Subject card

Subject name and code	, PG_00037554
Field of study	Green Technologies

Date of commencement of studies	October 2021	Academic year of realisation of subject	2022/2023
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						

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 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_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
	[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

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
	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
	Tests and activity during classes	50.0%	50.0%
	Final exam	40.0%	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 4. Howard Anton, "Calculus", 6th edition, John Wiley & Sons, 1999
	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	Adresy na platformie eNauczanie: WCh - GT - Mathematics 3 2022/23 (H.Guze) - Moodle ID: 23977 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23977

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 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