GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Calculus, PG_00058906		
Field of study	Informatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research 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	8.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Mathematics Center -> Vice-Rector For Education		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Anna Niewulis	
	Teachers	dr Anna Niewulis	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	0.0	0.0	60

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	60	15.0	125.0	200

Subject objectives

Students obtain competence in the range of using methods of mathematical analysis and knowledge how to solve simple problems that can be found in the field of engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	Student mentions basic properties of elementary functions; Student solves equations and inequalities with elementary functions. Student gives the definition of basic notions of differential calculus. Student uses basic notions and formulas of differential calculus. Student determines intervals of monotonicity of a given functions and its extrema. Students calculates antiderivatives using the substitution method of integration and integration by parts. Student applies definite integrals to solving geometrical problems.	[SW1] Assessment of factual knowledge
[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions. Student understands the need of lifelong learning and improving their engineering knowledge.	[SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>Course content – lecture
The set of Real numbers and its subsets. The absolute value of a Real number. Bounded sets and their upper and lower bounds. The continuity axiom of real numbers' set.
Number sequences. The limit of a sequence. Properties of convergent sequences.
Functions and their properties. Domain and co-domain, the graph of a function. Injection, surjection and bijection. Function superposition. The inverse function.
The limit of a function. Continuous functions and their properties.
The derivative of one variable function. General rules of differentiation.
Higher order derivatives. Taylor"s and Maclauren"s formula. LsHospitalss formula. Asymptotes of a graph of a function.
Extreme points, upward and downward concavity, inflection points.
Information on partial derivatives. Extreme points of two variable function.
Indefinite integral. General rules for integration. Integration of elementary functions.
The Riemann definite integral. The fundamental theorems of integration.
Geometric applications of the definite integral.</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>Midterms</td><td>50.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>- Praca zbiorowa pod redakcją Wikieł B.: Matematyka - Podstawy z elementami matematyki wyższej. PG, Gdańsk 2007;

- M. Gewert, Z. Skoczylas : Analiza matematyczna 1, Oficyna Wydawnicza GiS 2008;

- K. Jankowska, T. Jankowski : Zbiór zadań z matematyki, Wydawnictwo PG, 2010.</td></tr><tr><td>Supplementary literature</td><td>W. Żakowski, G. Decewicz - Matematyka. Analiza matematyczna. Cześć I., WNT;</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Evaluate the limit $\lim_{n\to\infty}[((2n+31)/(2n-1))^{2n}+(\sin 2n)/n]$.
2. Find all asymptotes of the function $f(x) = (3x^3+1) / (x^2-2x+1)$.
3. For the given function $f(x)=4x \arcsin(1-2x)$ find the domain and evaluate $f'(1/4)$.
4. Find intervals of monotonicity and local extremes of the following function $f(x)=xe^{1/x}$.
5. Evaluate integrals: a) $\int(2x+1)e^{-3x}dx$, b) $\int_0^3 (\sqrt{x}) /(3+x)\ dx$.
6. Find the area between two curves $y=2x$, $y=3-x^2$.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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