



Subject card

Subject name and code	Mathematics 2, PG_00041653						
Field of study	Transport and Logistics, Transport and Logistics						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2020/2021		
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 Katarzyna Paćzkowska				
	Teachers		dr Katarzyna Paćzkowska mgr Dorota Grott				
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						
	WOiO - Transport i logistyka - Matematyka II - 2020/21 (K.Paćzkowska) - Moodle ID: 10280 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=10280 WIMiO - TiL - Równania różniczkowe 2020/21 (K.Paćzkowska) - Moodle ID: 15775 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=15775						
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	110.0	225	
Subject objectives	Students obtain competence in the range of using methods of mathematical analysis and linear algebra 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_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 means and systems of transport	<p>Student defines the basic concepts of linear algebra. Student determines solutions of systems of linear equations.</p> <p>Student examines functions of several variables, using the concept of a limit, continuity and partial derivatives. Student determines local and global extremes of functions of two variables. 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.</p> <p>Student determines general and particular solutions of certain types of the first-order differential equations. Student recognizes various types of differential equations and selects the appropriate methods to solve them. Student determines general and particular solutions of higher orders linear differential equations with constant coefficients.</p> <p>Student determines convergence of number series. Student calculates the radius of convergence and the interval of convergence of a power series.</p> <p>Student distinguishes between line integrals and applies appropriate methods to calculate them. Student calculates surface integrals.</p>	[SW1] Assessment of factual knowledge
	[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	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
Subject contents	Elements of linear algebra: matrices, determinants, rank of a matrix, system of linear equations, Kronecker Capelli theorem, Cramers theorem, Gauss Jordan elimination method. Limits and continuity of a function of several variables, partial derivatives, total differential, extrema of functions of two variables. Double integral over a rectangle, double integral over the normal domain, change of variables in a double integral, the polar coordinate system, applications of the double integral, triple integral. Ordinary differential equations, general and particular solution of the differential equation, separable, linear, Bernoulli and exact differential equations, linear differential equations of order n with constant coefficients, application of the Laplace transform to solve linear differential equations. Convergent and divergent series, alternating series, convergence tests for infinite series, power series, radius and interval of convergence of the series, Taylor and Maclaurin series, basic information on Fourier series, Line integral of a scalar field, line integral of a vector field, fundamental theorem of line integrals, Greens theorem. Surface integral, flux integral.		
Prerequisites and co-requisites	Knowledge of the subject: Mathematics sem. 1.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	50.0%	60.0%
	Written and oral exam	50.0%	40.0%

Recommended reading	Basic literature	<p>1. Gewert M., Skoczylas Z.: Analiza matematyczna 2. GiS, Wrocław, 2004.</p> <p>2. Gewert M., Skoczylas Z.: Równania różniczkowe zwyczajne. GiS, Wrocław, 2004.</p> <p>3. Krysicki W., Włodarski L.: Analiza matematyczna w zadaniach, cz.I., cz.II. PWN, Warszawa, 2006.</p> <p>4. Leksiński W., Nabitak I., Żakowski W.: Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa, 2003.</p> <p>5. Jurlewicz T., Skoczylas Z.: Algebra liniowa 1. GIS, Wrocław, 2006.</p>
	Supplementary literature	<p>1. Jankowska K., Jankowski T.: Zadania z matematyki wyższej. Wyd.PG, Gdańsk, 1999.</p> <p>2. Jankowska K., Jankowski T.: Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, Wydawnictwo PG, Gdańsk 2008.</p> <p>3. Jankowska K., Jankowski T.: Zbiór zadań z matematyki, Wydawnictwo PG, Gdańsk 2002.</p> <p>4. Żakowski W., Kołodziej W.: Matematyka, cz.II. WNT, Warszawa, 1995.</p> <p>5. Żakowski W, Leksiński W.: Matematyka, cz.IV. WNT, Warszawa, 1995.</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>1. Discuss the existence of solutions of the given system of linear equations.</p> <p>2. Compute the second order partial derivatives of the given function $f(x,y)$.</p> <p>3. Find the local extreme values of the function $f(x,y)$.</p> <p>4. Compute the double integral of the given function $f(x,y)$ over the region D.</p> <p>5. Find the general solution of the differential equation..</p> <p>6. Check convergence of the series using the ratio test, the root test, the comparison test or the integral test.</p>	
Work placement	Not applicable	