



## Subject card

Subject name and code	Mathematics 2, PG_00041996						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
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			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			7.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Mathematics Center -> Vice-Rector for Education						
Name and surname of lecturer (lecturers)	Subject supervisor		Nikodem Mrozek				
	Teachers		mgr Danuta Beger mgr Katarzyna Kiepiela Nikodem Mrozek				
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						
	Adresy na platformie eNauczanie: EN – matematyka 2 sem. 2020/21 (N.Mrozek) - Moodle ID: 13750 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13750">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13750</a>						
Learning activity and number of study hours	Additional information:						
	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	90		9.0		76.0	175
Subject objectives	Student obtains competence in the range of using methods of mathematical analysis and linear algebra and skills to solve simple problems that can be found in the field of engineering.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_K01	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student understands the need of lifelong learning. Student is able to inspire others and organize their learning process.	[SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work

	Course outcome	Subject outcome	Method of verification
	K6_W01	<p>Student performs calculations on complex numbers Student determines the real and complex roots of polynomials Student examines complex functions. Student knows the definition of the derivative of complex function. Student determines the real and imaginary parts of functions of a complex variable. Student calculates the integral of complex function. Student knows the fundamental theorems for sequences and series of complex terms. Student evaluates limits of a function of two variables. Student calculates partial derivatives of a function of two variables. Student analyses properties of a given function of two variables using differential calculus of multivariable functions. Student examines functions of several variables, using the concept of a limit, continuity and derivatives. Student determines local and global extrema of functions of several variables. Students calculates double integrals, and explains the method of substitution in the double integral. Student applies double integrals to solving geometrical problems. Student calculates triple integrals, and explains the method of substitution in the triple integral. Student uses triple integrals in geometrical problems. Student determines the Fourier series of a given function (or periodic function). Student demonstrates some techniques for solving ordinary differential equations. Student determines general and particular solutions of certain types of the first-order differential equations. Students finds the right method for solving ordinary differential equations. Student determines fundamental set of solutions of the homogeneous linear equation of order <math>n</math> with constant coefficients. Student determines general and particular solutions of higher orders linear differential equations with constant coefficients. Student determines general and particular solutions of systems of differential linear equations. Student determines general and particular solutions of a first-order partial linear differential equations. Student calculates line integrals. Student distinguishes types of line integrals and applies appropriate methods to calculate them. Student presents the application of line integrals. Student calculates surface integrals. Student uses mathematical packages to perform calculations and visualization of mathematical concepts.</p>	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents	<p><b>Integral calculus of functions of one variable</b></p> <ul style="list-style-type: none"> <li>Definite integrals and their applications. Improper integrals.</li> </ul> <p><b>Complex numbers</b></p> <ul style="list-style-type: none"> <li>Algebraic, trigonometric and exponential form of a complex number</li> <li>Operations on complex numbers</li> </ul> <p><b>Fourier series</b></p> <ul style="list-style-type: none"> <li>Information of Fourier series.</li> </ul> <p><b>Ordinary differential equations</b></p> <ul style="list-style-type: none"> <li>Ordinary first order differential equations</li> <li>Higher order linear differential equations with constant coefficients.</li> <li>Systems of linear differential equations .</li> </ul> <p><b>Integral calculus of functions of several variable</b></p> <ul style="list-style-type: none"> <li>Functions of two variables. The differential calculus. The double and triple integrals.</li> <li>Line integral of a scalar field, line integral of a vector field</li> <li>Surface integral, flux integral</li> </ul> <p><b>Complex analysis</b></p> <ul style="list-style-type: none"> <li>The basic complex functions. Derivation of a complex function. Conformal maps.</li> <li>Taylor's and Laurent's series. Residue.</li> <li>Integral of a complex function.</li> </ul> <p><b>Partial differential equations</b></p> <ul style="list-style-type: none"> <li>Information of the partial differential equations.</li> </ul>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 987 794 1021">Subject passing criteria</th> <th data-bbox="794 987 1141 1021">Passing threshold</th> <th data-bbox="1141 987 1487 1021">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1021 794 1055">Exam</td> <td data-bbox="794 1021 1141 1055">50.0%</td> <td data-bbox="1141 1021 1487 1055">40.0%</td> </tr> <tr> <td data-bbox="448 1055 794 1093">Midterm colloquium</td> <td data-bbox="794 1055 1141 1093">50.0%</td> <td data-bbox="1141 1055 1487 1093">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Exam	50.0%	40.0%	Midterm colloquium	50.0%	60.0%
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Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>Solve the given differetial equation of the first order (example of Brenolli equation).</li> <li>Solve the given differetial equation of the second order.</li> <li>Find the extremum of the given function of the two variables.</li> <li>Find the volumes of the given solids by means of double integral (or by means of triple integral).</li> <li>Find the line integral to arc lenth (or with respect to coordinates).</li> <li>Find the integral the complex function.</li> </ol>											
Work placement	Not applicable											