GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Epidemiological analyzes and medical prognosis, PG_00044132		
Field of study	Mathematics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
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		
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. Bartoszuk, 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	