



Subject card

Subject name and code	Mathematics, PG_00054686						
Field of study	Biotechnology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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	dr Anita Dąbrowicz-Tlałka dr Ewa Kozłowska-Walania dr Hanna Guze					
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_U01		Student uses gained knowledge in basic mathematics to analyse results of experiments .			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information	
	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	

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 n 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="456 1010 794 1037">Subject passing criteria</th> <th data-bbox="798 1010 1136 1037">Passing threshold</th> <th data-bbox="1139 1010 1479 1037">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1041 794 1068">written exam</td> <td data-bbox="798 1041 1136 1068">50.0%</td> <td data-bbox="1139 1041 1479 1068">50.0%</td> </tr> <tr> <td data-bbox="456 1072 794 1099">midterm tests</td> <td data-bbox="798 1072 1136 1099">0.0%</td> <td data-bbox="1139 1072 1479 1099">40.0%</td> </tr> <tr> <td data-bbox="456 1104 794 1131">class work</td> <td data-bbox="798 1104 1136 1131">0.0%</td> <td data-bbox="1139 1104 1479 1131">10.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	written exam	50.0%	50.0%	midterm tests	0.0%	40.0%	class work	0.0%	10.0%
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	eResources addresses	Adresy na platformie eNauczenie: WCh - Bt 1, ZT - Mat. ćw. s2: 23/24 (A.Tłałka) - Moodle ID: 35777 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=35777
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Check the convergence of the series ... and determine its type. 2. Discuss the solvability of the given system of equations 3. Find local extrema of the given function $f(x, y) = \dots$ 4. Using a double or triple integral, find the volume of a solid bounded by surfaces.... 5. Determine the potential of the vector field... 6. Using the prediction method, solve the first and second order linear differential equations. 7. Calculate the expected value and variance of the given random variable of the continuous type ... 	
Work placement	Not applicable	