GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00052287		
Field of study	Mathematics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Zakład Układów Dynamicznych -> Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Sergey Kryzhevich	
	Teachers	dr hab. Sergey Kryzhevich	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	30.0	60

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	60	5.0	35.0	100

Subject objectives

clear 119 / 5 000 Wprowadzenie do podstawowych narzędzi i metod związanych z teorią układów nieliniowych równań różniczkowych zwyczajnych.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] Is familiar with the methods of solving classical ordinary and partial differential equations, is able to apply them in typical practical problems.	Student can solve autonomous systems of linear differential equations and some integrable nonlinear systems.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K7_U09] Is able, at an advanced level and covering modern mathematics, to apply and present in speech and in writing the methods of at least one selected branch of mathematics: mathematical and functional analysis, theory of differential equations and dynamical systems, algebra and number theory, geometry and topology, calculus probability and statistics, discrete mathematics and graph theory, logic and set theory.	Student can apply some basic methods of Linear Algebra, Mathematical Analysis, Functional Analysis, and other mathematical disciplines to solve nonlinear systems of ordinary differential equations or to make their qualitative analysis.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K7_W04] Has enhanced knowledge of a selected branch of mathematics, theoretical or applied.	Student knows and can apply basic facts of stability theory and some numerical methods of solving nonlinear systems.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents	Linear systems of differential equations. The matrix method. Basic methods of solving nonlinear systems. First integrals, Lyapunov functions, stability. Classification of fixed points.
Prerequisites and co-requisites	Assessment in the following subjects: algebra, analysis, differential equations

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	51.0%	50.0%
	Exam	51.0%	50.0%
Recommended reading	Basic literature	1. Arrowsmith, D.K. and Place, C.M. (1982) Ordinary Differential Equation. Chapman and Hall, New York. 2. Coddington, Earl A.; Levinson, Norman (1955). Theory of Ordinary Differential Equations. New York: McGraw-Hill.	
	Supplementary literature	1. W. Hurewicz, Lectures on Ordinary Differential Equations, Dover Publications, ISBN 0-486-49510-8 2. Hartman, Philip (2002) [1964], Ordinary differential equations, Classics in Applied Mathematics, vol. 38, Philadelphia	
	eResources addresses	Adresy na platformie eNauczanie: Układy Nieliniowe [PG_00052287] - Moodle ID: 37807 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37807	
Example issues/ example questions/ tasks being completed	During the first classes, the student receives a topic to independently develop and present the project within the set deadline. The theoretical knowledge acquired during lectures and seminars is tested in the exam. State and prove the properties of the matrix exponent. State and prove the theorem of stability by firs approximation. Determine the type of fixed points for a nonlinear autonomous system of second order.		
Work placement	Not applicable		