



Subject card

Subject name and code	Mathematics I, PG_00055861						
Field of study	Power Engineering, Power Engineering, Power Engineering						
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	1	ECTS credits			10.0		
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 mgr Danuta Beger					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	60.0	0.0	0.0	0.0	105
	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	105	24.0		121.0	250	
Subject objectives	Obtaining competences by a student in using the apparatus of mathematical analysis and equations and applying the acquired knowledge to solve simple problems occurring in engineering fields						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	<p>[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</p>	<p>Student: Can name the basic properties of elementary functions. Solves the equations and inequalities containing elementary functions. Computes the limits of sequences and functions by definition. He knows the definition of a derivative and its applications, finds monotonicity intervals of functions and its extremes. Analyzes properties of a functions based on its first and second derivative. Applies the basic techniques of integration to calculate indefinite an definite integrals Examines the convergence of improper integrals. The student defines the basic the concepts of linear algebra. Defines the basic concepts of matrix calculus. Detetmines the position of the straight lines and planes in space. Uses packages mathematical to carry out calculations and visualization of mathematical concepts.</p>	<p>[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge</p>
	<p>[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems</p>	<p>The student joins the knowledge in mathematics with knowledge from others fields.</p>	<p>[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information</p>
	<p>[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</p>	<p>Student can use a computer program to calculate the needed values. He knows what mathematical methods are used in programs for technical calculations.</p>	<p>[SK2] Assessment of progress of work</p>

Subject contents	<p>Elements of linear algebra. Matrices and determinants. Operations on matrices. Inverse of a matrix. System of linear equations. Matrical equations.</p> <p>Elementary functions.</p> <p>Sequences. Definition. Monotonicity. Limit.</p> <p>Computing limits (by 'sandwich theorem', using roots, the 'e-type' limits ($\lim (1+3/(2n+2))^{(3n-2)}$))</p> <p>Calculus Finding derivative (using formulas).</p> <p>Applications of derivative (monotnicity, concavity, extrema). Text exercises (for optimalization).</p> <p>Line tangent to the graph (approximating using tangent line).</p> <p>Higher order derivatives (Taylor's polynomial).</p> <p>Indefinite integral. Integration by parts and by substitution.</p> <p>Integration of rational (partial fractions) trigonometric (methods of substitution) and irrational functions.</p> <p>Definite integral. Application of definite integral (calculating areas and some phisical applicatons (total force, center of mass)).</p> <p>Improper integrals. Calculating 'unbounded areas'</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 1314 794 1346">Subject passing criteria</th> <th data-bbox="799 1314 1141 1346">Passing threshold</th> <th data-bbox="1145 1314 1482 1346">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1352 794 1384">Tests during the semester</td> <td data-bbox="799 1352 1141 1384">50.0%</td> <td data-bbox="1145 1352 1482 1384">60.0%</td> </tr> <tr> <td data-bbox="453 1391 794 1422">Exam</td> <td data-bbox="799 1391 1141 1422">50.0%</td> <td data-bbox="1145 1391 1482 1422">35.0%</td> </tr> <tr> <td data-bbox="453 1429 794 1451">other (activity, homework)</td> <td data-bbox="799 1429 1141 1451">0.0%</td> <td data-bbox="1145 1429 1482 1451">5.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Tests during the semester	50.0%	60.0%	Exam	50.0%	35.0%	other (activity, homework)	0.0%	5.0%
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	Supplementary literature	<p>1. Fichtenholtz G. M., Rachunek różniczkowy i całkowy, t. 1-2, PWN, Warszawa 1962</p> <p>2. Jankowska K., Jankowski T., Zbiór zadań z matematyki wyższej, Wydawnictwo PG, Gdańsk 2004</p> <p>3. Krysicki W., Włodarski W., Analiza matematyczna w zadaniach, cz. 1, PWN, Warszawa 1994</p> <p>4. Krysicki W., Włodarski W., Analiza matematyczna w zadaniach, cz. 2, PWN, Warszawa 1994</p>
	eResources addresses	<p>Podstawowe https://dydmat.mimuw.edu.pl - https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24482 - Adresy na platformie eNauczanie:</p>
Example issues/ example questions/ tasks being completed	<p>1. Solve a system of equations. 2. Find the inverse matrix. 3. Solve the matrix equation eg. np. $3X - AX = B$ jeżeli $A = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$, $B = \begin{bmatrix} -1 & -3 \\ 2 & -1 \end{bmatrix}$. 4. Compute limits of sequences. 5. Check by definition that a given sequence has limit.</p> <p>6. Compute limits of functions, 7. Find asymptotes of a given function. 8. Calculate derivatives (using formulas). 9. Examine the intervals of monotonicity and extremes of a function. 10. Find tangent line to the graph, approximate value of eg. $\sqrt{14}$ 11. optimizing exercise 12. Calculate antiderivative (eg of a rational function, trigonometric function). 13. Calculate the improper integral. 14. Calculate definite integral (find area or center of mass and such).</p>	
Work placement	Not applicable	