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 2021	Academic year of realisation of subject	2023/2024
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	Zakład Równań Różniczkowych i Zastosowań Matematyki -> Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics		

Name and surname of lecturer (lecturers)	Subject supervisor	dr Agnieszka Bartłomiejczyk
	Teachers	mgr inż. Katarzyna Tessmer dr hab. Piotr Bartłomiejczyk dr Agnieszka Bartłomiejczyk

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						

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_U12	Students are able to interpret statistical data on the population, e.g. histograms, graphs.	[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task
	K6_K04	Student are able to construct and discuss simple mathematical models.	[SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness
	K6_K02	Students understand the need to popularize the application of differential equations in fields such as biology and medicine.	[SK1] Assessment of group work skills [SK4] Assessment of communication skills, including language correctness

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 (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, eg modeling immune response, modeling tumor growth 5. Working with data and visualization in a selected environment, e.g. Python, Matlab

Prerequisites and co-requisites	Differential equations

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	theory test	50.0%	50.0%
	presentation	40.0%	20.0%
	numerical simulations	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	Adresy na platformie eNauczanie: Analizy epidemiologiczne i prognozy medyczne seminarium 2023/2024 - Moodle ID: 36741 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36741 Analizy epidemiologiczne i prognozy medyczne seminarium 2023/2024 - Moodle ID: 36741 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36741 Analizy epidemiologiczne i prognozy medyczne seminarium 2023/2024 - Moodle ID: 36741 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36741

Example issues/ example questions/ tasks being completed	1. Discuss the construction of the SIR model. 2. Write a programme to predict the development of a coronavirus pandemic in Poland or in a selected province for a given week. 3. Prepare a presentation on modelling population dynamics with acquired parasite resistance.

Work placement	Not applicable