GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00038783		
Field of study	Mechatronics, Mechatronics		
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	8.0
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 Katarzyna Kiepiela	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	60.0	60.0	0.0	0.0	0.0	120

E-learning hours included: 0.0

Adresy na platformie eNauczanie:
WM - Mtr - MATEMATYKA I 2020/21 (S.Domachowski) - Moodle ID: 9840
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9840

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	120	7.0	73.0	200

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_U03	Student recognizes the importance of self-expanding knowledge.	[SU1] Assessment of task fulfilment
K6_W01	Student names basic properties of elementary functions. Student solves equations and inequalities with elementary functions. Student evaluates the limits of sequences. Student explains the concept of limit and continuity of functions. Student defines basic concepts of differential calculus of one variable. Student analyses properties of a functions on the basis of an examination of its first and second derivatives. Student geometrically interprets results of an examination of a graph of a function using the concept of limit,continuity and derivatives of functions. Student applies 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 performs calculations on complex numbers. Student defines basic notions of matrix calculus. Student calculates determinants of any degree. Student determines eigenvalues of matrices.	[SW1] Assessment of factual knowledge
K6_U01	Student combines knowledge of mathematics with knowledge from other fields.	[SU2] Assessment of ability to analyse information

Subject contents

Elementary functions, inverse function, cyclometric functions.Infinite sequences. Limit of a sequence.Sequence divergent to infinity. Limit of a function at a point, right-side limit of a function, left-side limit of a function, improper limit. continuous function at a point, continuity of an inverse function. Derivatives of the first order. Differentiation of elementary functions. Tangent to a curve at the point. Differentiation of inverse functions. Differentiation of composite functions. Rolle and Lagrange theorem. Geometrical interpretation of the sign of a derivative. Extrema of a function. Indeterminate forms and de l'Hospital's Rule. Derivatives of higher orders. Geometrical interpretation of a second derivative. Taylor formula. Indefinite integrals. Formula for the integration by parts, Formula for the integration by substitution. Integration of rational functions. Integration of irrational functions of second degree. Integration of trigonometric functions. Definite integrals. Newton- Leibniz formula. Geometric application of definite integrals, the integral as an area, the length of an arc, the volume and surface area of a solid of revolution. Improper integrals. Complex numbers. Matrices, matrix operations, matrix inversion, determinants, rank of a matrix. Eigenvalues of the matrix. System of linear equations. Cramer's theorem. Kronecker – Capelli theorem. Gauss – Jordan elimination method.

Prerequisites and co-requisites

No recomendations

Assessment methods and criteria

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

Recommended reading

Basic literature	W.Żakowski, G.Decewicz , Matematyka czesc 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" PWN, Warszawa 1986 W. Stankiewicz „Zadania z matematyki dla wyższych uczelni technicznych", PWN, Warszawa 1980, K.Jankowska, J.Jankowski, Zbiór zadań z matematyki, Wydawnictwo Politechniki Gdańskiej Gdańsk 2003, J Dymkowska, D. Beger Rachunek całkowy w zadaniach, Wydawnictwo Politechniki Gdańskiej 2015, J Dymkowska, D. Beger Rachunek różniczkowy w zadaniach, Wydawnictwo Politechniki Gdańskiej 2016.

	Supplementary literature	W. 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 , T.Jurlewicz, Z.Skoczylas „ Algebra liniowa 1 Przykłady i zadania ", Oficyna Wydawnicza Gis, Wrocław 2004 ,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 - Mtr - MATEMATYKA I 2020/21 (S.Domachowski) - Moodle ID: 9840 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9840
Example issues/ example questions/ tasks being completed	1.Find the domain and range of the function f(x)=... . Determine the inverse function of f 2.Evaluate the limit of the given sequence an=(3n2+6n)½-3½n. 3. Evaluate the limit of the given function f(x)=… at the point x0= 4. Using the rules of differentiation find the derivative of the following function f(x)=… . 5. Evaluate the indefinite integral of the given rational function f(x)=(x+3)⁄(x3 +3x2 +4x+2). 6. Sketch the graph of the function f(x)=… . Identify any local extrema and inflection points. 7. Determine indefinite integrals of the following functions using the method of integration by parts or the method of substitution…. 8. Find the volume of a solid of revolution obtained by rotating the graph of the function f(x)=… about the OXaxis. 9. Find the area of the surface obtained by rotating the arc y=f(x) about the OX-axis. 10. Discuss the existence of solutions of the given system of linear equations. 11.Find all eigenvalues of the matrix A	
Work placement	Not applicable	