



Subject card

Subject name and code	Mathematics, PG_00054686						
Field of study	Biotechnology						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
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 Hanna Guze				
Lesson type and method 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 .		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		

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	Student should have passed the exam in mathematics for the first semester.														
Assessment methods and criteria	<table border="1" data-bbox="448 1001 1477 1137"> <thead> <tr> <th data-bbox="448 1001 794 1032">Subject passing criteria</th> <th data-bbox="794 1001 1141 1032">Passing threshold</th> <th data-bbox="1141 1001 1477 1032">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1032 794 1064">written exam</td> <td data-bbox="794 1032 1141 1064">50.0%</td> <td data-bbox="1141 1032 1477 1064">50.0%</td> </tr> <tr> <td data-bbox="448 1064 794 1095">midterm tests</td> <td data-bbox="794 1064 1141 1095">0.0%</td> <td data-bbox="1141 1064 1477 1095">40.0%</td> </tr> <tr> <td data-bbox="448 1095 794 1137">class work</td> <td data-bbox="794 1095 1141 1137">0.0%</td> <td data-bbox="1141 1095 1477 1137">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	Uzupełniająca https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24334 - Educational materials supporting the achievement of learning outcomes.
Example issues/ example questions/ tasks being completed	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	