



## Subject card

|   |   |  |   |                                     |  |            |     |
|---|---|--|---|-------------------------------------|--|------------|-----|
| Subject name and code                       | Protection Against Floods , PG_00048023   |  |   |                                     |  |            |     |
| Field of study                              | Environmental Engineering   |  |   |                                     |  |            |     |
| Date of commencement of studies             | October 2022  |  | Academic year of realisation of subject |                                     | 2022/2023  |            |     |
| Education level                             | second-cycle studies  |  | Subject group                           |                                     | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |            |     |
| Mode of study                               | Part-time studies   |  | Mode of delivery                        |                                     | at the university  |            |     |
| Year of study                               | 1   |  | Language of instruction                 |                                     | Polish   |            |     |
| Semester of study                           | 2   |  | ECTS credits                            |                                     | 4.0  |            |     |
| Learning profile                            | general academic profile  |  | Assessment form                         |                                     | assessment   |            |     |
| Conducting unit                             | Department of Hydraulic Engineering -> Faculty of Civil and Environmental Engineering                     |  |   |                                     |  |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  |  | dr hab. inż. Dariusz Gašiorowski        |                                     |  |            |     |
|   | Teachers  |  |   |                                     |  |            |     |
| Lesson types and methods of instruction     | Lesson type   | Lecture  | Tutorial                                | Laboratory                          | Project  | Seminar    | SUM |
|   | Number of study hours   | 15.0   | 15.0                                    | 0.0                                 | 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   |   | 4.0                                 |  | 70.0       | 104 |
| Subject objectives                          | Mastering the methods for forecasting flood phenomena and rules for limiting floods and its consequences. |  |   |                                     |  |            |     |

|                                 |   |   |   |
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| Learning outcomes               | Course outcome  | Subject outcome   | Method of verification  |
|                                 | [K7_W09] has deepened, ordered, theoretically developed knowledge related to: hydrology, drainage, water management, flood protection or resource and water intake or water and sewage management   | Student knows the basic hydrological processes causing floods.  | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge |
|                                 | [K7_W01] has broadened and deepened knowledge of selected mathematics sections, including statistics components and optimization methods, and mathematical and numerical methods necessary for: 1) modeling and analysis of water supply systems and their physical phenomena; 2) description and analysis of flood protection systems; 3) functional analysis, optimization and reliability of sanitary engineering systems; 4) description of phenomena related to the flow of water in the environment, in pipes and open channels, filtration, migration of pollutants  | Student knows the basics of mathematical modeling of the transformation of the flood wave through the reservoir and the propagation of the flood wave in the flood plain. | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge |
|                                 | [K7_U14] can technically and economically analyze and evaluate the solutions and functioning of facilities and systems in the sanitary engineering or flood protection, water intakes and water infrastructure or water and wastewater treatment plants; can assess the suitability and potential of using new achievements in materials, fixtures, devices and methodologies for designing and modeling the analyzed technical infrastructure and industrial objects, including innovative solutions   | Student knows the principles of forecasting flood phenomena and methods for limiting floods and its effects.  | [SU2] Assessment of ability to analyse information<br>[SU1] Assessment of task fulfilment                     |
|                                 | [K7_W06] has deepened, structured and theoretical knowledge related to hydraulics used in the construction, operation, operation of networks and plumbing, sewage, heating, ventilation or water treatment plants and wastewater treatment facilities   | Student knows the methods of calculating the capacity of compound channel.  | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge |
| Subject contents                | <p>LECTURE: Floods - genesis and classification. Flood protection - basic concepts, tasks. Propagation of flood waves in river channels. Elements of hydrological forecasting. Technical means of flood protection. The role of retention reservoirs in limiting the effects of floods. The impact of river basin management on the flood potential of the river. Non-technical flood protection measures. Determination of flood hazard zones. Rules for the development of floodplains. Methods of limiting the effects of floods. Legal aspects of flood protection. Organization of flood protection services in Poland. Flood risk assessment. Principles of preparation of the flood hazard and the flood risk maps.</p> <p>TUTORIALS: Basics of computational simulation of flood wave propagation in open channels. Application of simplified flood wave transformation equations: retention equation, cascade equation of linear reservoirs, Muskingum equation. Controlling the operation of the retention reservoir during the passage of a surge wave. Determination of the impact of polders on the reduction of flood waves. Analysis of the influence of the embankment spacing on the flood wave propagation. Analysis of the reservoirs operation. Determination of the value of potential flood losses.</p> |   |   |
| Prerequisites and co-requisites | Knowledge in hydraulics, hydrology, mathematics, basics of computer science.  |   |   |
| Assessment methods and criteria | Subject passing criteria  | Passing threshold   | Percentage of the final grade   |
|                                 | Tutorial test   | 60.0%   | 25.0%   |
|                                 | Lecture test  | 60.0%   | 50.0%   |
|                                 | Homework  | 50.0%   | 25.0%   |
| Recommended reading             | Basic literature  | [1] Chadwick A. and Morfet J.: Hydraulics in Civil and Environmental Engineering. E&FN Spon, London and New York 1999.  |   |

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|  | Supplementary literature | [1] Szymkiewicz R., Suiliang Huang, Szymkiewicz A.: Introduction to Computational Engineering Hydraulics, Gdańsk University of Technology, Gdańsk 2016   |
|  | eResources addresses     | Adresy na platformie eNauczenie:   |
| Example issues/<br>example questions/<br>tasks being completed |                          | <ol style="list-style-type: none"> <li>1. Determination of the impact of development in floodplain on the capacity of the river</li> <li>2. Analysis of the flood wave transformation during passage through the reservoir.</li> <li>3. Determination of the value of potential flood losses.</li> </ol> |
| Work placement   |                          | Not applicable   |