GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics III, PG_00043536
Field of study	Environmental Engineering

Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
			Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
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 Małgorzata Kula
		dr Cezary Mrozicki

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie: WILiŚ - Inżynieria Środowiska - sem. 3 - Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18687 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18687 WILiŚ - Inżynieria Środowiska - sem. 3 - Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18687 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18687						

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	60	10.0	60.0	130

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 knowledge in the field of mathematics, including: linear algebra, mathematical analysis and elements of mathematical statistics, probability theory, applications of mathematics, including mathematical methods and numerical methods, necessary for: 1) description and analysis of hydrological phenomena; 2) description and analysis of meteorological phenomena; 3) solving project tasks of the sanitary industry;	The student explains the substitution method in computing double integral and triple integral. The student mentions the application of double integrals and triple integrals. The student distinguishes between line integrals and applies appropriate methods to calculate them. The student distinguishes between surface integrals and applies appropriate methods to calculate them. The student presents the use of line integrals. Student presents the application of surface integrals. The student recognizes various types of differential equations and selects the appropriate methods to solve them. The student recognizes the importance of skillful use of basic mathematical apparatus in terms of study in future.	
		[K6_U01] has the ability to self-education, can obtain information from literature, databases and other sources, uses information technology, Internet resources; can integrate the obtained information, make their interpretation, as well as draw conclusions and formulate and justify opinions	The student combines knowledge of mathematics with knowledge from other fields.	

Subject contents	Double integral: Definition, properties, interpretation; expressing the double integral as an iterated integral; integration by substitution (polar coordinates); application of double integrals. Triple integral: Definition, properties, interpretation; expressing the triple integral as an iterated integral; integration by substitution (cylindrical coordinates and spherical coordinates); application of triple integrals. Line integrals: Line integrals of the first kind - definition, properties and interpretation; transforming the line integral to the corresponding definite integral. Line integrals of the second kind (along oriented curves) - definition, properties and interpretation; transforming the line integral to the corresponding definite one; Green"s theorem; path independence. Surface integrals: Integrals of the first kind - definition, properties and interpretation; transforming the surface integral to the corresponding double integral. Integrals of the second kind (surface-oriented) - definition, properties and interpretation; transforming the surface integral to the corresponding double integral; Gauss-Ostrogradski"s theorem; Stoke"s theorem. Application of surface integrals. Ordinary differential equations: First order differential equations. General and particular solution. The Cauchy initial value problem. Variables separable, linear, Bernoulli"s, exact differential equations. Second order linear differential equations with constant coefficients. Fundamental set of solution of the homogeneous linear differential equation. Non-homogeneous linear differential equations. Higher order linear differential equations with constant coefficients.

Prerequisites and co-requisites	Knowledge of the subject: Mathematics I. Knowledge of the subject: Mathematics II.

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	35.0%
	Midterm colloquium	50.0%	65.0%

Recommended reading	Basic literature	W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach 2, Wydawnictwo Naukowe PWN, Warszawa 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Definicje. Twierdzenia. Wzory. Oficyna Wydawnicza GIS, Wrocław 2008 M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Przykłady i zadania. Oficyna Wydawnicza GIS, Wrocław 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	WILiŚ - Inżynieria Środowiska - sem. 3 - Matematyka 2021/2022 (C. Mrozicki) - Moodle ID: 18687 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18687
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Example issues/ example questions/ tasks being completed	1. Calculate the double integral. 2. Calculate the integral of a triple. 3. Calculate the integral curved. 4. Solve the differential equation.
Work placement	Not applicable