



Subject card

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|---|---|--|--|-------------------------------------|--|------------|-----|
| 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% | | |

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| 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 | |