



Subject card

Subject name and code	Qualitative theory of ordinary differential equations, PG_00071152						
Field of study	Technical Physics, Mathematics, Nanotechnology, Nanotechnology						
Date of commencement of studies	October 2024	Academic year of realisation of subject				2025/2026	
Education level	second-cycle studies	Subject group				Optional subject group	
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	2	Language of instruction				Polish	
Semester of study	4	ECTS credits				1.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Institute of Applied Mathematics -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Klaudiusz Czudek				
	Teachers		dr Klaudiusz Czudek				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=5437 Moodle ID: 5437 Jakościowa teoria równań różniczkowych zwyczajnych https://enauczanie.pg.edu.pl/2025/course/view.php?id=5437						
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	15	2.0	8.0	25		
Subject objectives	We are going to introduce basic methods of investigating dynamical systems and their applications						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W101] is able to make an in-depth identification of key objects and phenomena related to the field of study, as well as theories that describe them and applicable analytical and design methods	A student understands the importance of periodic orbits and equilibrium points and the importance of their stability in the study of physical phenomena.			[SW1] Assessment of factual knowledge		
	[K7_U101] is able to formulate complex research problems and adopts appropriate methods, obtaining innovative solutions, cooperating with other people, both as a leader and a team member	A student understands the importance of dynamics of circle rotation in the study of gravitational forces and is able to propose solutions to specific problems.			[SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_K101] acknowledges the importance of knowledge related to the field of study in solving cognitive and practical problems, critically assessing the information obtained	A student understands the role of KAM theory to the study of the stability of Lagrange points and the solar system.			[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	Course content – lecture 1. Basic methods of Qualitative theory of ODE's. 2. Equations related to gravitational forces. 3. Billiards. 4. The role of topology in the study of ODE's 5. Bifurcations.		
Prerequisites and co-requisites	Differential equations		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	50.0%	100.0%
Recommended reading	Basic literature	Murillo, Żołądek "Qualitative theory of ODE's"	
	Supplementary literature	Arnold "Mathematical methods in classical mechanics" Arnold "Theory of ODE's"	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Find the correct phase portrait of a given equation; specify the type of an equilibrium point		
Practical activities within the subject	Not applicable		

Document generated electronically. Does not require a seal or signature.