



## 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 Więclawski  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 knowledge on natural processes (hydrological, hydraulic 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 them; 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 foundation	
Subject contents	<p>Lectures:</p> <ol style="list-style-type: none"> <li>1. Introduction to soil mechanics</li> <li>2. Water in soil</li> <li>3. Filtration. Freezing of soils</li> <li>4. Stresses in soil</li> <li>5. Compressibility of soil</li> <li>6. Strength of soils -- shear strength</li> <li>7. Bearing capacity of shallow foundations</li> <li>8. Consolidation</li> <li>9. Lateral stresses in soil: earth pressure</li> <li>10. Geotechnical failures. Soil reinforcement</li> <li>11. Stability of slopes</li> </ol> <p>Laboratory classes:</p> <ol style="list-style-type: none"> <li>1. Macroscopic tests on coarse soils and on fine soils</li> <li>2. Physical quantities of coarse soils</li> <li>3. State of coarse soils -- density index</li> <li>4. State of fine soils -- consistency limits</li> <li>5. Filtration</li> <li>6. Granulometric curve of a coarse soil</li> <li>7. Experiment with the Proctor apparatus</li> <li>8. Experiments with the oedometer</li> <li>9. Soil strength testing using the triaxial apparatus and the direct shear apparatus</li> </ol> <p>AUDITORIAL CLASSES: Physical properties of soil -- three phase system. Water flow through soil. Vertical stresses in soil. Soil strength.</p>		
Prerequisites and co-requisites	Mathematics, especially mathematical analysis (integral and differential calculus), tensor calculus Physics (mechanics), especially solid mechanics, hydraulics, elasticity theory Geology, especially mineralogy, 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 classes - reports	100.0%	16.5%
	Auditory classes - test	50.0%	33.0%
	Laboratory classes - 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.tajnigigeotechniki.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	<p>The entire class and all of its parts are given in Polish.</p> <p>LECTURES:</p> <p>Assessment based on a multiple choice test with negative points for the wrong answers. About 40 - 50 questions, with 3 options each. Exemplary questions:</p> <ol style="list-style-type: none"> <li>1. Choose the cohesive soils: A) Sa B) FGr C) saclSi</li> <li>2. What is the typical value of the specific density of soil skeleton for a quartz sand? A) 2,65 g/cm<sup>3</sup> B) 1500 kg/m<sup>3</sup> C) 2,65 kN/m<sup>3</sup></li> </ol> <p>AUDITORIAL CLASSES:</p> <p>Passing based on a written test. The scope and the contents of the test are chosen by the auditorial classes teacher. Exemplary problems:</p> <ol style="list-style-type: none"> <li>1. Draw a vertical geostatic stress diagram for a geotechnical section given on a figure</li> <li>2. Given the values of soil skeleton specific density, bulk density and water content of soil calculate its void ratio</li> <li>3. Determine the internal friction angle value using the provided laboratory test data</li> </ol> <p>LABORATORY CLASSES:</p> <p>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:</p> <ol style="list-style-type: none"> <li>1. Describe how to determine soil filtration coefficient</li> <li>2. Draw the triaxial cell. Show the stresses acting on the sample</li> <li>3. What are the Atterberg limits?</li> </ol>
Work placement	Not applicable