



## Subject card

|                                             |                                                                                                                                                                                                             |                                                          |                                         |                                     |                   |            |     |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|-------------------|------------|-----|
| Subject name and code                       | , PG_00069424                                                                                                                                                                                               |                                                          |                                         |                                     |                   |            |     |
| Field of study                              | Wzmacnianie gruntu                                                                                                                                                                                          |                                                          |                                         |                                     |                   |            |     |
| Date of commencement of studies             | October 2022                                                                                                                                                                                                |                                                          | Academic year of realisation of subject |                                     | 2025/2026         |            |     |
| Education level                             | first-cycle studies                                                                                                                                                                                         |                                                          | Subject group                           |                                     |                   |            |     |
| Mode of study                               | Part-time studies                                                                                                                                                                                           |                                                          | Mode of delivery                        |                                     | at the university |            |     |
| Year of study                               | 4                                                                                                                                                                                                           |                                                          | Language of instruction                 |                                     | Polish            |            |     |
| Semester of study                           | 7                                                                                                                                                                                                           |                                                          | ECTS credits                            |                                     | 2.0               |            |     |
| Learning profile                            | general academic profile                                                                                                                                                                                    |                                                          | Assessment form                         |                                     | exam              |            |     |
| Conducting unit                             | Department of Geotechnical and Hydraulic Engineering -> Faculty of Civil and Environmental Engineering -> Wydziały Politechniki Gdańskiej                                                                   |                                                          |                                         |                                     |                   |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                          |                                                          | dr inż. Angelika Duszyńska              |                                     |                   |            |     |
|                                             | Teachers                                                                                                                                                                                                    |                                                          |                                         |                                     |                   |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                 | Lecture                                                  | Tutorial                                | Laboratory                          | Project           | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                       | 10.0                                                     | 0.0                                     | 0.0                                 | 10.0              | 0.0        | 20  |
|                                             | E-learning hours included: 0.0                                                                                                                                                                              |                                                          |                                         |                                     |                   |            |     |
|                                             | eNauczanie source addresses:                                                                                                                                                                                |                                                          |                                         |                                     |                   |            |     |
|                                             | Moodle ID: 2206 Wzmacnianie gruntu B inż. nst DGiH sem. 7 r. 2025/2026<br><a href="https://enauczanie.pg.edu.pl/2025/course/view.php?id=2206">https://enauczanie.pg.edu.pl/2025/course/view.php?id=2206</a> |                                                          |                                         |                                     |                   |            |     |
| 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                                                                                                                                                                                       | 20                                                       |                                         | 3.0                                 |                   | 27.0       | 50  |
| Subject objectives                          | The aim of the course is to familiarize students with current techniques for strengthening of soils and the foundation of buildings in difficult geotechnical conditions.                                   |                                                          |                                         |                                     |                   |            |     |

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|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Learning outcomes                                              | Course outcome                                                                                                                                                                                                                                                          | Subject outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Method of verification                                                      |
|                                                                | [K6_W07] Understand the investment's impact on the environment and the interrelationships and dependencies between the building structure and the natural environment                                                                                                   | The student understands the impact of construction investments on the surroundings and the water–soil environment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | [SW1] Ocena wiedzy faktograficznej                                          |
|                                                                | [K6_W06] Demonstrates practical knowledge and understanding of materials, devices and tools, processes and technologies in the field of civil engineering (and their limitations).                                                                                      | The student demonstrates knowledge of soil improvement techniques.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | [SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym           |
|                                                                | [K6_U07] Design and build engineering structures in a sustainable manner, with care for the natural environment and a minimum carbon footprint                                                                                                                          | The student designs earth structures in a sustainable manner.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu |
|                                                                | [K6_K01] Is aware of the key aspects of professional, ethical and social responsibility related to management, business operation, decision making and opinion formulation in civil engineering.                                                                        | The student knows the principles of earthworks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | [SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce   |
|                                                                | [K6_U06] Conduct engineering activities in civil engineering subject area, using and applying practical knowledge and understanding of materials, equipment and tools, processes and technologies.                                                                      | The student is able to select soil reinforcement technologies for geotechnical situations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu |
| Subject contents                                               | Course content – lecture<br>Foundation of buildings on soils with insufficient bearing capacity and excessive flexibility possibilities, technologies, solutions.<br>Course content – project<br>Design of a retaining structure of soil reinforced with geosynthetics. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                             |
| Prerequisites and co-requisites                                | knowledge of soil mechanics and foundations                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                             |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Percentage of the final grade                                               |
|                                                                | project                                                                                                                                                                                                                                                                 | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 40.0%                                                                       |
|                                                                | exam                                                                                                                                                                                                                                                                    | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 60.0%                                                                       |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"><li>• PN-EN 1997-1 Eurokod 7: Projektowanie geotechniczne. Część 1: Zasady ogólne.</li><li>• EN 1997-3:2025 Eurocode 7. Geotechnical design. Part 3: Geotechnical structures</li><li>• BS 8006:2010. Code of practice for strengthened/ reinforced soils and other fills.</li><li>• EBGeo: Recommendations for Design and Analysis of Earth Structures using Geosynthetic Reinforcements, Ernst W. &amp; Sohn Verlag. 2011</li><li>• Duszyńska A.: Wymiarowanie konstrukcji oporowych z gruntu zbrojonego geosyntetykami. Materiały dydaktyczne dla studentów. Politechnika Gdańska. 2025</li></ul>     |                                                                             |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                | <ul style="list-style-type: none"><li>• AGH, PG, PIG-PIB, IBDIM: Wytyczne doboru rozwiązań geotechnicznych wzmocnienia podłoża gruntowego w budownictwie drogowym. RID II. 2025</li><li>• Bzówka J. i inni: Geotechnika komunikacyjna. Wydawnictwo Politechniki Śląskiej. 2015.</li><li>• ISO/TR 18228 Design using geosynthetics (2020-2025)</li><li>• Duszyńska A.: Zbrojenie geosyntetyczne podstawy nasypu. Seria: Inżynieria Transportowa. PG, WILiŚ, Gdańsk 2016</li><li>• Urbański (red.): Podstawy projektowania geotechnicznego. Wprowadzenie do nowych technologii w geotechnice, Wyd. Politechniki Krakowskiej, 2016</li></ul> |                                                                             |
|                                                                | eResources addresses                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                             |
| Example issues/<br>example questions/<br>tasks being completed | Reinforcement of soil - embankment, slopes. Geosynthetics in earth structures. Techniques for ground improvement.                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                             |
| Practical activities within the subject                        | Not applicable                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                             |

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