GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics I, PG_00055811		
Field of study	Ocean Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2021/2022
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	9.0
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 Cezary Mrozicki	
	Teachers	mgr Justyna Woroń dr Cezary Mrozicki	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	60.0	0.0	0.0	0.0	105
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie: WIMiO - Oceanotechnika - sem. 1- Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18683 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18683 WIMiO - Oceanotechnika - sem. 1- Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18683 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18683						

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	105	20.0	100.0	225

Subject objectives	Students obtain competence in the range of using methods of mathematical analisis 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] has a basic knowledge in maths, including algebra, elements of logics, geometry, mathematical analysis, theory of probability necessary to describe and analyse the operation of machines and ocean-technology objects	The student lists the basic properties of elementary functions. The student solves equations and inequalities containing elementary functions. The student interprets geometrically the study of graphs of functions using the concept of limit and continuity of functions. The student defines the basic concepts of differential calculus of one variable. The student analyses the properties of functions on the basis of an examination of its first and second derivative. The student applies the basic rules and techniques of integration to calculate indefinite integrals. The student lists geometrical applications of definite integrals. The student distinguishes between types of improper integrals. The student solves equations using complex numbers.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
	[K6_U02] can work individually and in a team, communicate through various techniques in professional environment and also record, analyse, and present the results of work, can estimate the time needed to complete a given task	The student combines knowledge of mathematics with knowledge from other fields	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task

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, exponential, logarithmic, trigonometric and cyclometric functions properties and graphs, solving equations and inequalities.

Limits and continuity:
Infinite sequences.
Fundamental definitions of limit of sequence, convergence and divergence, limit theorems.
Applications to solving equation.

Differential calculus of functions with one variable and applications of differential calculus of functions with one variable:
Definition of first derivative and differential.
Rolls and Lagranges theorems.
Higher derivatives and differentials.
Monotonicity and local extrema.
Convexity, concavity and inflexion points of a function.
De lHospitals Theorem. Taylors Theorem.
Asymptotes.
Applying differential calculus to study the properties of one variable functions.

Integral calculus of functions with one variable indefinite integral:
Basic methods and ways of integration - integration by parts and substitution.
Integration of rational functions, trigonometric and irrational.

Definite integrals in Riemanns sense:
Newton-Leibnitz Theorem.
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 resolution.

Improper integral:
Definition. Types of integrals.

Analytic geometry in 3-space:
Basic vectors definitions and properties. Eigenvectors and Eigenvalues.
Dot product, cross product, triple scalar product - their properties and applications.
Equations for lines and planes in 3-space.
The distance from a point to a plan.
Angles between planes and lines.

Complex numbers:
Algebraic form, equality, conjugation, operations, modulus, trigonometric form, operations in polar form, roots, solving equations.

Prerequisites and co-requisites	There are no preliminary or additional requirements.
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	Pod redakcją 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 T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 2006 K. Jankowska, T. Jankowski, Zbiór zadań z matematyki, Wydawnictwo PG, Gdańsk 2008 K. Jankowska, T. Jankowski, Zadania z matematyki wyższej, Wydawnictwo PG, Gdańsk 2008 K. Jankowska, T. Jankowski, Funkcje wielu zmiennych. Całki wielokrotne. Geometria analityczna, Wydawnictwo PG, Gdańsk 2008
	Supplementary literature	W. Leksiński, I. Nabiałek, W. Żakowski, Matematyka. Definicje, twierdzenia, przykłady, zadania. WNT, Warszawa 2006
	eResources addresses	WIMiO - Oceanotechnika - sem. 1- Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18683 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18683 WIMiO - Oceanotechnika - sem. 1- Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18683 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18683
Example issues/ example questions/ tasks being completed	1. Investigate the monotonicity of the sequence (a_n). 2. Enter the properties of the function f (x) = ... 3. Calculate the derivative of the function f (x) = ... 4. Determine the indefinite integral of the function f (x) = ...	
Work placement	Not applicable	