



Subject card

Subject name and code	Foundation Engineering, PG_00042253						
Field of study	Civil Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Geotechnics, Geology and Marine Civil Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Grzegorz Horodecki				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	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 familiarize students with current ground improvement techniques of weak subsoil and foundation of building objects in difficult geotechnical conditions.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U15] has advanced skills in civil engineering within offered specialization/profile	Can choose the appropriate foundation technique for geotechnical conditions and the planned building			[SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W14] knows and applies building codes and obeys the Construction Law; has knowledge on environmental impact of investment realisation	The student knows the standards in the of geotechnics field and the impact of soil improvement technology on neighboring buildings			[SW1] Assessment of factual knowledge		
	[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements	Is able to analyze geotechnical conditions and apply the appropriate foundation solution for a building			[SW1] Assessment of factual knowledge		
	[K7_W12] has deep and theoreticaly firm knowledge about geotechnical investigation, the rules of geotechnical design and engineering geology; knows the complicated processes in soil, techniques of foundations, draining systems, soil strengthening, geosynthetics applications, underground constructions and earthworks	The student knows different types of foundation techniques			[SW1] Assessment of factual knowledge		
	[K7_W15] has deep and adequate knowlege of civil engineering, within offered specialization and profile	The student knows the rules for the selection of individual types of ground improvement technology			[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE: Methods of ground improvement of organic soil. Techniques of soil replacement. Soil compaction. Microblasting method. High and low pressure injections. Foundation on a improvement subsoil. Compensation foundation. Methods of underpinning of existing foundations - examples of solutions.</p> <p>TUTORIALS: Examples of analytical calculations of selected techniques of foundation.</p>			
Prerequisites and co-requisites	Knowledge of subjects of Soil Mechanics, Foundation I and II.			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade	
	passing the lecture	55.0%	40.0%	
	passing the tutorials	55.0%	60.0%	
Recommended reading	<p>Basic literature</p> <ol style="list-style-type: none"> 1. Dembicki E.: Fundamentowanie. T 1 i 2. Arkady 1987-1988. 2. Wiłun Z.: Zarys geotechniki. WKŁ 2020. 3. Pisarczyk S.: Geoinżynieria. Metody modyfikacji podłoża gruntowego. OW PW 2005. 4. Molisz R., Baran L., Werno M.: Nasypy na gruntach organicznych. WKiŁ 1986. 5. Bolt A., Cichy W., Topolnicki M., Zadroga B.: Mechanika gruntów w zadaniach. PG 1985. 6. Dembicki E.: Zagęszczanie gruntów metodą mikrowybuchów. PWN, 2018. 7. Kwiecień S., Sękowski J.: Kolumny kamienne formowane w technologii wymiany dynamicznej. WPS, Gliwice 2012. 8. Lechowicz Z., Szymański A.: Odkształcenia i stateczność nasypów na gruntach organicznych. Cz. I (Metodyka badań) i cz. II (Metodyka obliczeń). SGGW, 2002. 9. Praca zbiorowa. Budownictwo drogowe. Warunki gruntowe a projektowanie oraz budowa dróg i mostów. Elamed, 2020. 10. Myślińska E.: Grunty organiczne i laboratoryjne metody ich badania. PWN 2001. 11. Sikora Z.: Sondowania statyczne. WNT Warszawa 2006. 12. Moseley M.P. & Kirsch K.: Ground Improvement. 2nd edition. Taylor & Francis 2004. 13. Prawo budowlane, Prawo wodne. 14. Rozporządzenie Ministra Transportu, Budownictwa i Gospodarki Morskiej z dnia 25.04.2012 w sprawie ustalania geotechnicznych warunków posadawiania obiektów budowlanych. Dz. U. 2012 Nr 0, poz. 463. 15. PN-EN 1997-1:2008 Eurokod 7. Projektowanie geotechniczne. 16. PN-EN 12715:2003. Wykonawstwo specjalnych robót geotechnicznych (skrót WSRG przyp. GH). Iniekcja. 17. PN-EN 12716: 2019-01. (w. ang.) WSRG. Iniekcja strumieniowa. 18. PN-EN 14199:2015-07. WSRG. Mikropale. 19. PN-EN 14679:2005. (w. ang.) WSRG. Wgłębne mieszanie gruntu. 20. PN-EN 14731:2005. (w. ang.) WSRG. Wzmacnianie gruntu metodą wibrowania wgłębego. 21. PN-EN 15237:2007. (w. ang.) WSRG. Drenaż pionowy. 22. PN-EN 12699:2015-06. (w. ang.) WSRG. Pale przemieszczeniowe. 23. Recommendations for the design, construction and control of rigid inclusion ground improvements. ASIRI National Project. 24. Leśniewska A.: Wytrzymałościowe i technologiczne aspekty wzmacniania gruntu metodą wgłębego mieszania na mokro. Gdańsk, 2007 (rozprawa doktorska). 25. Świniański J., Marchwicki M.: Wzmacnianie gruntu sztywnymi kolumnami - podstawy projektowania wg ASIRI i EC 7. Inżynieria i Budownictwo, nr 6/2014. 26. Topolnicki M.: Ryzyko związane ze wzmacnianiem gruntu kolumnami o różnej sztywności. Inżynieria i Budownictwo, nr 4/2013. 27. Horodecki G., Duszyńska A.: Dobór geotekstyliów i wyrobów pokrewnych pełniących funkcję zbrojenia w budownictwie komunikacyjnym wybrane problemy inżynierskie. Magazyn Autostrady nr 11-12/2007. 28. Horodecki G.: Nietypowa podziemna konstrukcja oporowa w technologii DSM jako zabezpieczenie głębokiej wymiany gruntu. Magazyn Autostrady nr 5/2018. 29. Horodecki G.: Grunty słabonośne odciążenie zamiast wzmacniania. Magazyn Autostrady nr 4/2015. 			
	Supplementary literature	Artykuły w czasopismach krajowych: Inżynieria Morska i Geotechnika , Inżynieria i Budownictwo, Magazyn Autostrady , Mosty , Geoinżynieria oraz zagranicznych (np. Ground Improvement).		
	eResources addresses	Adresy na platformie eNauczanie:		

Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none">1. Vibroflotation - what is it, conditions and scope of application.2. Jet-grouting technology - what is involved, types, conditions and scope of application. Advantages and disadvantages.3. Rapid Impulse Compaction - how it works, conditions and scope of application.
Work placement	Not applicable