GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mathematics II, PG_00060451		
Field of study	Mechanical and Naval Engineering		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	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 Anita Dąbrowicz-Tlałka	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	18.0	27.0	0.0	9.0	0.0	54

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	54	15.0	131.0	200

Subject objectives

he aim of this subject is to obtain the students competence in the range of using the 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_W01] possesses mathematical knowledge within the range of linear algebra and mathematical analysis useful in characterising and interpreting mechanical systems, technological processes and operational properties of devices	The student determines the eigenvectors and eigenvalues of the matrix.. The student analyzes the properties of an implicit function and a function of two variables based on the differential calculus of functions of several variables. The student determines the gradient, divergence and rotation as well as the field potential. The student uses double and triple integrals in geometric applications. The student demonstrates selected techniques for solving ordinary differential equations (first-order linear differential equations, Bernoulli equations, n-order linear differential equations with constant coefficients).	[SW1] Assessment of factual knowledge
[K6_U01] is able to acquire information from specialized literary sources, databases and other resources, essential for solving engineering tasks; is able to compile the obtained information pieces and to interpret them, additionally is able to form conclusions and present justified opinion	Student uses gained knowledge in basic mathematics to analyse results of experiments .	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task

Subject contents	• **Vectors and eigenvalues.** • **Functions of two variables:** - Domain and partial derivatives. - Second degree surfaces. - Differential of a function of two variables. - Local extremes. - Gradient, divergence, rotation. • **Implicit function.** • **Double integrals:** - Rules for determining the limits of integration normal and regular region in R2. - Change of variables in double integral, Jacobian. - Polar coordinates. - Applications of double integral. • **Triple integrals:** - Rules for determining the limits of integration normal and regular region in R3. - Change of variables in triple integral, Jacobian. - Cylindrical and spherical coordinates. - Rules for determining the limits of integration normal and regular areas. - Applications of the triple integral. • **Differential equations:** - Differential equations with separated variables. - Linear differential equations (constant variation method, prediction method). - Bernoulli equation. - Linear differential equations of the second order with constant coefficients (method of changing constants, prediction method).
Prerequisites and co-requisites	

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Class activity and online assignments</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>Tests</td><td>0.0%</td><td>40.0%</td></tr>
<tr><td>Written exam</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>- M. Gewert, Z. Skoczylas : Analiza matematyczna 2, Oficyna Wydawnicza GiS, Wrocław;

- K. Jankowska, T. Jankowski : Zadania z matematyki wyższej, Wydawnictwo PG, 2010;

- K. Jankowska, T. Jankowski : Funkcje wielu zmiennych - Całki wielokrotne - Geometria analityczna, Wydawnictwo PG, 2010;

- E. Mieloszyk : Macierze, wyznaczniki i układy równań, Wydawnictwo PG, 2000;</td></tr>
<tr><td>Supplementary literature</td><td>G.M. Fichtenholz : Rachunek różniczkowy i całkowy, t. 2, Wydawnictwo Naukowe PWN

W. Krysicki, L. Włodarski : Analiza matematyczna w zadaniach II, Wydawnictwo Naukowe PWN

W. Stankiewicz : Zadania z matematyki dla wyższych uczelni technicznych, Wydawnictwo Naukowe PWN</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Find local extrema of the given function f (x, y) = ...
2. Calculate the double integral ... over the indicated area D.
3. Using cylindrical or spherical coordinates, calculate the given triple integral ...
4. Determine the potential of the vector field ...
5. Using the prediction method, solve the first and second order linear differential equations.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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