



## Subject card

|                                             |                                                                                                                                                                                                                         |                                                          |                                                                                                                                                                                                      |                                     |                                                                                                                                                                                                                                                                                         |            |     |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | , PG_00062839                                                                                                                                                                                                           |                                                          |                                                                                                                                                                                                      |                                     |                                                                                                                                                                                                                                                                                         |            |     |
| Field of study                              | Civil Engineering                                                                                                                                                                                                       |                                                          |                                                                                                                                                                                                      |                                     |                                                                                                                                                                                                                                                                                         |            |     |
| Date of commencement of studies             | October 2024                                                                                                                                                                                                            |                                                          | Academic year of realisation of subject                                                                                                                                                              |                                     | 2025/2026                                                                                                                                                                                                                                                                               |            |     |
| Education level                             | first-cycle studies                                                                                                                                                                                                     |                                                          | Subject group                                                                                                                                                                                        |                                     |                                                                                                                                                                                                                                                                                         |            |     |
| Mode of study                               | Full-time studies                                                                                                                                                                                                       |                                                          | Mode of delivery                                                                                                                                                                                     |                                     | at the university                                                                                                                                                                                                                                                                       |            |     |
| Year of study                               | 2                                                                                                                                                                                                                       |                                                          | Language of instruction                                                                                                                                                                              |                                     | Polish                                                                                                                                                                                                                                                                                  |            |     |
| Semester of study                           | 4                                                                                                                                                                                                                       |                                                          | ECTS credits                                                                                                                                                                                         |                                     | 3.0                                                                                                                                                                                                                                                                                     |            |     |
| Learning profile                            | general academic profile                                                                                                                                                                                                |                                                          | Assessment form                                                                                                                                                                                      |                                     | assessment                                                                                                                                                                                                                                                                              |            |     |
| Conducting unit                             | Department of Geotechnical and Hydraulic Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology                                                                  |                                                          |                                                                                                                                                                                                      |                                     |                                                                                                                                                                                                                                                                                         |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                      |                                                          | dr inż. Paweł Więclawski                                                                                                                                                                             |                                     |                                                                                                                                                                                                                                                                                         |            |     |
|                                             | Teachers                                                                                                                                                                                                                |                                                          |                                                                                                                                                                                                      |                                     |                                                                                                                                                                                                                                                                                         |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                             | Lecture                                                  | Tutorial                                                                                                                                                                                             | Laboratory                          | Project                                                                                                                                                                                                                                                                                 | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                   | 0.0                                                      | 0.0                                                                                                                                                                                                  | 0.0                                 | 30.0                                                                                                                                                                                                                                                                                    | 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                                                       |                                                                                                                                                                                                      | 0.0                                 |                                                                                                                                                                                                                                                                                         | 0.0        | 30  |
| Subject objectives                          | Courses in the module 'Hands on Engineering'. The main idea is to work as a team in conducting experimental research and simulation of geoengineering issues.                                                           |                                                          |                                                                                                                                                                                                      |                                     |                                                                                                                                                                                                                                                                                         |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                          |                                                          | Subject outcome                                                                                                                                                                                      |                                     | Method of verification                                                                                                                                                                                                                                                                  |            |     |
|                                             | [K6_K02] Can work effectively in a group, as well as function in teams, which may consist of representatives of various branches and levels.                                                                            |                                                          | The student executes tasks assigned as part of a research project carried out by a team. Performs and/or coordinates research together with members of the research team.                            |                                     | [SK3] Assessment of ability to organize work<br>[SK2] Assessment of progress of work<br>[SK1] Assessment of group work skills                                                                                                                                                           |            |     |
|                                             | [K6_K03] Can effectively, clearly and unambiguously convey information, describe activities and communicate their results/ outcomes to engineers or a wider audience using appropriate communication methods and tools. |                                                          | The student is able to prepare a research report including: description, analytical and graphical part. Applies appropriate methods of data presentation.                                            |                                     | [SK3] Assessment of ability to organize work<br>[SK5] Assessment of ability to solve problems that arise in practice<br>[SK4] Assessment of communication skills, including language correctness                                                                                        |            |     |
|                                             | [K6_W05] Demonstrate knowledge and understanding of research methods (obtaining information, simulations, experimental methods) in the field of civil engineering.                                                      |                                                          | The student is able to identify an engineering problem and propose a research programme. Knows what parameters are needed to describe the issue.                                                     |                                     | [SW3] Assessment of knowledge contained in written work and projects<br>[SW2] Assessment of knowledge contained in presentation<br>[SW1] Assessment of factual knowledge                                                                                                                |            |     |
|                                             | [K6_U05] Conducts research (obtaining information, simulations, experimental methods) in the field of construction in order to solve specific tasks and report research results.                                        |                                                          | The student conducts investigations of geotechnical structures on physical models. Able to use basic testing equipment to obtain appropriate data for analysis and interprets the results correctly. |                                     | [SU1] Assessment of task fulfilment<br>[SU2] Assessment of ability to analyse information<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU4] Assessment of ability to use methods and tools<br>[SU5] Assessment of ability to present the results of task |            |     |

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| Subject contents                | <p>Course content – project</p> <p>Activities in the module 'Hands on Engineering'. The main idea is to work as a team in conducting experimental research and simulation of geoenvironmental issues. The class includes 4 thematic modules:</p> <ol style="list-style-type: none"> <li>1. Angle of repose of natural slope. Stability assessment of natural slope formations.</li> <li>2. Vertical retaining structure composed of reinforced soil. Global stability evaluation.</li> <li>3. Anthropogenic embankment constructed with lightweight aggregate or waste-derived materials. Global stability assessment and characterization of geotechnical parameters.</li> <li>4. Educational site visit (technical field excursion).</li> </ol> <p>The specialised test rigs make it possible to observe the failure mechanisms occurring in the subsoil in a plane state of deformation, which will not only facilitate the analysis of the results of our research, but will also serve as an introduction to the independent numerical modelling of engineering structures. We use several alternative measurement techniques in our experiments: analogue, digital and photographic.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |
| Prerequisites and co-requisites |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Percentage of the final grade |
|                                 | Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20.0%                         |
|                                 | Working with geotechnical documentation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20.0%                         |
|                                 | Soil bearing capacity investigation report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20.0%                         |
|                                 | Geotechnical structure stability test report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20.0%                         |
|                                 | Natural slope angle study report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 50.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20.0%                         |
| Recommended reading             | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                               |
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ol style="list-style-type: none"> <li>1. Z. Wiłun, Zarys Geotechniki. Wydawnictwo Komunikacji i Łączności, Warszawa 2013.</li> <li>2. PN-EN 1997-1:2008, Eurokod 7: Projektowanie geotechniczne. Część 1: Zasady ogólne.</li> <li>3. H. Konderla, Stateczność skarp i zboczy w ujęciu Eurokodu 7. Górnictwo i Geoinżynieria, Zeszyt 32/2, 2008.</li> <li>4. Jermolowicz P., PODZIAŁ GEOSYNTETYKÓW - INŻYNIERIA ŚRODOWISKA (<a href="http://www.inzynieriasrodowiska.com.pl">www.inzynieriasrodowiska.com.pl</a>)</li> <li>5. Rychlewski P., GEOSYNTETYKI W BUDOWNICTWIE, Inżynier budownictwa, 2011.</li> <li>6. IBDIM; ZASTOSOWANIE GEOSYNTETYKÓW W BUDOWLACH ZIEMNYCH STUDIUM POZNAWCZO-TECHNICZNE, 2003.</li> <li>7. Sybilski D.; Zastosowanie odpadów gumowych w budownictwie drogowym. Przegląd budowlany 5/2009.</li> <li>8. Jastrzębska M.; Rozwiązania ekologiczne w geotechnice. Inżynier budownictwa. 2024</li> <li>9. OCENA I BADANIA WYBRANYCH ODPADÓW PRZEMYSŁOWYCH DO WYKORZYSTANIA W KONSTRUKCJACH DROGOWYCH. Instytut Badawczy Dróg i Mostów w Warszawie. 2004.</li> <li>10. Pisarczyk S., Grunty nasypowe. Właściwości geotechniczne i metody ich badania. Oficyna Wyd. PW, Warszawa, 2004.</li> </ol> |                               |

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|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                           | <ol style="list-style-type: none"> <li>1. Jaroszewski W., Marks L., Radomski A., Słownik geologii dynamicznej, Warszawa: Wydawnictwa Geologiczne, 1985, s. 109, ISBN 83-220-0196-7.</li> <li>2. Książkiewicz M., Geologia dynamiczna, Wydawnictwa Geologiczne, Warszawa 1972, s. 185,190</li> <li>3. Klimaszewski M., Geomorfologia, PWN, Warszawa 1978, s.204</li> <li>4. Bugajski M., Grabowski W.: Geosyntetyki w budownictwie drogowym. Wydawnictwo Politechniki Poznańskiej. Poznań 1999.</li> <li>5. PN-EN ISO 10318:2007 Geosyntetyki. Terminy i definicje.</li> <li>6. Duszyńska A.: Co warto wiedzieć o geosyntetykach. Inżynieria Morska i Geotechnika 2010, nr 2.</li> <li>7. Zabielska-Adamska K., Osady ściekowe spalane w piecu rusztowym jako materiał do budowy nasypów. Materiały Budowlane 7/2015, s. 97 99</li> <li>8. Gajewska B., Grzegorzewicz K., Kłosiński B., Wzmacnianie podłoża gruntowego z zastosowaniem lekkich wypełnień. Drogownictwo, 1/2011.</li> <li>9. Batóg A., Hawrysz M., Wykorzystanie do budowy nasypów drogowych kruszyw z recyklingu odpadów budowlanych. Geoinżynieria 3/2011.</li> <li>10. Poneta P., Jurczyk J., Kabala M., Wykorzystanie odpadów pochodzących ze zużytych opon samochodowych w konstrukcji nasypów drogowych. Drogownictwo, 3/2012.</li> </ol> |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Example issues/<br>example questions/<br>tasks being completed | <ol style="list-style-type: none"> <li>1. What is soil?</li> <li>2. What is a geotechnical structure?</li> <li>3. What is a natural slope angle?</li> <li>4. List the uses of geosynthetic materials.</li> <li>5. List the calculation methods for the general stability of slopes and hillsides.</li> <li>6. List the basic strength parameters of non-cohesive soils.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Practical activities within<br>the subject                     | Not applicable                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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