GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Foundation Engineering, PG_00064563						
Field of study	Civil Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
Education level	first-cycle studies		Subject group				
Mode of study	Part-time studies		Mode of delivery	at the university			
Year of study	3		Language of instruction	Polish			
Semester of study	5		ECTS credits	4.0			
Learning profile	general academic profile		Assessment form	exam			
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. Adam Krasiński				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 5884 Fundamentowanie_niestac-26_27 https://enauczanie.pg.edu.pl/2025/course/view.php?id=5884						
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	Acquiring knowledge in the field of construction and design of shallow and deep foundations, retaining structures and other selected geotechnical structures. Learning current methods of calculating and designing foundations. Acquiring skills in identifying important geotechnical problems and solving them. Preparation for independent work as civil engineer and education at the second level of studies.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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.	Carries out engineering activities in the field of foundations and geotechnical works in civil engineering, using his knowledge and understanding of the issues and mechanisms of interaction between structures and the subsoil.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
[K6_U03] Design engineering objects and details, processes and engineering systems by applying appropriate standards and methods of design.	Is able to design typical shallow and deep foundations and geotechnical structures for civil, industrial and infrastructure constructions. Knows and uses the appropriate standards, instructions and guidelines as well as appropriate calculation methods for this purpose.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K6_W06] Demonstrates practical knowledge and understanding of materials, devices and tools, processes and technologies in the field of civil engineering (and their limitations).	Has knowledge in the field of analyzing and using geotechnical documentation for the purposes of designing and constructing foundations of buildings. Knows the basic technical solutions of foundations and technologies for their construction. Is able to select geotechnical solutions and technologies appropriate to the needs and to soil and water conditions.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_W03] Demonstrate knowledge and understanding of the processes, established standards and design methods in the civil engineering subject area and of their limitations.	Demonstrates knowledge and understanding of the processes and established standards and design methods for foundation, ground improvement and other geotechnical works and is aware of their limitations.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

Lectures:

1. Classification of subsoils and geotechnical categories of buildings.
2. Field tests of soils and geotechnical documentation
3. Principles of geotechnical design according to EC7.
4. Application and classification of shallow foundations
5. Calculation, construction and design of shallow foundations
6. Gravity retaining walls - structures, principles of calculation, design and construction
7. Foundation piles - application, classification and types of construction technologies
8. Pile and pile foundations - calculation, design and testing
9. Sheet piles and diaphragm walls - construction schemes, calculation and design
10. Ground anchorages - structures and calculation
11. Drainage of foundation excavations
12. Ground improvement - technologies and use of geosynthetics
13. Strengthening of existing foundations

Design

1. Examples of calculation tasks for the design of shallow foundations
2. Project 1a - retaining wall shallowly founded
3. Examples of calculation tasks for the design of pile foundations
4. Project 1b - retaining wall supported on piles
5. Examples of calculation tasks for designing sheet pile walls and ground anchorages
6. Project 2 - anchored or strutted sheet pile wall

Prerequisites and co-requisites

Completion of first-degree courses:
- soil mechanics
- basics of general construction
- building materials
- general mechanics and strength of materials
- technical drawing
- basics of concrete and metal structures

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Activity during lectures</td><td>0.0%</td><td>10.0%</td></tr>
<tr><td>Projects completion</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Task exam</td><td>55.0%</td><td>15.0%</td></tr>
<tr><td>Lecture exam</td><td>55.0%</td><td>35.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Z. Wiłun: Zarys geotechniki WKŁ, Warszawa, 2004
2. E. Dembicki i inni: Fundamentowanie, t. I i II. Arkady, Warszawa 1988.
3. B. Rosiński: Fundamentowanie. Arkady, Warszawa 1978.
4. K. Biernatowski: Fundamentowanie. PWN, Warszawa 1984.
5. E. Motak: Fundamenty bezpośrednie. Wzory, tablice, przykłady. Arkady, Warszawa 1988.
6. K. Gwizdała: "Fundamenty palowe" Tom 1 i 2. PWN, Warszawa, 2011, 2013.</td></tr>
<tr><td>Supplementary literature</td><td>1. Puła O., Rybak C., Sarniak W.: Fundamentowanie. Projektowanie posadowień. DWE, Wrocław 1999
2. A. Jarominiak: Lekkie konstrukcje oporowe. WKŁ, Warszawa 2000.
3. J. Kobiak, W. Stachurski: Konstrukcje żelbetowe. Arkady, Warszawa 1989.
4. Starosolski W., Konstrukcje żelbetowe, T2., PWN, Warszawa 1996
5. Czasopisma: Inżynieria Morska i Geotechnika, Geinżynieria, Inżynieria i Budownictwo</td></tr>
<tr><td>eResources addresses</td><td>Basic
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24003 - A. Krasiński: Teaching materials for the subject Foundations
Supplementary
https://inzynieria.com/czasopisma/wydania/gdmt - Magazine: Geoinżynieria
https://imig.pl/ - Magazine: Inżynieria Morska i Geotechnika</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Exam:1. List and describe the types of soils and geotechnical categories of buildings.2. What is soil subgrade testing documentation and what basic elements should it consist of?3. What is dynamic probing and what is static probing?4. Sketch the pressure distributions on the ground under the foundation strip for different values of eccentricity e B.5. Sketch possible calculation schemes for foundation grids.6. What are the differences in the technologies of construction and applications of Vibro, SDP and CFA piles?7. Explain the mechanism and causes of negative friction in piles.8. Sketch and describe two example structures of pile load test stands.9. Draw approximate bending moment diagrams in a sheet pile wall: a) cantilever, b) single anchored at the bottom, freely supported, c) single anchored at the bottom, fixed in the ground.10. Sketch the stages of construction of a diaphragm wall.11. What is the difference between soil replacement and vibroreplacement? (sketches)12. List the methods of strengthening the subsoil composed of cohesive and organic soils and briefly describe two of them.13. Principle of operation of deep wells and wellpoints. When do we use one and when the other?14. Sketch examples of strengthening old brick foundations.15. Calculate the eccentricity of loads and the distribution of pressures on the ground under an example of a foundation footing.16. Calculate the load-bearing capacity of the subsoil under an example of a shallow foundation.17. Estimate the settlement of an example of a shallow foundation.18. Calculate the forces in piles in an example pile foundation.19. Calculate the load-bearing capacity of an example pile.20. Calculate the earth pressure and bending moment in an example sheet pile wall.21. Estimate the load-bearing capacity of an example plate anchorage.Project:1. Describe the problem of earth pressure on a retaining wall.2. Load-bearing capacity of the subsoil in conditions with and without drainage.3. Provide the procedure for calculating and designing a retaining wall.4. Provide the procedure for calculating and designing a sheet pile wall.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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