GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00039849		
Field of study	Mechanical Engineering, Mechanical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2020/2021
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	7.0
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 Stanisław Domachowski	
	Teachers	dr Stanisław Domachowski mgr Mirosław Bednarczyk	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	45.0	0.0	0.0	0.0	75

E-learning hours included: 0.0

Adresy na platformie eNauczanie:
WM - MiBM - MATEMATYKA I 2020/21 (S.Domachowski) - Moodle ID: 9839
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9839

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	75	7.0	93.0	175

Subject objectives

The aim of this subject is for the student to obtain the competence in the range of using 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] possesses mathematical knowledge within the range of linear algebra and mathematical analysis useful in characterising and interpreting mechanical systems, technological processes and operational properties of devices	Student defines the basic concepts of differential calculus of one variable. Student analyses the properties of functions on the basis of an examination of its first and second derivatives. Student geometrically interprets the results of an examination of a graph of a function using the concept of limit, continuity and derivatives of functions. Student applies the basic rules and techniques of integration to calculate indefinite integrals. Student lists geometrical applications of definite integrals . Student distinguishes between types of improper integrals. Student studies convergence of number series.	[SW1] Assessment of factual knowledge
[K6_U01] is able to acquire information from specialized literary sources, databases and other resources, essential for solving engineering tasks; is able to compile the obtained information pieces and to interpret them, additionally is able to form conclusions and present justified opinion		

Subject contents	Functions of one variable and their properties: The absolute value function – definition, solving equations and inequalities with absolute value, graphs of functions with absolute value. Power functions – solving power and polynomial equations and inequalities. Rational functions – solving rational equations and inequalities. Exponential function – properties and graphs, solving exponential equations and inequalities. Logarithmic functions – properties and graphs, solving logarithmic equations and inequalities. Trigonometric and cyclometric functions – properties and graphs, solving trigonometric equations and inequalities.Infinite sequences. Fundamental definitions of a limit of a sequence, convergence and divergence, limit theorems. Applications to solving equation. Differential calculus of one variable functions and its applications: Definition of a 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 Thorem. Asymptotes. Applying differential calculus to studying the properties of one variable functions. Integral calculus of one variable functions – antiderivatives: The process of finding antiderivatives and integration formulas – the substitution method of integration and integration by parts. Integration of rational, trigonometric and irrational functions. Definite integrals in Riemann's sense: Newton-Leibniz Thorem. Integration formulas, the substitution method of integration and integration by parts for definite integrals. Applications of integral calculus in computing areas of plane figures, lengths of arcs, volumes of solids of revolution. Improper integrals, applications of improper integrals. Improper integrals, applications of improper integrals.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written exam 90 minutes, tests, etest, • Active participation during classes	50.0%	100.0%

Recommended reading

Basic literature	W.Żakowski, G.Decewicz , Matematyka część 1 Analiza Matematyczna, Wydawnictwa Naukowo- Techniczne, Warszawa 1991, B.Wikieł, Matematyka, Podstawy z elementami matematyki wyższej, Wydawnictwo Politechniki Gdańskiej Gdańsk 2009, W. Krysicki, L. Włodarski „Analiza matematyczna w zadaniach" część I, PWN, Warszawa 1986 W. Stankiewicz „Zadania z matematyki dla wyższych uczelni technicznych", cz.I, PWN, Warszawa 1980,K.Jankowska, J.Jankowski, Zbiór zadn z matematyki, Wydawnictwo Politechniki Gdańskiej Gdańsk 2003. J.Dymkowska, D. Beger „Rachunek całkowy w zadaniach" Wydawnictwo Politechniki Gdańskiej Gdańsk 2015, J.Dymkowska, D. Beger „Rachunek różniczkowy w zadaniach" Wydawnictwo Politechniki Gdańskiej Gdańsk 2015,
Supplementary literature	A. Kiełbasa "Matematyka Matura 2009 Matura 2010 poziom podstawowy i rozszerzony" cz. I i II, Wyd. "2000", Warszawa 2008 Z. Cewe, J. Kobierowska, H. Nahorska, I. Stepuro, J. Witkowska "Matura z matematyki od roku 2010", Zbiór zadań maturalnych z zakresu kształcenia rozszerzonego, Wydawnictwo "Podkowa", Gdańsk 2010W. Jankowski „Matematyka. Podręcznik dla wydziałów elektrycznych i mechanicznych politechnik", PWN, Warszawa 1967 W. Leksiński, I. Nabiałek, W. Żakowski „Matematyka. Definicje, twierdzenia, przykłady, zadania"-podręczniki akademickie , Wyd. NT, Warszawa 1994, K.Dobrowolska, praca zbiorowa „Matematyka dla studiów technicznych dla pracujących" Tom I, PWN, Warszawa 1981, R. Grzymkowski „Matematyka, zadania i odpowiedzi", podręczniki akademickie, Wyd. Pracowni Komputerowej Jacka Skalmierskiego, Gliwice 2002 M. Gewert, Z. Skoczylas „Analiza matematyczna 1, Przykłady i zadania", Oficyna Wydawnicza Gis, Wrocław 2005 J. Głazunow „Matematyka wyższa, zbiór zadań z analizy funkcji jednej zmiennej", Wyd. Elbląskiej Uczelni Humanistyczno-Ekonomicznej, Elbląg 2006 M. Lassak „Zadania z analizy matematycznej", Wyd. Wspierania Procesu Edukacji, Warszawa 2003
eResources addresses	WM - MiBM - MATEMATYKA I 2020/21 (S.Domachowski) - Moodle ID: 9839 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9839

Example issues/ example questions/ tasks being completed	1.Find the domain and the set of values of the function f(x)=log2(x+2). 2.Solve the equation :|x-3|2 -4|x-3|-12=0. 3. Solve the inequality: 36x4-97x2+36<0 . 4.Solve the equation: 11·52x -4x =3·22x+25x. 5.Solve the inequality: logx2(x+6)≥1. 6.Solve the equation: |cosx|=cosx+2sinx. 7.Find the domain and the set of values of the function f(x)=log2(x+2). Determine the inverse function of f. 8. Evaluate the limit of a given sequence an=(3n2+6n)½-3½n. 9. Evaluate the indefinite integral of the given rational function f(x)=(x+3)⁄(x3 +3x2 +4x+2). 10.Find local extremes and intervals of monotonicity of the following function f(x)= (x2 +4x+1)ex.
Work placement	Not applicable