GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00039027		
Field of study	Medical and Mechanical Engineering, Mechanical and Medical 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 inż. Magdalena Łapińska	
	Teachers	mgr Katarzyna Kiepiela dr inż. Magdalena Łapińska	

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 - IMM - Matematyka 1 2020/21 (K.Kiepiela, M.Łapińska) - Moodle ID: 6211
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=6211

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	10.0	90.0	175

Subject objectives

The aim of this subject is to obtain the student's competence in the range of using the basic methods of mathematical analysis. 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_U01	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student combines knowledge of mathematics with knowledge from other fields.	[SU1] Assessment of task fulfilment
K6_W01	Student applies the basic properties of derivatives. Student analyzes the properties of functions with the use of its first and second derivatives. Student applies basic formulas and techniques of integration to calculate indefinite integrals. Student uses basic operations on complex numbers.	[SW1] Assessment of factual knowledge
K6_U05	The student is able to apply the mathematical methods for analysis to solve problems in the field of mechanical and medical engineering.	[SU2] Assessment of ability to analyse information

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.
Prerequisites and co-requisites	No recomendations
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
written exam , 90 minutes	50.0%	100.0%

Recommended reading	Basic literature	G.M. Fichtenholz, Rachunek różniczkowy i całkowy,Tom 1, Wydawnictwo Naukowe PWN, Warszawa 2002 , B.Wikieł, Matematyka, Podstawy z elementami matematyki wyższej, Wydawnictwo Politechniki Gdańskiej Gdańsk 2009, K.Jankowska, J.Jankowski, Zbiór zadań z matematyki, Wydawnictwo Politechniki Gdańskiej Gdańsk 2003, W. Krysicki, L. Włodarski „Analiza matematyczna w zadaniach" część I, PWN, Warszawa 1986.
	Supplementary literature	M.Gewert, Z.Skoczylas, Analiza matematyczna 1, Przykłady i zadania, GiS, Wrocław 2000, R.Leitner, W.Matuszewski, Z.Rojek, Zadania z matematyki wyższej, cz. 1, WNT,Warszawa 1992, W.Żakowski, Ćwiczenia problemowe dla politechnik, WNT, Warszawa, 1991.
	eResources addresses	WM - IMM - Matematyka 1 2020/21 (K.Kiepiela, M.Łapińska) - Moodle ID: 6211 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=6211

Example issues/ example questions/ tasks being completed

1. Prove that this sequence is monotonic a_n=(n^2+1)/n!.

2. Evaluate the limit of a given sequence $a_n=(3n^2+6n)^{1/2}-3^{1/2}n$.

3. Find the limit of the function f(x)= x sin(1/x) in the zero point.

4. Evaluate the indefinite integral of the given rational function $f(x)=(x+3)/(x^3+3x^2+4x+2)$.

5. Find local extremes and intervals of monotonicity of the following function $f(x)=(x^2+4x+1)e^x$.

Work placement	Not applicable