



## Subject card

Subject name and code	Mathematics, PG_00054686						
Field of study	Biotechnology						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2024/2025		
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 Anita Dąbrowicz-Tlałka				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	45.0	0.0	0.0	0.0	90
	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	90		10.0		125.0	225
Subject objectives	The aim of this subject is to obtain the students competence in the range of using the basic methods of mathematical analysis and linear algebra. 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_W01		Student examines the convergence of the number series. Student defines basic notions of matrix calculus. Student uses basic notions and formulas of matrix calculus in solving systems of linear equations. Student analyses properties of a given function of two variables using differential calculus of several variables functions. Student uses double and triple integral in geometrical applications. Student determines gradient, divergence and rotation as well as field potential. Student demonstrates some chosen techniques of solving ordinary differential equations. Student gives the definition of basic notions of probability theory. Student describes the basic types of distributions of random variable.			[SW1] Assessment of factual knowledge	
	K6_U01		Student uses gained knowledge in basic mathematics to analyse results of experiments .			[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment	

Subject contents	<p>Number series: Convergent and divergent series. Convergence tests of the number series.</p> <p>Elements of linear algebra: Matrices, their properties and operations on matrices. Determinants. Inverse of a square non-singular matrix. Dot product, cross product, their properties and its applications. The triple scalar product and applications.</p> <p>Systems of linear equations. Cramer patterns. The rank of the main and completed matrix. Kronecker-Capelli theorem.</p> <p>Functions of two variables: Partial derivatives. Total differential.</p> <p>Taylor's formula. Maxima and minima of a function of several variables.</p> <p>Multiple integrals: Normal and regular area. Double and triple integral. Change of variables - polar, cylindrical and spherical coordinates. Examples of applications.</p> <p>Elements of field theory: scalar and vector fields. Gradient, divergence, rotation.</p> <p>Ordinary differential equations: First order linear differential equations. Linear differential equations order <math>n</math> with constant coefficients.</p> <p>Calculus of probability: Discrete and continuous random variable, distribution function, expected value and variance of a random variable. Basic distribution of a random variable.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="454 1012 794 1039">Subject passing criteria</th> <th data-bbox="798 1012 1137 1039">Passing threshold</th> <th data-bbox="1141 1012 1482 1039">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="454 1043 794 1070">class work</td> <td data-bbox="798 1043 1137 1070">0.0%</td> <td data-bbox="1141 1043 1482 1070">10.0%</td> </tr> <tr> <td data-bbox="454 1075 794 1102">midterm tests</td> <td data-bbox="798 1075 1137 1102">0.0%</td> <td data-bbox="1141 1075 1482 1102">40.0%</td> </tr> <tr> <td data-bbox="454 1106 794 1133">written exam</td> <td data-bbox="798 1106 1137 1133">50.0%</td> <td data-bbox="1141 1106 1482 1133">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	class work	0.0%	10.0%	midterm tests	0.0%	40.0%	written exam	50.0%	50.0%
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<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> <li>1. Check the convergence of the series ... and determine its type.</li> <li>2. Discuss the solvability of the given system of equations ... .</li> <li>3. Find local extrema of the given function <math>f(x, y) = \dots</math></li> <li>4. Using a double or triple integral, find the volume of a solid bounded by surfaces....</li> <li>5. Determine the potential of the vector field...</li> <li>6. Using the prediction method, solve the first and second order linear differential equations.</li> <li>7. Calculate the expected value and variance of the given random variable of the continuous type ...</li> </ol>
<p>Work placement</p>	<p>Not applicable</p>

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