Warszawa 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2008 T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2006 T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2006 T. Jurlewicz, Z. Skoczylas, Algebra liniowa 2. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2006 T. Jurlewicz, Z. Skoczylas, Algebra liniowa 2. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2006 K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, Wydawnictwo PG, Gdańsk 2008 K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, Wydawnictwo PG, Gdańsk 2008 K. Jankowska, T. Jankowski, Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, Wydawnictwo PG, Gdańsk 2008
	Supplementary literature	W. Leksiński, I. Nabiałek, W. Żakowski, Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa 2006
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Give the definition of the sum of the series. 2. Check whether the given series is convergent using the ratio test, the root test.. the comparison test or the integral test. 3. Discuss the existence of the solution for the given system of linear equations. 4. Compute partial differentials of the second order for the given function f(x,y) . 5. Find extreme values of the function f(x,y).	
Work placement	Not applicable	