



Subject card

Subject name and code	Epidemiological analyzes and medical prognosis, PG_00044132						
Field of study	Mathematics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	first-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	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Faculty Of Applied Physics And Mathematics -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Agnieszka Bartłomiejczyk				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	15.0	60
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie:						
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	The aim of the course is to familiarize students with the construction and analysis of mathematical models describing selected medical phenomena, with particular emphasis on models related to epidemiological processes.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K04		Student are able to construct and discuss simple mathematical models.		[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice		
	K6_U12		Students are able to interpret statistical data on the population, e.g. histograms, graphs.		[SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment		
	K6_K02		Students understand the need to popularize the application of differential equations in fields such as biology and medicine.		[SK4] Assessment of communication skills, including language correctness [SK1] Assessment of group work skills		
Subject contents	1. Dynamical systems as a basic modeling tool (simple population models) 2. Elements of asymptotic analysis of solving differential equations 3. Epidemiological models and forecasts (simple epidemiological models of an infectious disease models taking into account demographic processes, analysis of the impact of vaccinations on the course of the epidemic) 4. Other mathematical models, e.g. modeling immune response, modeling tumor growth 5. Working with data and visualization in the Python environment						
Prerequisites and co-requisites	Differential equations I						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	test		50.0%		50.0%		
	presentation		50.0%		20.0%		
	projects		50.0%		30.0%		

Recommended reading	Basic literature	1. F. Brauer, P. van den Driessche, J. Wu, Mathematical epidemiology, Springer, 2008. 2. U. Foryś, Matematyka w biologii, WNT, Warszawa 2005. 3. J.D. Murray, Wprowadzenie do biomatematyki, PWN, Warszawa 2006.
	Supplementary literature	1. A. Palczewski, Równania różniczkowe zwyczajne, WNT, Warszawa 2004. 2. R. Rudnicki, Modele i metody biologii matematycznej, Instytut Matematyczny PAN, 2014. 3. M. Gągolewski, M. Bartoszek, A. Cena: Przetwarzanie i analiza danych w języku Python, PWN, 2016
	eResources addresses	
Example issues/ example questions/ tasks being completed	Discuss the construction of the SIR model. Investigate the stability of the steady states. Perform a mathematical analysis of the SIR model with demographics.	
Work placement	Not applicable	

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