



Subject card

Subject name and code	Mathematical Analysis, PG_00050156						
Field of study	Economic Analytics						
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	e-learning				
Year of study	1	Language of instruction	Polish				
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. Natalia Jarzębkowska					
	Teachers	dr inż. Natalia Jarzębkowska					
Lesson type and method 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: 60.0						
	WZiE - AG - Analiza matematyczna 2020/2021 (N.Jarzębkowska) - Moodle ID: 13212 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13212						
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	12.0	78.0	150		
Subject objectives	The aim of this subject is to obtain the students competence in the range of using the basic methods of mathematical analysis. Furthermore, the student is able to use this knowledge to solve simple theoretical and practical problems that can be found in finances, economic issues and in the fields of social sciences.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	<p>[K6_U08] Has the ability to use mathematical and IT tools to analyse economic phenomena and make decisions by economic entities.</p>	<p>Students apply basic concepts and models of mathematical analysis</p> <p>Student solves equations and inequalities with elementary functions.</p> <p>Student solves exercises involving numerical sequences.</p> <p>Student evaluates the limits of functions.</p> <p>Student uses the first and second derivatives of a function to analyze its properties.</p> <p>Student applies the basic rules and techniques of integration to calculate indefinite integrals.</p> <p>Student uses definite integral to solve geometrical and economical problems.</p> <p>Student examines functions of several variables, using the concept of a limit, continuity and derivatives.</p> <p>Student determines convergence of number series.</p> <p>Student solves differential equations and difference linear equations.</p>	<p>[SU4] Assessment of ability to use methods and tools</p> <p>[SU2] Assessment of ability to analyse information</p> <p>[SU1] Assessment of task fulfilment</p>
	<p>[K6_W02] Knows how to describe economic phenomena using quantitative methods with the use of IT tools.</p>	<p>Student names basic properties of elementary functions.</p> <p>Student defines the basic concepts of differential calculus of one variable function.</p> <p>Student defines the basic rules and techniques of integration to calculate indefinite integrals.</p> <p>Student defines the basic concepts of differential calculus of several variable function.</p> <p>Student defines the basic concepts of number series.</p> <p>Student combines knowledge of mathematics with knowledge from other fields.</p> <p>Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions.</p>	<p>[SW3] Assessment of knowledge contained in written work and projects</p> <p>[SW1] Assessment of factual knowledge</p>

Subject contents	<p>LECTURES and TUTORIALS</p> <p>Functions of one variable and their properties. Elementary functions: absolute value, polynomials, rational, power, exponential, logarithmic, trigonometric, cyclometric - properties, graphs, solving equations and inequalities.</p> <p>Infinite sequences - properties, limits. The limit and continuity of a function. Derivatives and differentials of first and higher orders. Rolle, Lagrange, de l'Hospital, Taylor-Maclaurin theorems. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. Asymptotes.</p> <p>Integral calculus of one variable functions - antiderivatives. Fundamental rules of integration, substitution method, integration by parts. Integration of rational, trigonometric and irrational functions. Riemann definite integral. Newton-Leibniz theorem. Fundamental methods of definite integration. Geometric and economic examples of application. Improper integrals.</p> <p>Number and power series.</p> <p>Extrema of functions of two and several variables.</p> <p>Differential and difference linear equations.</p> <p>Constrained extrema.</p>														
Prerequisites and co-requisites	Knowledge of the high school mathematics.														
Assessment methods and criteria	<table border="1" data-bbox="448 642 1477 786"> <thead> <tr> <th data-bbox="448 642 794 678">Subject passing criteria</th> <th data-bbox="794 642 1141 678">Passing threshold</th> <th data-bbox="1141 642 1477 678">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 678 794 714">Final exam</td> <td data-bbox="794 678 1141 714">50.0%</td> <td data-bbox="1141 678 1477 714">50.0%</td> </tr> <tr> <td data-bbox="448 714 794 750">Midterm colloquium</td> <td data-bbox="794 714 1141 750">50.0%</td> <td data-bbox="1141 714 1477 750">25.0%</td> </tr> <tr> <td data-bbox="448 750 794 786">Class activity</td> <td data-bbox="794 750 1141 786">50.0%</td> <td data-bbox="1141 750 1477 786">25.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Final exam	50.0%	50.0%	Midterm colloquium	50.0%	25.0%	Class activity	50.0%	25.0%
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Example issues/ example questions/ tasks being completed	<p>Find the derivatives of the following functions .</p> <p>Find local extremes and intervals of monotonicity of the following function $f(x)=$.</p> <p>Sketch the graph of the function $f(x)$. Identify any local extrema and points of inflection</p> <p>Evaluate the indefinite integral of the given rational function .</p> <p>Find the area between the two curves $y=$ and $y=$ from $x=$ to $x=$.</p> <p>Calculate definite integrals of the following functions using methods of integration by parts or by substitution.</p> <p>Identify any local extremes of function of two/three variables.</p> <p>Find the absolute extrema of the function $f(x,y)$ on the compact set D.</p> <p>Check whether the given series is convergent using the ratio test, the root test, the comparison test or the integral test.</p> <p>Determine radius and domain of convergence of a power series.</p> <p>Determine global extrema of functions of two / three variables on a convex set D.</p> <p>Solve the initial problem for linear differential equation of second order.</p>														
Work placement	Not applicable														