GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics II, PG_00055046		
Field of study	Management and Production Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
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	2	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	dr inż. Magdalena Łapińska	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	15.0	0.0	75
	E-learning hours included: 0.0						

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	14.0	86.0	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_U05] is able to prepare and present a presentation on the results of analysis of the tasks in the area of production engineering, is able to plan and carry out experiments, measurements, computer simulations and analyses and interpret the results and draw conclusions is able to use analytical methods, simulation and experiments for formulating and solving problems associated with production engineering	Student combines knowledge of mathematics with knowledge from other fields. Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools
	[K6_W01] has knowledge of linear algebra, differential equations, analysis and mathematical statistics useful for modelling and interpreting mechanical systems, manufacturing processes and operating properties of devices, has structured knowledge of physics including classical mechanics, optics, electricity and magnetism, demonstrates knowledge of elements of quantum physics	The student has knowledge of mathematical analysis and differential equations. The learned concepts can be used to solve problems in the field of modeling and interpreting mechanical systems, device manufacturing processes.	[SW1] Assessment of factual knowledge
	[K6_K03] is aware of the social role of a graduate of a technical university, understands the importance of non-technical aspects and effects of engineering activities including their impact on the environment and responsibility for decisions, sees the need to formulate and provide the public with information and opinions on the achievements of technology, correctly identifies and resolves dilemmas associated with thejob of an engineer	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

Subject contents

- Differential calculus of functions of one variable: definition of derivative and differential, Rolle and Lagrange theorem, higher order derivatives and differentials. Applications - monotonicity and extremes of functions, concavity, convexity, inflection points, theorem. de l'Hospital, asymptotes of a function.
- Integral calculus of functions of one variable: indefinite integral, determined with applications, integration by parts and by substitution, integration of rational, trigonometric and irrational functions.
- Limit and continuity of functions of several variables Differential calculus of multivariable functions: partial derivatives, total differential, extremes of multivariable functions, implicit functions. Integral calculus of multivariable functions: double integral along a rectangle and normal area, replacement of variables in a double integral, applications of double integrals. Triple integral over a cuboid and normal area, change of variables in the triple integral, application of triple integrals.
- First order differential equations: separated, homogeneous, linear, Bernoulli, complete equations. The integrating factor. Numerical methods of solving differential equations

Prerequisites and co-requisites

Successful completion of the course in Mathematics 1.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	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	• Gewert M., Skoczylas Z., "Analiza matematyczna 2. Definicje, twierdzenia, wzory", Oficyna Wydawnicza GiS • Jurlewicz T., Skoczylas Z., "Algebra i geometria analityczna. Definicje, twierdzenia, wzory", Oficyna Wydawnicza GiS • Kajetanowicz P., Wierzejewski J., ,,Algebra z geometrią analityczną", Wydawnictwo Naukowe PWN • W.Żakowski, W.Kołodziej , Matematyka część 2 Analiza Matematyczna, Wydawnictwa Naukowo- Techniczne, Warszawa 12003 • 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, T.Jankowski, Funkcje wielu zmiennych, Całki wielokrotne, Geometria analityczna
	eResources addresses	Adresy na platformie eNauczanie: WIMIO - ZiIP - Matematyka 2- wykład i ćwiczenia 2022/23 (M.Łapińska) - Moodle ID: 27773 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=27773
Example issues/ example questions/ tasks being completed	1. Calculation of double integrals 2. Calculation of triple integrals 3. Solving matrix equations. 4. Searching for the determinant value.	
Work placement	Not applicable	

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