GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics, PG_00057665						
Field of study	Green Technologies						
Date of commencement of studies	October 2025		Academic year of realisation of subject	2025/2026			
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	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						

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	10.0	125.0	240

Subject objectives

Students obtain competence in using methods of mathematical analysis (single variable calculus) and knowledge how to solve simple problems that are found in the field of engineering, in particular connected to green technologies and enviroment protection.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U03] is able to use information and communication technologies relevant to the common tasks of engineering, is able to use known methods and mathematical-physical models to describe and explain phenomena and chemical processes	Student combines knowledge of mathematics with knowledge from other fields. Student uses methods of mathematical description of phenomena in the physical and chemical processes.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[K6_K01] understands the need for learning throughout life, can inspire and organize the learning process of others. Is aware of his/her own limitations and knows when to ask the experts, can properly identify priorities for implementation, critically evaluate his knowledge	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student is able to process the acquired information, analyze and interpret it, is able to draw conclusions and reason opinions.	[SK2] Assessment of progress of work [SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice
[K6_W01] has a basic knowledge from some branches of mathematics and physics useful for formulating and solving simple problems in the field of environmental technologies and modern analytical methods	Student explains the concept of limit and continuity of functions and gives a graphic interpretation of discontinuity points. Student uses the first and second derivative of a function to analyze its properties. Student uses definite integral to solve geometrical problems. Student uses complex numbers as an extension of the solutions of selected analyzed problems. Student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in the future.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>The sets of numbers and set notation. Basic mathematics symbols.

Functions of one variable:

• definitions, graphs, properties, continuity, limits
• absolute value, equations and inequalities
• polynomials, rational functions, power functions, trigonometric and inverse trigonomertic functions, exponential and logarithmic functions
• equations and inequalities involving these functions
• applications to mathematical modeling

Infinite number sequences, limits and continuity of functions:

• boundedness and monotonicity
• limits
• continuity of functions, types of discontinuities and their interpretation

Single variable calculus:

• definition of the derivative
• Rolle's and Lagrange's theorems and their applications
• L'Hospital's Rule
• monotonicity and local/global extrema (optimization problems)
• higher order derivatives
• concavity, inflection points
• applications of single variable differential calculus to curve sketching, related rates and approximation problems
• applications of differential calculus to other fields (e.g. chemistry, physics, biology)
• definite and indefinite integral, Fundamental Theorem of Calculus
• basic integration formulas
• integration by substitution, by parts, by partial fractions
• applications of integral calculus to other fields

Complex numbers</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Midterm colloquium</td><td>0.0%</td><td>40.0%</td></tr>
<tr><td>Tests and Activity</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>Written exam</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>"Matematyka - Podstawy z elementami matematyki wyższej"pod redakcją Barbary Wikieł, Wydawnictwo PG, Gdańsk 2009
K. Jankowska, T. Jankowski, "Zbiór zadań z matematyki", cz. 1, PG Gdańsk
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</td></tr>
<tr><td>Supplementary literature</td><td>R. Leitner, "Zarys matematyki wyższej I i II", WNT
W. Krysicki, L. Włodarski, "Analiza matematyczna w zadaniach I", PWN</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Find the domian and the set of values of the function f(x) =....
2. Find the derivative of f(x)=
3. Sketch the graph of the function f(x)= . Identify any local extrema and points of inflection.
4. Find solutions of the equation ... in the set of complex numbers.
5. Use the definite integral to determine the volume of the solid formed by the rotation of the curve ... around the axis oX.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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