



Subject card

Subject name and code	Mathematics III, PG_00039873						
Field of study	Mechanical Engineering, Mechanical Engineering						
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	Polish				
Semester of study	3	ECTS credits	5.0				
Learning profile	general academic profile	Assessment form	assessment				
Conducting unit	Mathematics Center -> Vice-Rector for Education						
Name and surname of lecturer (lecturers)	Subject supervisor	dr Stanisław Domachowski					
	Teachers	dr Stanisław Domachowski					
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						
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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	6.0	59.0	125		
Subject objectives	The aim of this subject is to obtain the student's competence in the range of using the basic methods of mathematical analysis, ordinary differential equations, partial differential equations. Furthermore, the student is able to use this knowledge to solve simple theoretical and practical problems that can be found in the field of engineering.						

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	The student combines knowledge of mathematics with knowledge from other fields.	[SU2] Assessment of ability to analyse information
	[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	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. Student determines general and particular solutions of the partial linear differential equations of first order	[SW1] Assessment of factual knowledge
Subject contents	Double integral over a rectangle and the normal domain. Iterated integrals. Change of variables in a double integral, applications of double integrals. Triple integral over a cuboid and the normal domain, Change of variables in a triple integral, applications of triple integrals. Number series. Convergence tests for infinite series. Power 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 linear homogeneous equation. Non-homogeneous linear differential equations. Systems of differential equations. Linear first order partial differential equations. Quasi-linear first order partial differential equations. Characteristic equations.		
Prerequisites and co-requisites	No recommendations		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	tests, • Active participation during classes	50.0%	100.0%
Recommended reading	Basic literature	Matwiejew M.M. Metody całkowania równań różniczkowych zwyczajnych PWN, Warszawa 1982, W. Kryszewski, L. Włodarski Analiza matematyczna w zadaniach cz II PWN, Warszawa 1986, Jankowska K, Jankowski T, Zadania z matematyki wyższej PG Gdańsk 2007, Niedoba J, Niedoba W, Równania różniczkowe zwyczajne i cząstkowe pod redakcją B.Choczewskiego AGH 2001, J Dymkowska, D. Beger Rachunek całkowy w zadaniach, Wydawnictwo Politechniki Gdańskiej 2015, W.Stankiewicz, J.Wojtowitz, Zadania z matematyki dla wyższych uczelni technicznych, część 2 PWN Warszawa 1971, Kryszewski W, Bartos J, Dyczka W, Królikowska K, Wasilewski M. Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach PWN Warszawa 1989.	

	Supplementary literature	Kącki E. Siewierski L. Wybrane działy matematyki wyższej z ćwiczeniami, PWN Warszawa 1975, Muszyński J, Myszkiś A.D. Równania różniczkowe zwyczajne PWN warszawa 1984, Gerstenkorn T. Śródka T. Kombinatoryka i rachunek prawdopodobieństwa PWN Warszawa 1983.
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Compute the double integral of the given function $f(x,y)$ over the region D 2. Find the area of the region bounded by the curves 3. Using cylindrical or spherical coordinates evaluate the given triple integral. 4. Check convergence of the series using the ratio test, the root test, the comparison test or the integral test. 5. Find a radius of convergence of power series. 6. Prove a uniformly and absolutely convergent of a series. 7. Find a an interval of convergence of a power series. 8. Find a general solution of differential equations. 9. Find a particular solution satisfying the given initial conditions of the differential equations. 	
Work placement	Not applicable	