



Subject card

Subject name and code	Maths III, PG_00055173						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
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			assessment		
Conducting unit	Mathematics Center -> Vice-Rector for Education						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Stanisław Domachowski				
	Teachers						
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		8.0		57.0	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		The student combines knowledge of mathematics with knowledge from other fields.		[SU1] Assessment of task fulfilment		
	K6_W01		Students calculate 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 order 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	Basic vectors definitions and properties. Dot product, crros product, their properties and its applications. The triple scalar product and applications. Equations of lines and planes in 3-space. The distance from a point to a plane. Angles between planes and lines. Limit and continuity of a function of several variables, partial derivatives, total differential, maxima and minima of a function of several variables, implicit functions. 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. 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. Kryszicki, 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.Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, część 2 PWN Warszawa 1971, Kryszicki W, Bartos J, Dyczka W, Królikowska K, Wasilewski M. Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach PWN Warszawa 1989.	
	Supplementary literature	Kački E. Siewierski L. Wybrane działy matematyki wyższej z ćwiczeniami, PWN Warszawa 1975, Muszyński J, Myszkis A.D. Równania różniczkowe zwyczajne PWN warszawa 1984, Gerstenkorn T. Śródka T. Kombinatoryka i rachunek prawdopodobieństwa PWN Warszawa 1983.	
	eResources addresses	Adresy na platformie eNauczanie:	
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. Find a general solution of differential equations. 5. Find a particular solution satisfying the given initial conditions of the differential equations. 		
Work placement	Not applicable		