GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00022416		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2023/2024
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	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 Anna Niewulis	
	Teachers	mgr Justyna Woroń mgr Katarzyna Kiepiela dr Anna Niewulis	

Lesson types and methods of instruction

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	10.0	80.0	150

Subject objectives

The aim of this subject is to obtain the students competence in the range of using the basic methods of mathematical analysis and linear algebra.Furthermore, the student is able to use this knowledge to solve simple theoretical and practical problems that can be found in the field of engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W01	Student explains the concept of limit and continuity of functions. Student evaluates the limits of functions. Student defines the basic concepts of differential calculus of one variable function. Student determines intervals of monotonicity of a given function and it's extreme. Student uses the first and second derivatives of a function to analyze its properties. Student applies the basic rules and techniques of integration to calculate indefinite integrals. Student gives the graphic interpretation of definite integral. Student examines the convergence of improper integrals.	[SW1] Assessment of factual knowledge
K6_U01	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.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
K6_K02	Student is able to work individually and in a group, knows how to estimate the time needed to carry out the task, and is able to implement the work schedule.	[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills

Subject contents	Limits and continuity: Infinite sequences. Fundamental definitions of limit of sequence, convergence and divergence, limit theorems. Applications to solving equations. Differential calculus of functions with one variable and applications of differential calculus of functions with one variable: Definition of first derivative and differential. Roll s and Lagrange s theorems. Higher derivatives and differentials. Monotonicity and local extrema. Convexity, concavity and inflexion points of a function. De l Hospital s Theorem. Taylor s Theorem. Asymptotes. Applying differential calculus to studying the properties of functions with one variable. Integral calculus of one variable functions indefinite integral: Basic methods and ways of integration - integration by parts and substitution. Integration of rational functions, trigonometric and irrational. Definite integrals in Riemann s sense: Newton-Leibnitz Theorem. Integration formulas, the substitution method of integration and integration by parts for definite integrals. Applications of integral calculus to computing areas of plane figures, lengths of arcs, volumes of solids of revolution. Improper integral: Definition. Types of integrals.
Prerequisites and co-requisites	Knowledge of the subject: Propedeutics to Mathematics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	50.0%	50.0%
Midterm colloquium	50.0%	50.0%

Recommended reading

Basic literature	B. Wikieł, Matematyka. Podstawy z elementami matematyki wyższej. Wydawnictwo PG, Gdańsk 2009 W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach 1, Wydawnictwo Naukowe PWN, Warszawa 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2008 T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2006
Supplementary literature	W. Leksiński, I. Nabiałek, W. Żakowski, Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa 2006
eResources addresses	Adresy na platformie eNauczanie: WEiA - Et. - MATEMATYKA I 2023/24 (A.Niewulis) - Moodle ID: 34884 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34884

Example issues/ example questions/ tasks being completed	1. Calculate limits $\lim_n ((2n-1)/(2n+3))^{2n+2}$ $\lim_{x1}(x^3-1)/(x^4-1)$. 2. Calculate derivatives or multiple derivatives $(\ln(5x)+ \ln(x^2)+\tan(x)\cos(x))'$, $(xe^x)''$. 3. Find the largest and the smallest value of the function $f(x)=2/x -2 + x$ for x in [1,4]. Also discus its monotonicity. 4. Find the inflection points and intervals of concavity/covexity for $f(x)=-x^4 +12x^3 - 48x^2 + 60x +1$. 5. Give two examples of applications of denite integrals, draw diagrams (if needed). 6. Find the area of a region between two curves: $y=x^2$ and $x=y^2$.
Work placement	Not applicable