GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics 2, PG_00041996
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering
Date of commencement of studies	October 2020
Education level	first-cycle studies
Mode of study	Full-time studies
Year of study	1
Semester of study	2
Learning profile	general academic profile

Academic year of realisation of subject	2020/2021		
Subject group	Obligatory subject group in the field of study		
Mode of delivery	at the university		
Language of instruction	Polish		
ECTS credits	7.0		
Assessment form	exam		

Conducting unit	Mathematics Center -> Vice-Rector for Education

Name and surname of lecturer (lecturers)	Subject supervisor	Nikodem Mrożek
	Teachers	mgr Danuta Beger
		mgr Katarzyna Kiepiela
		Nikodem Mrożek

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	45.0	45.0	0.0	0.0	0.0	90
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie: EN – matematyka 2 sem. 2020/21 (N.Mrożek) - Moodle ID: 13750 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13750						
	Additional information:						

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	90	9.0	76.0	175

Subject objectives	Student obtains competence in the range of using methods of mathematical analysis and linear algebra and skills to solve simple problems that can be found in the field of enginering.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_K01	Student recognizes the importance of self-expanding knowledge and takes the challenge of working with a group to solve a problem. Student understands the need of lifelong learning. Student is able to inspire others and organize their learning process.	[SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work

	Course outcome	Subject outcome	Method of verification
	K6_W01	Student performs calculations on complex numbers Student determines the real and complex roots of polynomials Student examines complex functions. Student knows the definition of the derivative of complex function. Student determines the real and imaginary parts of functions of a complex variable. Student calculates the integral of complex function. Student knows the fundamental theorems for sequences and series of complex terms. Student evaluates limits of a function of two variables. Student calculates partial derivatives of a function of two variables. Student analyses properties of a given function of two variables using differential calculus of multivariable functions. Student examines functions of several variables, using the concept of a limit, continuity and derivatives. Student determines local and global extrema of functions of several variables. Students calculates double integrals, and explains the method of substitution in the double integral. Student applies double integrals to solving geometrical problems. Student calculates triple integrals, and explains the method of substitution in the triple integral. Student uses triple integrals in geometrical problems. Student determines the Fourier series of a given function (or periodic function). Student demonstrates some techniques for solving ordinary differential equations. Student determines general and particular solutions of certain types of the first-order differential equations. Students finds the right method for solving ordinary differential equations. Student determines fundamental set of solutions of the homogeneous linear equation of order n with constant coefficients. Student determines general and particular solutions of higher orders linear differential equations with constant coefficients. Student determines general and particular solutions of systems of differential linear equations. Student determines general and particular solutions of a first-order partial linear differential equations. Student calculates line integrals. Student distinguishes types of line integrals and applies appropriate methods to calculate them. Student presents the application of line integrals. Student calculates surface integrals. Student uses mathematical packages to perform calculations and visualization of mathematical concepts.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents	**Integral calculus of functions of one variable**
	• Definite integrals and their applications. Improper integrals.
	Complex numbers
	• Algebraic, trigonometric and exponential form of a complex number
	• Operations on complex numbers
	Fourier series
	• Information of Fourier series.
	Ordinary differential equations
	• Ordinary first order differential equations
	• Higher order linear differential equations with constant coefficients.
	• Systems of linear differential equations .
	Integral calculus of functions of several variable
	• Functions of two variables. The differential calculus. The double and triple integrals.
	• Line integral of a scalar field, line integral of a vector field
	• Surface integral, flux integral
	Complex analysis
	• The basic complex functions. Derivation of a complex function. Conformal maps.
	• Taylor's and Laurent's series. Residue.
	• Integral of a complex function.
	Partial differential equations
	• Information of the partial differential equations.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	50.0%	40.0%
	Midterm colloquium	50.0%	60.0%

Recommended reading	Basic literature	Bibliography
		1. Leja F., *Rachunek różniczkowy i całkowy*, PWN Warszawa 1962
		2. Żakowski W., Leksiński W., *Matematyka cz. IV*, Wydawnictwo Naukowo-Techniczne, Warszawa, 1971
	Supplementary literature	Supplementary Bibliography
		1. Fichtenholtz, G. M., *Rachunek różniczkowy i całkowy, t. 1-2*, PWN Warszawa 1962
		2. Jankowska K., Jankowski T., *Zbiór zadań z matematyki*, Wydawnictwo PG Gdańsk 1998
		3. Krysicki W., Włodarski L., *Analiza matematyczna w zadaniach, cz. II*, PWN Warszawa 1994
		4. Pogorzelski W., *Analiza matematyczna, t. 2-3*, PWN Warszawa 1956
	eResources addresses	EN – matematyka 2 sem. 2020/21 (N.Mrożek) - Moodle ID: 13750 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13750

Example issues/ example questions/ tasks being completed	1. Solve the given differetial equation of the first order (example of Brenolli equation).
	2. Solve the given differetial equation of the second order.
	3. Find the extremum of the given function of the two variables.
	4. Find the volumes of the given solids by means of double integral (or by means of triple integral).
	5. Find the line integral to arc lenth (or with respect to coordinates).
	6. Find the integral the complex function.
Work placement	Not applicable