



Subject card

Subject name and code	MATHEMATICS 2, PG_00070668						
Field of study							
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
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		English		
Semester of study	2		ECTS credits		6.0		
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 inż. Renata Zakrzewska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	45.0	0.0	0.0	0.0	75
	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	75		3.0		72.0	150
Subject objectives	Uses the apparatus of linear algebra and mathematical analysis to solve theoretical and practical problems occurring in social sciences						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U04] develops logical solutions to complex or unstructured problems, even under conditions of uncertainty.		integrates the information obtained from solving complex problems, interpreting them, as well as drawing conclusions and formulating and justifying opinions		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K6_W02] possesses advanced knowledge of methods and techniques that enable precise formulation and effective problem solving.		uses mathematical apparatus to solve economic problems, combining knowledge of mathematics with knowledge of social sciences		[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		

Subject contents	Course content – lecture		
	1. Matrix algebra. 2. Geometry of n-space, vectors, length and angle. 3. Vector spaces, subspaces and spanning sets. 4. Linear independence, basis and dimension. 5. Eigenvalues and eigenvectors. 6. Quadratic forms. 7. Integral calculus of one variable functions - antiderivatives. 8. Fundamental rules of integration, substitution method, integration by parts. 9. Integration of rational, trigonometric and irrational functions. 10. Riemann definite integral, 11. Newton-Leibniz theorem. 12. Fundamental methods of definite integration. 13. Improper integrals. 14. Number and power series. 15. Extrema of functions of two and several variables, constrained extrema. 16. Differential linear equations.		
	Course content – exercises		
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Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Oral exam	50.0%	20.0%
	Midterm colloquium	50.0%	60.0%
	Written exam	50.0%	20.0%
Recommended reading	Basic literature	1. Batóg B., Bieszk-Stolorz B., Foryś I., Guzowska M., Heberlein K., (2016). Matematyka dla kierunków ekonomicznych, Teoria, przykłady, zadania, Warszawa: Wydawnictwo Difin 2. OZE - Open AGH e-podręczniki, (2021). Matematyka, Kraków: Wydawnictwo: AGH 3. Jankowska K., Jankowski T., (2008). Zbiór zadań z matematyki, Gdańsk: Wydawnictwo PG	
	Supplementary literature	Fragmentarily: 1. Jankowska K., Jankowski T., (2008). Zadania z matematyki wyższej, Gdańsk: Wydawnictwo PG 2. Jurlewicz T., Skoczylas Z., (2013). Algebra liniowa 1, 2, Definicje, twierdzenia wzory, Wrocław: Wydawnictwo GiS, 3. Jurlewicz T., Skoczylas Z., (2014) Algebra i geometria analityczna, Wrocław: Wydawnictwo GiS, 4. Gewert M., Skoczylas Z., (2015) Analiza matematyczna 1, 2, Przykłady, zadania, Wrocław: Wydawnictwo GiS, 5. Dymkowska J., Beger D., (2018) Rachunek całkowy w zadaniach, Gdańsk: Wydawnictwo PG	
	eResources addresses		
Example issues/ example questions/ tasks being completed	• Discuss the relation between the line l and the plane S. • Check linear dependence of given system of vectors. • Find eigenvalues and eigenvectors of symmetric matrix A. • Solve the overdetermined system applying the least square method. • Determine definiteness of quadratic form $Q(x)$. • Evaluate the indefinite integral of the given rational function. • Find the area between the two curves $y=$ and $y=$ from $x=$ to $x=$. • Calculate definite integrals of the following functions using methods of integration by parts or by substitution. • Identify any local extremes of function of two/three variables. • Find the absolute extrema of the function $f(x,y)$ on the compact set D. • Check whether the given series is convergent using the ratio test, the root test, the comparison test or the integral test. • Determine radius and domain of convergence of a power series. • Determine global extrema of functions of two / three variables on a convex set D. • Solve the initial problem for linear differential equation of second order.		

Practical activities within the subject	Not applicable
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