GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Energy aspects in geoengineering , PG_00055981						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject	2025/2026			
Education level	first-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	3		Language of instruction	Polish			
Semester of study	6		ECTS credits	4.0			
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 inż. Krzysztof Szarf				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	15.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=5523						
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		6.0	49.0	100	
Subject objectives	The aim of the class is to familiarize the students with elements of geoengineering and geotechnics related to energy engineering.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W15] knows and understands the basic quantities characteristic methods for thermodynamics, fluid mechanics and hydraulics, hydrology; knows the calculation methods and IT tools necessary to analyse the results of laboratory and field work	Student is aware of the role of soil in the engineering tasks. Student is knowledgeable about physical and mechanical properties of soil, as well as about the methods to incorporate these properties into engineering calculations.	[SW1] Assessment of factual knowledge
[K6_W16] has an elementary knowledge about energy and environmental construction including building materials, their strength, construction mechanics and building physics, moisture migration in buildings, heat transfer through building partitions, has a basic knowledge of marine and inland hydrotechnical structures; has knowledge of the hydraulic and hydrological conditions of designing facilities and building structures, photogrammetry, remote sensing, hydrography, and spatial analysis.	Student's body of knowledge includes topics of soil strength (the soil being a construction material) and soil-structure interactions.	[SW1] Assessment of factual knowledge
[K6_U11] Can design and properly dimension basic foundations in hydrotechnical construction facilities; can evaluate and list the loads acting on constructions, knows the codes of modern geotechnical investigations and technologies, knows the principles of foundations and safe design of foundations of typical buildings	Student is able to calculate forces acting between the soil and the energy engineering structure according to current building codes.	[SU4] Assessment of ability to use methods and tools

Subject contents

Course content – lecture

Introduction to Soil Mechanics, physical properties of soil

Water in soil, filtration

Stress in soil, compressibility of soil

Soil strength -- shear strength

Bearing capacity of shallow and deep foundations

Lateral earth pressure

Course content – exercises
Physical properties of soil

Filtration of water in soil

Vertical and horizontal stress in soil, lateral earth pressure

Bearing capacity and settlements of foundation

Course content – project
Loads acting on an exemplary energy engineering constructions

Bearing capacity of foundations of an exemplary energy engineering constructions

Settlement of an exemplary energy engineering constructions

Prerequisites and co-requisites	Basic knowledge of classical mechanics and mathematics. Mathematics, especially mathematical analysis (integral and differential calculus). Physics (mechanics), especially solid mechanics, hydraulics, elasticity theory. Strength of materials. Polish proficiency

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lectures - Final test	50.0%	20.0%
Lectures - Questions related to the previously discussed topic	0.0%	20.0%
Design classes - project	50.0%	30.0%
Auditory classes - test	50.0%	30.0%

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	Agnieszka Gontaszewska, Własności termofizyczne gruntów w aspekcie przemarzania, Oficyna wydawnicza uniwersytetu zielonogórskiego, 2010 Sławomir Labocha,Fundamenty słupów elektroenergetycznych, Wydawnictwo naukowe PWN, 2025 Norma PN-EN 1997-1:2004 Eurokod 7 Projektowanie geotechniczneNorma 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	

Example issues/ example questions/ tasks being completed	Lectures - Questions related to the previously discussed topic - a test held weekly on eNauczanie website. Several questions with a long time to answer. Exemplary question: "Three foundations are presented below. Assign a correct description to each foundation type" Lectures - Final test - Assessment based on a multiple choice test with negative points for the wrong answers. About 40 - 50 questions Exemplary question: "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" Auditory classes - test - Passing based on a written test consisting of about 3 problems. Exemplary problem: "Draw a vertical geostatic stress diagram for a geotechnical section given on a figure" Design classes - project - a design project solved individually based on data provided according to the methods provided. Example of a fragment of calculations: "settlement calculations for a high voltage pylon foundation"
Practical activites within the subject	Not applicable

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