## Subject card

| Subject name and code | , PG_00059946 | | | | | |
|---|---|---|---|---|---|---|
| Field of study | Environmental Engineering | | | | | |
| Date of commencement of studies | February 2025 | | Academic year of realisation of subject | | 2024/2025 | |
| Education level | second-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 | 1 | | Language of instruction | | Polish | |
| Semester of study | 1 | | ECTS credits | | 2.0 | |
| Learning profile | general academic profile | | Assessment form | | assessment | |
| Conducting unit | Department of Geotechnical and Hydraulic Engineering -> Faculty of Civil and Environmental Engineering | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Michał Szydłowski | | | |
| | Teachers | | | | | |

| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 15.0 | 0.0 | 15.0 | 0.0 | 0.0 | 30 |
| | 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 | 30 | 5.0 | 20.0 | 55 |

| Subject objectives | Getting to know the basic mathematical models used in environmental engineering for the analysis of surface and groundwater resources, and introduction to numerical methods of solving them. |
|---|---|

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|---|---|---|---|
| | K7_U06 | The student applies basic mathematical models to solve environmental engineering problems. | [SU4] Assessment of ability to use methods and tools |
| | K7_W01 | The student formulates the problem of solving differential equations with ordinary and partial derivatives describing selected issues in the field of environmental engineering, such as water flow with a free surface, water flow in a system of tanks, transport of pollutants in channels, water flow in a porous medium. | [SW1] Assessment of factual knowledge |
| | [K7_W12] has knowledge of contemporary and useful principles on data acquisition, filtration, processing and analysis | The student has knowledge of publicly available databases about the environment and computing packages. | [SW1] Assessment of factual knowledge |
| | [K7_U05] can rely on scientific sources for modern methods and technologies, and propose trends in the development of methods and rules for acquiring, filtering, processing and analyzing data | The student uses available scientific sources to describe the solution to an engineering problem using mathematical modeling. | [SU2] Assessment of ability to analyse information |

| Subject contents | Basic mathematical models of surface and underground water flow. Solving ordinary differential equations: initial and boundary problems. Methods of numerical solution of the initial problem. Solution of the steady-state non-uniform flow equation in an open channel. Solving differential equations with partial derivatives. Solving groundwater flow equations. |
|---|---|

| Prerequisites and co-requisites | Knowledge of basic computer operation and operating system. Knowledge of subjects: Mathematics, Fundamentals of computer science and Hydraulics. |
|---|---|

| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|---|
| | practical exercises | 60.0% | 100.0% |

| Recommended reading | Basic literature | 1. Szymkiewicz R.: Mathematical modeling of flows in rivers and canals, Wyd. Scientific PWN Warsaw 2000.<br>2. Szymkiewicz R.: Numerical methods in water engineering. ed. Gdańsk University of Technology, 2007.<br>3. Szymkiewicz R.: Numerical modeling in open channel hydraulics. Springer, 2010. |
|---|---|---|
| | Supplementary literature | 1. Fletcher C.A.J.: Computational techniques for fluid mechanics. Springer,1991 |
| | eResources addresses | Adresy na platformie eNauczanie: |
| Example issues/ example questions/ tasks being completed | Open channel flow analysis. Ground flow simulation. Urban flood. | |
| Work placement | Not applicable | |

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