



## Subject card

Subject name and code	Mathematics 1, PG_00041990						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
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			English		
Semester of study	1	ECTS credits			6.0		
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 Marcin Szyszkowski				
	Teachers		dr Marcin Szyszkowski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	60.0	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	15.0		45.0	150	
Subject objectives	Students obtain competence in using methods of mathematical analysis (single variable calculus) and linear algebra, and knowledge how to solve simple problems that are found in the field of engineering.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_K01] is aware of the need for training and self-improvement in the profession of energy and the possibility of further education; can think and act in a creative and entrepreneurial manner; can define priorities for the implementation of an individual or group task	Student can use a computer programme to calculate a needed value. He knows what mathematical apparatus the programme uses to calculate the data.			[SK2] Assessment of progress of work		
	[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems	Student uses various methods to solve systems of linear equations. Student analyzes and solves problems from the area of analytic geometry. Student applies the basic properties of derivatives. Student analyzes the properties of functions with the use of its first and second derivatives. Student applies basic formulas and techniques of integration to calculate indefinite integrals. Student uses basic operations on complex numbers. Student solves the ordinary differential equations of the first and second order.			[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W01] has basic knowledge of mathematics necessary to describe the phenomena related to the processes of energy conversion and transfer; uses information technology to solve mathematical problems	Assessment of ability to use knowledge gained in the different modules.			[SW1] Assessment of factual knowledge		

Subject contents	<p><u>Elements of linear algebra.</u></p> <ul style="list-style-type: none"> <li>• Matrices and matrix operations.</li> <li>• Determinants and their properties.</li> <li>• Inverse matrix.</li> <li>• Rank of a matrix. Systems of linear equations.</li> </ul> <p><u>Analytic geometry in 3-space.</u></p> <ul style="list-style-type: none"> <li>• The vectors, dot product, cross product and triple scalar product and their applications.</li> <li>• Equations of lines and planes</li> </ul> <p><u>Elementary functions.</u></p> <ul style="list-style-type: none"> <li>• Linear function</li> <li>• Quadratic function</li> <li>• Polynomials</li> <li>• Power function</li> <li>• Exponential function</li> <li>• Logarithmic function</li> <li>• Cyclometric and trigonometric functions</li> </ul> <p><u>Sequences.</u></p> <ul style="list-style-type: none"> <li>• Definition.</li> <li>• Monotone sequences.</li> <li>• Limit of a sequence.</li> </ul> <p><u>Differential calculus of one variable functions.</u></p> <ul style="list-style-type: none"> <li>• Applications differential calculus of one variable functions.</li> </ul> <p><u>Anti-derivate.</u></p> <ul style="list-style-type: none"> <li>• The substitution method of integration and integration by parts.</li> <li>• Integration of rational, trigonometric and irrational functions.</li> </ul> <p><u>Definite integrals</u></p> <ul style="list-style-type: none"> <li>• Application</li> </ul> <p><u>Improper integrals.</u></p>											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 1263 794 1301">Subject passing criteria</th> <th data-bbox="794 1263 1141 1301">Passing threshold</th> <th data-bbox="1141 1263 1485 1301">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1301 794 1339">Tests</td> <td data-bbox="794 1301 1141 1339">50.0%</td> <td data-bbox="1141 1301 1485 1339">50.0%</td> </tr> <tr> <td data-bbox="448 1339 794 1368">Written final exam</td> <td data-bbox="794 1339 1141 1368">40.0%</td> <td data-bbox="1141 1339 1485 1368">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Tests	50.0%	50.0%	Written final exam	40.0%	50.0%
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Recommended reading	<p>Basic literature</p> <p>W.W.Sawyer, What is Calculus About?, MAA Volume 2 (1962)</p> <p>Rhonda Huettenueller, College Algebra DeMYSTiFieD, McGraw-Hill Education; 2 edition (December 27, 2013)</p> <p>George B. Thomas, Jr., Ross L. Finney., Calculus and analytic geometry, Addison-Wesley Publishing Company; 7th edition (January 1988)</p> <p>T.Jankowski, Linear algebra, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2001.</p>											

	Supplementary literature	<p>Praca zbiorowa pod redakcja B.Wikieł, Matematyka. Podstawy z elementami matematyki wyższej. Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2007.</p> <p>M.Gewert, Z.Skoczylas, Analiza matematyczna I - Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS  M.Gewert, Z.Skoczylas, Analiza matematyczna I - Przykłady i zadania, Oficyna Wydawnicza GiS</p> <p>K. Jankowska, T. Jankowski, Zbiór zadań z matematyki. Wydawnictwo Politechniki Gdańskiej, Gdansk, 2007.</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> <li>• Solve the system of linear equations</li> <li>• Find the sine of the angle between two vectors</li> <li>• Find the equation of a line perpendicular to a plane</li> <li>• Determine the monotonicity of a function and find it's extreme values</li> <li>• Evaluate a definite integral</li> </ul>	
Work placement	Not applicable	