GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Foundation Engineering II, PG_00042252		
Field of study	Civil Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
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	3.0
Learning profile	general academic profile	Assessment form	exam
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 hab. inż. Marcin Cudny	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	15.0	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	5.0	25.0	75

Subject objectives

Practical skills in design calculations and numerical simulations of soil - structure interaction in geotechnics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U15] has advanced skills in civil engineering within offered specialization/profile	Ability to analyze initial-boundary value problems in geotechnics using FEM numerical simulations.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K7_W14] knows and applies building codes and obeys the Construction Law; has knowledge on environmetal impact of investment realisation	Knowledge of the selection of partial factors in numerical simulations of various geotechnical problems.	[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 complcated processes in soil, techniques of foundations, draining systems, soil strengthening, geosynthetics applications, underground constructions and earthworks	Ability to validate the quality of geotechnical investigations carried out as part of the implementation of various geotechnical projects. The ability to evaluate the usefulness of the obtained test results for the estimation of parameters needed in advanced calculations.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K7_U14] is able to plan and to interpret the geotechnical investigatons, to analyse the foundation stability; can design direct and deep foundations in complex soil conditions for complcated statical and dynamical loads	The ability to plan an optimal program of laboratory or field tests in order to determine parameters for advanced calculations of various geotechnical problems.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
[K7_W02] knows principles of analysis, design and dimensioning of complex constructions and its elements	Ability to build an FEM model for numerical simulations of various geotechnical problems. Ability to conduct various types of numerical analyses (drainage, consolidation, undrained, creep, dynamics).	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation

Subject contents	1. Introduction - summary of the gained experience on foundation engineering to date. 2. Review of computational methods used in geotechnical design and analysis. 3. Finite Element Method (FEM) - presentation of the standard implementation in engineering programs (pre-processor, solver, post-processor). 4. Presentation of FEM systems used in geotechnical practice: ZSoil, Plaxis, Tochnog. 5. Practical classes - examples of simple boundary-initial problems solved in practice. 6. 3D/2D transition for structural elements in a row (piles, columns, anchors). 7. Project - design of excavation in organic compressible soils with calculations in two FE codes (ZSoil, Plaxis), with various material descriptions and different drainage conditions. 8. Comparative analysis of the results obtained in project calculations.
Prerequisites and co-requisites	Basic knowledge of soil mechanics and foundation engineering.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam	50.0%	30.0%
project	50.0%	70.0%

Recommended reading

Basic literature	1. Helwany S., Applied Soil Mechanics with Abaqus Applications. 2. User Manual Plaxis FEM code - current version. 3. User Manual ZSoil FEM code - current version. 4. Muir Wood D., Geotechnical Modelling. 5. Kempfert H-G., Gebreselassie, B., Excavations and Foundations in Soft Soils. 6. ICE manual of geotechnical engineering Volume 2. Geotechnical Design, Construction and Verification 7. Eurocode, Geotechnical Design..
Supplementary literature	Journals: Géotechnique ICE Geotechnical Engineering Computers and Geotechnics
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Parameters of material models: Mohr-Coulomb, Cap-model, Soft Soil, Soft Soil Creep, Hardening Soil. 2. Methods of numerical simulation of piles and anchors in a plane strain conditions. 3. Methods of introducing initial conditions in the numerical calculations of geotechnical problems (K0, OCR, POP) 4. Method B & undrained conditions. 5. Methods of introducing changes in the numerical model, e.g. construction of an embankment or excavation. 6. Methods of planning the model geometry in the case of excavation analysis. 7. Tunnel drilling simulation (TBM) - parameters and phases of calculations.
Work placement	Not applicable

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