GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics II, PG_00055373
Field of study	Mechanical Engineering

Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
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	8.0
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 Stanisław Domachowski
	Teachers	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	45.0	0.0	15.0	0.0	90
	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	90	12.0	98.0	200

Subject objectives	The aim of the subject is to obtain the student's competence in the use of the basic apparatus of mathematical analysis and linear algebra and the application of the acquired knowledge to solve simple theoretical and practical problems occurring in engineering fields.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U01] is able to acquire information from specialized literary sources, databases and other resources, essential for solving engineering tasks; is able to compile the obtained information pieces and to interpret them, additionally is able to form conclusions and present justified opinion	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem.	[SU3] Assessment of ability to use knowledge gained from the subject
	[K6_W01] possesses mathematical knowledge within the range of linear algebra and mathematical analysis useful in characterising and interpreting mechanical systems, technological processes and operational properties of devices	Student examines functions of several variables, using the concept of a limit, continuity and derivatives. Students calculates double integrals, and explains the method of substitution in the double integral. Student applies double integrals in solving geometrical problems. Student calculates triple integrals, and explains the method of substitution in the triple integral. Student applies triple integrals in geometrical problems. Student calculates the radius of convergence and the interval of convergence of a power series. Student demonstrates some chosen techniques of solving ordinary differential equations. Student determines general and particular solutions of some types of the first and second order differential equations. Student determines general and particular solutions of higher orders linear differential equations with constant coefficients. Student determines general and particular solutions of systems of differential equations.	[SW1] Assessment of factual knowledge

Subject contents	Vectors in three- dimensional space. The dot , and the cross product of vectors, their properties and applications. The scalar triple product of vectors, and its applications. Equations of a line and a plane in a space. Distance from a point to a plane. Angles between planes and lines. Limits and continuity of a function of several variables, partial derivatives, total differentia, extrema of functions of several variables, implicit functions. Double integral over a rectangle, and the normal domain, change of variables in a double integral. Applications of the double integral. Triple integral over a cuboid, and the normal domain. Change of variables in a triple integral. Applications of the triple integral. Infinite series. Convergence tests for infinite series. Power series. Taylor and Maclaurin series. First order differential equations. General and particular solution of the differential equation. Initial value problem. Separable, linear, Bernoulli and exact differential equations. Integrating factor. Second order differential equations. Linear differential equations of order n with constant coefficients. Fundamental set of solutions of the homogeneous linear differential equation with constant coefficients. Non-homogeneous linear differential equations. Systems of differential equations.

Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final exam, 3 tests, active participation during classes	50.0%	100.0%

Recommended reading	Basic literature	Zadania z matematyki dla wyższych uczelni technicznych, PWN, Warszawa 1980,K.Jankowska, T.Jankowski, Zbiór zadań z matematyki, Wydawnictwo Politechniki Gdańskiej Gdańsk 2003, K.Jankowska, T.Jankowski, Funkcje wielu zmiennych, całki wielokrotne, geometria analityczna, Wydawnictwo Politechniki Gdańskiej Gdańsk 2006, G.Kwiecińska, Matematyka część III Analiza funkcji wielu zmiennych.Wydawnictwo UG.M.Gewert, Z.Skoczylas, analiza matematyczna 2, Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS Wrocław 2004, M.Gewert, Z.Skoczylas, analiza matematyczna 2, Przykłady i zadania, Oficyna Wydawnicza GiS Wrocław 2004, T.Jurlewicz, Z.Skoczylas, Algebra liniowa, Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS Wrocław 2004, T.Jurlewicz, Z.Skoczylas, Algebra liniowa,Przykłady i zadania, Oficyna Wydawnicza GiS Wrocław 2004, J.Dymkowska, D. Beger Rachunek całkowy w zadaniach" Wydawnictwo Politechniki Gdańskiej Gdańsk 2015, J.Dymkowska, D. Beger Rachunek różniczkowy w zadaniach" Wydawnictwo Politechniki Gdańskiej Gdańsk 2015,

	Supplementary literature	T. Jankowski Matematyka. Podręcznik dla wydziałów elektrycznych i mechanicznych politechnik, PWN, Warszawa 1967 W. Leksiński, I. Nabiałek, W. Żakowski Matematyka. Definicje, twierdzenia, przykłady, zadania-podręczniki akademickie , Wyd. NT, Warszawa 1994, K.Dobrowolska, praca zbiorowa Matematyka dla studiów technicznych dla pracujących Tom I, PWN, Warszawa 1981, R. Grzymkowski Matematyka, zadania i odpowiedzi, podręczniki akademickie, Wyd. Pracowni Komputerowej Jacka Skalmierskiego, Gliwice 2002 , M. Lassak Zadania z analizy matematycznej, Wyd. Wspierania Procesu Edukacji, Warszawa 2003
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Find the local extreme values of the function f(x,y)=x/(y+1)+8/x-y-1. 2.Compute the double integral of the given function f(x,y) over the region D 3.Find the area of the region bounded by the curves 4.Using cylindrical or spherical coordinates evaluate the given triple integral. 5.Check convergence of the series using the ratio test, the root test, the comparison test or the integral test. 6.Find a radius of convergence of power series. 7. Prove a uniformly and absolutely convergent of a series. 8. Find a an interval of convergence of a power series. 9.Find a general solution of differential equations. 10.Find a particular solution satisfying the given initial conditions of the differential equations.	
Work placement	Not applicable	