



Subject card

Subject name and code	Mathematics, PG_00044302						
Field of study	Civil Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			3.0		
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 Stanisław Domachowski				
	Teachers		dr Stanisław Domachowski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	10.0	0.0	0.0	0.0	25
	E-learning hours included: 0.0						
	Adresy na platformie eNauczenie: WILiŚ - Bud. II st. niestacjonarne - Matematyka 2023/24 (S.Domachowski) - Moodle ID: 29027 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29027						
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	25	7.0	43.0	75		
Subject objectives	The aim of this subject is to obtain the student's 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		
	[K7_W01] has knowledge of higher mathematics, physics and chemistry, which is a base of subjects, such as construction theory and advanced material technology	Student defines the concepts of the basis of a vector space . Student defines the concepts of the linear mapping, the matrix of a linear mapping. Student defines the concepts of the eigenvalues and eigenvector of the linear mapping. Student gives the definition of notions from tensor calculus. Student gives the definition of basic notions of variational calculus. Student determines extrema of a functional. Student determines a Fourier series for a given function.			[SW1] Assessment of factual knowledge		
	[K7_U06] is able to choose proper tools (measuring, analytical or numerical) to solve engineering problems, to acquire, filtrate, proces and analyse data	Student defines the concepts of the basis of a vector space . Student defines the concepts of the linear mapping, the matrix of a linear mapping. Student defines the concepts of the eigenvalues and eigenvector of the linear mapping. Student gives the definition of notions from tensor calculus. Student gives the definition of basic notions of variational calculus. Student determines extrema of a functional. Student determines a Fourier series for a given function.			[SU4] Assessment of ability to use methods and tools		

Subject contents	A vector space, a basis of a vector space, linear mappings, the matrix of a linear mapping. Eigenvalues, eigenvectors of a linear mapping. Tensor calculus. The basic notions of variational calculus. Extrema of a functional. Fourier series.		
Prerequisites and co-requisites	Completed undergraduate.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written exam , 90 minutes	50.0%	100.0%
Recommended reading	Basic literature	F.Leja, Rachunek różniczkowy i całkowy, Państwowe wydawnictwo naukowe, Warszawa 1978, W. Kołodziej, Wybrane rozdziały analizy matematycznej, Państwowe Wydawnictwo Naukowe, 1970. Wyd. 1, Jacek Komorowski, Od liczb zespolonych do tensorów, spinorów, algebr Liego i kwadryk, Państwowe Wydawnictwo Naukowe, Warszawa 1978. Uzupełniająca lista	
	Supplementary literature	Brak zaleceń	
	eResources addresses	WILiŚ - Bud. II st. niestacjonarne - Matematyka 2023/24 (S.Domachowski) - Moodle ID: 29027 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29027	
Example issues/ example questions/ tasks being completed	1. Show that the vectors $1, 1+x, 1+x+x^2, 1+x+x^2+x^3$ form a basis of the vector space consisting of all polynomials of degree at most 3. 2. Find the eigenvalues and the eigenvectors of the linear mapping $T([x, y, z]) = [2x+2z, 4y, 2x+2z]$, find the matrix of this linear mapping in the basis of eigenvectors. 3. Find extrema of the functional $J[y] = \int_1^2 (y')^3 dx$ with the conditions $y(1)=0, y(2)=1$. 4. Find the Fourier series for the function $f(x)=-x, -\pi \leq x \leq 0, f(x)=x, 0 \leq x \leq \pi$.		
Work placement	Not applicable		