GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00069246		
Field of study	Civil Engineering		
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	Full-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	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 hab. inż. Marcin Cudny	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	30.0	0.0	45

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	45	2.0	3.0	50

Subject objectives

The aim of the course is to provide knowledge of soil improvement methods in civil engineering, rules of their application, evaluation of soil conditions and the design of ground enhancement solutions. The student acquires skills in analysing and designing soil reinforcement with consideration of technological, environmental and economic constraints.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 becomes familiar with the consequences of negligence and risk-taking in the context of potential failures of ground improvement systems.	[SK5] Assessment of ability to solve problems that arise in practice
[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 organize/ create an appropriate program for an investment involving ground improvement, i.e., a program of necessary investigations, selection of technologies suited to site conditions, and the adoption of design, monitoring, and verification methods to ensure the correctness of the applied improvement.	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_U07] Design and build engineering structures in a sustainable manner, with care for the natural environment and a minimum carbon footprint	The student is able to select appropriate design methods (analytical or modelling) for individual ground improvement techniques. The student learns how to optimize reinforcement parameters with regard to environmental protection.	[SU4] Assessment of ability to use methods and tools
[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 learns how to select appropriate machinery for various ground improvement technologies and how these machines operate.	[SW1] Assessment of factual knowledge
[K6_W07] Understand the investment's impact on the environment and the interrelationships and dependencies between the building structure and the natural environment	As part of the course, the student learns about ground improvement methods and their impact on the surrounding environment (soil, water, and structures).	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture
Classification and properties of soils introduction.

Assessment of soil conditions and field investigations.

Ground improvement methods: soil replacement, compaction, gravel and concrete columns.

Piles and micropiles as reinforcement elements.

Injection and soil stabilisation.

Geosynthetics in construction functions, selection and design.

Design principles and performance control.

Case studies from engineering practice.

Course content – project
Assessment of ground conditions analysis of real data.

Selection and design of soil improvement method for a structure.

Capacity and settlement calculations.

Development of a partial design documentation.

Prerequisites and co-requisites

Basic knowledge of geotechnics and soil mechanics. Understanding of the fundamentals of foundation design and soil condition assessment.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
project report grade	50.0%	100.0%

Recommended reading	Basic literature	EN 1997 (Eurocode 7). Selected guidelines and standards on geotechnics. Duncan J.M., Wright S.G.: Soil Strength and Slope Stability.
	Supplementary literature	Dembicki, E.: Ground Improvement by microblasting method. Lancellotta, R.: Geotechnical Engineering, Taylor & Francis
	eResources addresses	
Example issues/ example questions/ tasks being completed	Do not concern	
Practical activites within the subject	Not applicable	

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