

## COURSE OF DOCTORAL STUDIES

Course title	Field of science (branch) code	University / Faculty	Institute / Department
<b>Soil Mechanics</b>	Natural Sciences (Geology) N 005	Vilnius University / Faculty of Chemistry and Geosciences	Institute of Geosciences /
Study methods	Number of credits allocated	Study methods	Number of credits allocated
Lectures		Seminars	
Individual work	<b>11</b>	Consultations	
<b>Course annotation</b>			
<p>The course's objective is to understand the fundamentals and state-of-the-art principles of interactions forces and soils, their distribution features, stress and strain.</p> <p>Course content:</p> <ol style="list-style-type: none"> <li>1. Geomechanical models of soil mass - structural diagrams and distribution of parameters. Characterization of soil mass by geomechanical models. Empirical modeling, theoretical model, numerical model, physical - experimental model, geological - engineering geological model, classification model, models of mechanical behavior (elastic, plastic, elastic-plastic, elastic-plastic linearly strengthening material models). Selection and application of mechanical behavior models in practice.</li> <li>2. Stress in soil mass. Concept of mechanical stress, definition, measurement. Types of stress. Stress as vector physical quantities. Stress decomposition. Normal and shear stress components. Principal stresses. Stresses caused by a point load. Vertical stress caused by a vertical line load. Vertical stress caused by a horizontal line load. Vertical stress caused by a vertical strip load. Vertical stress due to embankment loading. Vertical stress below the center of a uniformly loaded circular area. Vertical stress at any point below a uniformly loaded circular area. Vertical stress caused by a rectangular loaded area. Geostatic pressure - natural stresses caused by soil and gravity and filtration forces of ground water.</li> <li>3. Deformations. Types of soil compaction, compaction deformations, consolidation due to drainage. Homogeneous base deformations, with the possibility of lateral expansion of the soil. Limited thick layer method. Equivalent layer method. Layer summation method. Assessment of settlements in time.</li> <li>4. Soil mass stability. Stresses in inclined planes. Maximum deviation angle. Moro's strength theory. Moro's charts. Boundary equilibrium zone and calculated pressure. Analysis of slope stability. Soil pressure on retaining walls.</li> </ol>			
<b>Required readings</b>			
Arnold Verruijt. 2018. An introduction to soil mechanics. Part of the Theory and Applications of Transport in Porous Media book series (TATP, volume 30). Springer International Publishing AG 2018			

Isao Ishibashi, Hemanta Hazarika. 2015. Soil Mechanics Fundamentals and Applications. 2<sup>nd</sup> edition. CRC Press.

Richard H.G. Parry. 2004. Mohr Circles, Stress Paths and Geotechnics. CRC Press.

David Muir Wood. 2004. Geotechnical Modelling. CRC Press.  
<https://doi.org/10.1201/9781315273556>

Consulting lecturers Name, surname	Degree	The most important works in the field of science (branch) have been published during the last 5 years
<b>Gintaras Žaržojus</b>	<b>Dr.</b>	Reconstruction of Holocene marine sand natural hydrostatic pressure and its relation with shearing strength By: Skuodis, Šarūnas; <b>Žaržojus, Gintaras</b> ; Tamošiūnas, Tadas; et al. BALTICA Volume: 32 Issue: 2 Pages: 182-189 Published: DEC 2019
		Engineering geological and geotechnical properties of till soil of the Middle Pleistocene glacial period By: Lekstutyte, Ieva; Gadeikis, Saulius; <b>Žaržojus, Gintaras</b> ; et al. ESTONIAN JOURNAL OF EARTH SCIENCES Volume: 68 Issue: 2 Pages: 101-111 Published: 2019
		Vibrations Measurement of the Funicular Generated Vibrations on Gediminas Hill North Part Slope By: Skuodis, Šarūnas; Kelevišius, Kęstutis; <b>Žaržojus, Gintaras</b> Conference: 10th International Conference on Environmental Engineering (ICEE) Location: Vilnius, LITHUANIA Date: APR 27-28, 2017 10TH INTERNATIONAL CONFERENCE ENVIRONMENTAL ENGINEERING (10TH ICEE) Book Series: Environmental Engineering-Vilnius Spausdinta Article Number: UNSP enviro.2017.120 Published: 2017
		Initial DPSH Soil Test Results with Accelerometer Installed in the Probe Cone By: Kelevišius, Kęstutis; <b>Žaržojus, Gintaras</b> 13TH BALTIC SEA REGION GEOTECHNICAL CONFERENCE - HISTORICAL EXPERIENCE AND CHALLENGES OF GEOTECHNICAL PROBLEMS IN BALTIC SEA REGION Pages: 118-121 Published: 2016

Approved by the doctoral committee of Geology (N 005) on 1<sup>st</sup> of December 2022 (No. (7.17 E) 15600-KT-467).

Committee Chairman prof. dr. Sigitas Radzevičius