Subject card

Subject name and code	Mathematics II, PG_00024116
Field of study	Hydrogen Technologies and Electromobility

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 Anita Dąbrowicz-Tlałka
	Teachers	dr Anita Dąbrowicz-Tlałka
		dr inż. Magdalena Łapińska

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	60.0	0.0	0.0	0.0	105
	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	105	10.0	85.0	200

Subject objectives	Students obtain competence in the range of using methods of mathematical analysis and knowledge to solve simple problems that can be found in the field of engineering

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U01] Is able to obtain information from literature, databases and other sources, integrate them, interpret them and draw conclusions and formulate opinions; has the ability to self-educate m.in. in order to improve professional competences	Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future. Student recognizes the importance of self-expanding knowledge.	[SU2] Assessment of ability to analyse information
	[K6_K02] can work in a group taking on different roles in it	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student understands the need of lifelong learning. Student is able to inspire others and organize their learning process.	[SK2] Assessment of progress of work
	[K6_W01] has knowledge of mathematics – including linear algebra, mathematical analysis, numerical methods – necessary to describe physical and chemical phenomena, as well as the analysis of electrical circuits and automation and robotics systems	Student determines convergence of number series. Student calculates the radius of convergence and the interval of convergence of a power series. Student expands a function in Taylor and Maclaurin series. Student determines the Fourier series of a given function. Student examines functions of several variables, using the concept of a limit, continuity and derivatives. Student determines local and global extremes of functions of two variables. Student uses functions of many variables to study selected properties of scalar and vector fields. Students calculates double integrals, and explains the method of substitution in the double integral. Student applies double integrals in solving geometrical problems. Student demonstrates some techniques for solving ordinary differential equations. Student determines general and particular solutions of certain types of the first-order differential equations. Student finds the right method for solving the second - order ordinary differential equations. Student determines general and particular solutions of the second -order and n-order linear differential equations with constant coefficients.	[SW1] Assessment of factual knowledge

Subject contents	Number series. Power series, Taylors, Maclaurins and Fourier series. Functions of two variables, partial derivatives, applications (maxima and minima, gradient, divergence, rotation, potential field). Double integral, polar coordinates and generalized polar coordinates, applications. Ordinary differential equations - definition of the differential equation and its solution, general and particular solution, the Cauchy initial value problem. Variables separable equations. First order linear differential equations. Linear differential equations of order n with constant coefficients.
Prerequisites and co-requisites	none

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Activity during classes	0.0%	10.0%
	Midterms	50.0%	40.0%
	Final exam	50.0%	50.0%

Recommended reading	Basic literature	1. Gewert M., Skoczylas Z.: Analiza matematyczna, GiS, Wrocław, 2004. 2. Gewert M., Skoczylas Z.: Równania różniczkowe zwyczajne, GiS, Wrocław, 2004. 3. Krysicki W., Włodarski L.: Analiza matematyczna w zadaniach, cz.I., cz.II. PWN, Warszawa 2006. 4. Jankowska K., Jankowski T.: Zadania z matematyki wyższej. Wyd. PG, Gdańsk, 1999.
	Supplementary literature	1. Leksiński W., Nabiałek I., Żakowski W.: Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa, 2003. 2. Żakowski W., Kołodziej W.: Matematyka, cz.II. WNT, Warszawa, 1995. 3. Żakowski W, Leksiński W.: Matematyka, cz.IV. WNT, Warszawa, 1995.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Investigate the convergence of a number series ... and determine its type. 2. Using the appropriate power series, calculate the sum of the given series ... 3. Find the local extrema of the function f(x,y). 4. Check if the field ... is potential, if so, determine its potential. 5. Using the double integral, calculate the volume of a solid bounded by surfaces.... 6. Find a solution to the differential equation. satisfying given initial conditions. 7. Solve the following second-order linear differential equations ... using the appropriate method.
Work placement	Not applicable

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