GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Soil Mechanics, PG_00044392		
Field of study	Civil Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	4.0
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. Krzysztof Szarf	
	Teachers	dr inż. Witold Tisler dr inż. Paweł Więcławski dr inż. Krzysztof Szarf	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	10.0	5.0	0.0	0.0	25
	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	25	5.0	70.0	100

Subject objectives	The aim of the class is to tech the students basics of soil mechanics and soil classification

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W07] has basic knowlede on natural processes (hydrological, hydraulical or geological) and its influence on building subsoil; understands specific aspects of surface and underground water, which constraints the design and exploitation of buildings and engineering objects	Student learnt soil mechanics in the scope of the course Student learnt soil classification in the scope of the course Student is knowledgeable about geotechnical problems Student is knowledgeable about the role of underground water in geotechnics	
[K6_U02] is able to define basic calculation models used in computer calculations	Student is able to assess the importance of simplifications used in analytical and numerical soil mechanics computations	
[K6_U12] knows rules of manufacturing and application of building materials, is able to properly choose tchem; is able to make simple laboratory experiments for judging quality of building materials	Student knows and applies the basic workplace health and safety rules required to work in the soil mechanics laboratory Student can assess physical and mechanical properties of soil as a building material	
[K6_W08] knows the codes of modern geotechnical investigations and technologies, knows the principles of foundations and safe design of foundations of typical buildings	Student knows the contents of the codes PN-EN ISO 14688-1:2006 and PN-EN ISO 14688-2:2006 concerning soil identification and testing. Student knows the contents of the code PN/ B-03020:1981 and parts of the code PN-EN 1997-1:2008 concerning bearing capacity and settlements of shallow fountation	

Subject contents

Lectures:
1. Introduction to soil mechanics
2. Water in soil
3. Filtration. Freezing of soils
4. Stresses in soil
5. Compressability of soil
6. Strength of soils -- shear strength
7. Bearing capacity of shallow foundations
8. Consolidation
9. Lateral stresses in soil: earth pressure
10. Geotechnical failures. Soil reinforcement
11. Stability of slopes

Laboratory classes:
1. Macroscopic tests on coarse soils and on fine soils
2. Physical quantities of coarse soils
3. State of coarse soils -- density index
4. State of fine soils -- consistency limits
5. Filtration
6. Granulometric curve of a coarse soil
7. Experiment with the Proctor apparatus
8. Experiments with the oedometer
9. Soil strength testing using the triaxial apparatus and the direct shear apparatus

AUDITORIAL CLASSES: Physical properties of soil -- three phase system. Water flow through soil. Vertical stresses in soil. Soil strength.

Prerequisites and co-requisites

Mathematics, especially mathematical analysis (integral and differential calculus), tensor calculus Physics (mechanics), especially solid mechanics, hydraulics, elasticity theory Geology, especially minerology, petrology and hydrogeology Chemistry, especially physical chemistry and electrochemistry Strength of materials Polish proficiency

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory classess - reports	100.0%	16.5%
Auditory classes - test	50.0%	33.0%
Laboratory classess - test	50.0%	16.5%
Lecture - test	50.0%	34.0%

Recommended reading

Basic literature	Zenon Wiłun, Zarys geotechniki, WKiŁ 1982, 2013 Tomasz Jeż, www.tajnikigeotechniki.pl, Politechnika Poznańska Arnold Verruijt, Soil Mechanics, TU Delft, 2012
Supplementary literature	Norma PN-EN 1997-1:2004 Eurokod 7 Projektowanie geotechniczne Norma PN-EN-ISO 14688-1 Badania geotechniczne – Oznaczanie i klasyfikowanie gruntu – Część 1: Oznaczanie i opis Norma PN-EN-ISO 14688-2 Badania geotechniczne – Oznaczanie i klasyfikowanie gruntu – Część 2: Zasady klasyfikowania Norma PN-81/B-03020 Grunty budowlane. Posadowienie bezpośrednie budowli. Obliczenia statyczne i projektowanie Norma PN-86/B-02480 Grunty budowlane. Określenia, symbole, podział i opis gruntów Norma PN-88/B-04481 Grunty budowlane. Badanie próbek gruntu
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	The entire class and all of its parts are given in Polish. LECTURES: Assessment based on a multiple choice test with negative points for the wrong answers. About 40 - 50 questions, with 3 options each. Exemplary questions: 1. Choose the cohesive soils: A) Sa B) FGr C) saclSi 2. What is the typical value of the specific density of soil skeleton for a quartz sand? A) 2,65 g/cm^3 B) 1500 kg/m^3 C) 2,65 kN/m^3 AUDITORIAL CLASSES: Passing based on a written test. The scope and the contents of the test are chosen by the auditorial classes teacher. Exemplary problems: 1. Draw a vertical geostatic stress diagram for a geotechnical section given on a figure 2. Given the values of soil skeleton specific density, bulk density and water content of soil calculate its void ratio 3. Determine the internal friction angle value using the provided laboratory test data LABORATORY CLASSES: The basic requirement is to perform and analyse the laboratory tests correctly and to write a report card (100% passing score). Moreover, if the laboratory classes teacher requires so, students shall write a test. Exemplary problems in the written test: 1. Describe how to determine soil filtration coefficient 2. Draw the triaxial cell. Show the stresses acting on the sample 3. What are the Atterberg limits?
Work placement	Not applicable