GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00037554						
Field of study	Green Technologies						
Date of commencement of studies	October 2020		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	2		Language of instruction		English		
Semester of study	3		ECTS credits		5.0		
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 Hanna Guze				
	Teachers		dr Hanna Guze				
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: 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	60		5.0		60.0	125
Subject objectives	Students obtain competence in using methods of mathematical analysis (multivariable calculus) and knowledge how to solve simple problems that are found in the field of engineering, in particular connected to green technologies and environment protection.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods	Student evaluates the limits of sequences, radius and interval of convergence of a power series. Student is able to determine the type of convergence of a number series. Student evaluates double and triple integrals and explains the methods of change of variables. Student knows various types of differential equations and selects the appropriate methods to solve them. Students explains the definitione of the cross product.	[SW1] Assessment of factual knowledge
[K6_U03] is able to use information and communication technologies relevant to the common tasks of engineering, is able to use known methods and mathematical-physical models to describe and explain phenomena and chemical processes	Student recognizes the importance of skillful use of basic mathematical apparatus in terms of engineering studies. Student combines knowledge of mathematics with knowledge from other fields. Student uses methods of mathematical description of phenomena in the physical and chemical processes.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_K01] understands the need for learning throughout life, can inspire and organize the learning process of others. Is aware of his/ her own limitations and knows when to ask the experts, can properly identify priorities for implementation, critically evaluate his knowledge	Student understands the need of lifelong learning and improving their engineering knowldege. Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice

Subject contents

Infinite number series: necessary condition for convergence, criteria for convergence, alternating series, conditional and absolute convergence.

Power Series.

Analytic Geometry: vectors (dot product, cross product, mixed product, and their application),equations of lines and planes, relative position of lines and planes

Integrals of multivariable functions: double integrals (definition, polar coordinates, application in geometry and physics), triple integrals (definition, cylindrical and spherical coordinates, application in geometry and physics).

Ordinary Differential Equations: separable, homogeneous, Bernoulli, first order linear equations, linear of order n with constant coefficients, variation of parameters and undetermined coefficients method.

Probability and Statistics: discrete and continuous random variable, probability distribution, expected value and variation of a random variable, distribution functions, elements of statistics.

Prerequisites and co-requisites

Working knowledge of the concepts of the first and second semester.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Final exam	50.0%	50.0%
Tests	50.0%	50.0%

Recommended reading

Basic literature	1. George B. Thomas,Jr., Ross L. Finney, "Calculus and Analytic Geometry", 7th edition. Addison-Wesley Publishing Company, 1988 2. Sherman K. Stein, "Calculus nad Analytic Geometry. 4th edition, McGraw-Hill Book Company", 1987 3. John E.Hanke, Arthur G.Reitsch, "Understanding Business Statistics", IRWIN, 1991
Supplementary literature	1. K.T. Jankowscy, "Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna", Wydawnictwo PG, 2005 2. T. Jurkiewicz, Z. Skoczylas, "Algebra liniowa 1", Oficyna Wydawnicza GiS, Wrocław 2003 3. K.T. Jankowscy "Zadania z matematyki wyższej", Wydawnictwo PG, 2001 4. M.Bednarczyk, A.Dąbrowicz - Tlałka, "Elementy rachunku prawdopodobieństwa w zadaniach",Wydawnictwo PG, 2012

	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Determine convergence of the series. 2. Find the Taylor expansion of the given function. 3. Find the equation of the plane that passes through the points A, B, C. 5. Describe the following region in polar/cylindrical/spherical coordinates. 5. Evaluate the triple integral. 6. Find the general solution of the differential equation... . 7. Give the probability mass function and cumulative distribution function for the given discrete random variable.	
Work placement	Not applicable	