Ministry of Education and Science of Ukraine

ODESA STATE ACADEMY OF CIVIL ENGINEERING AND ARCHITECTURE

Institute of Hydrotechnical Construction and Civil Engineering
Department of Foundations and Foundations

SILABUS

educational component – EC 10

Foundations in special conditions

Educational level	Master's
Field of knowledge	19 Architecture and Construction
Specialty	192 Building and Civil Engineering
Educational program	Industrial and Civil Engineering
Educational component scope	3 **credits ECTS** (90 academic hours)
Types of classroom training	Lectures, practical classes
Individual tasks	Calculated and graphical work
Forms of final (term) control	exam

Lecturer(s):
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When studying the educational component, higher education students will develop the following skills and competences regarding properties of special types of soils and geological processes and methods of building foundations in these conditions. For example: features of loess subsidence, weak water-saturated, bulk soils and methods of construction on them. Design and construction of foundations on forged, seismic and landslide-hazardous conditions. Features construction of foundations in conditions of dense construction.

Requirements for studying the educational component: Engineering geology and the basics of soil mechanics; Basics and foundations; Reinforced concrete structures of industrial buildings. Seismic resistance of buildings and structures; Metal structures of industrial buildings; Architecture of buildings and structures.

Program learning outcomes:

PLO 3. The ability to use regulatory and legal acts in everyday and professional life activities; to navigate in scientific, special literature and laws.

PLO 4. The ability to practically carry out measures to protect personnel and the population from the consequences accidents, disasters, natural disasters and the use of weapons; evaluate the stability of elements of objects economic activity in emergency situations and determine the necessary measures regarding it increase; evaluate the radiation, chemical, bacteriological environment and the environment that can occur as a result of a natural disaster and accident.

PLO 7. The ability to assess the danger of aggressive influences on building structures and structures – atmospheric, chemically and biologically active environments, leakage currents and stray currents, etc., develop and implement measures to protect against them and ensure the necessary durability of structures and buildings.

PLO 8. Use the technical Ukrainian language orally and in writing.
PLO 9. Ability to design structures from modern materials; evaluate work and the stress state of buildings and structures in general, their structural elements, redistribution of efforts in connection with a change in the design scheme; solve the issue of assessment of bearing capacity constructions
PLO 12. The ability to carry out inspections of the technical condition of buildings, structures and engineering communications, and give an assessment of this state; evaluate their further operational suitability or the need to develop a project to restore this suitability; calculate the required level increasing the bearing capacity of the structure to ensure the operational suitability of the building.
PLO 13. Ability to design buildings and structures, including using software computer design systems based on an effective combination of innovative technologies and performing multivariate calculations of metal structures.
PLO 14. Design structures of buildings and structures in order to ensure their strength, stability, durability and safety, ensuring reliability.
PLO 15. Perform technical and economic justifications of constructive, technological, organizational solutions for the construction or reconstruction of buildings and structures, to develop technical documentation for projects and their elements.
PLO 17. The ability to find optimal solutions when creating certain types of construction products taking into account architectural and planning requirements, strength, durability, safety life activity, quality, cost, terms of execution and competitiveness.
PLO 18. The ability to justify and make optimal decisions on the arrangement of the basics and foundations in special conditions.

Differentiated program learning outcomes:
to know:
- the law of deformation of special (structurally unstable) soils;
- methods of calculating bases and foundations in special conditions;
- rules for using computer programs on PCs.

to possess:
- method of calculation of bases and foundations on structurally unstable soils;
- methods of improving the properties of structurally unstable soils;
- methods of designing foundations in seismically dangerous areas;
- methods of designing foundations in conditions of dense construction, and strengthening foundations.

to be able to:
- calculate and evaluate the joint operation of foundations with the basis for effective engineering solutions;
- evaluate complex ground conditions for necessary structural and technological solutions to ensure normal operation of buildings and structures.

Thematic plan

Topic 1. List and general characteristics of complex (special) ground conditions in the territory of Ukraine.
Topic 2. Loess rocks. Their general characteristics, Territories occupied by loess sediments, their power, methods of determining the mechanical characteristics of loess deposits in laboratory and sexual conditions
Topic 3. Design of foundations on loess deposits. Methods of protecting the base from subsidence
Topic 4. General characteristics of estuarine sediments. Design of foundations on marine and estuarine sediments.
Topic 5. Characteristics of physical and mechanical properties of bulk and alluvial soils. Design of foundations on bulk and alluvial soils.
Topic 6. General characteristics of plots on fake and flooded territories. Design of foundations on fake territories. Construction on water-saturated soils.
Topic 7. Seismic zones in Ukraine. Dependence of earthquake strength on ground conditions. Design of foundations in seismically dangerous areas.

Topic 8. Peculiarities of building foundations in conditions of dense construction. Reinforcement methods of foundations in existing buildings.

Score criteria and diagnostic tools

The minimum and maximum score for the «exam» in the educational component «Foundations in special conditions» ranges from 60 points to 100 points.

The educational component includes the following task – calculated and graphical work.

It consists of an explanatory note, executed on standard sheets of A4 format, and a graphic part. The explanatory note contains the following sections: definition of study soil subsidence from its own weight; determination of the calculated load on the prismatic pile with taking into account the action of negative friction forces; Calculation of the basis of foundations of shallow laying according to deformations on subsidence soils.

Basic calculations are performed in tabular form. The work indicates its content and a list of references.

Term control is carried out in the form of exam. The overall semester grade is the sum of the points of two components:

1) current control during the semester by accumulating points: assessment of learning theoretical (lecture) material, performance of practical work on topics and individual works (calculation and graphic work) - a total of 60 points;

2) final control during the examination session (exam) - the number of points from 24 to 40 points.

Information support

Main sources of information

1. Methodological recommendations for the educational discipline "Fundamentals in special conditions" to performance of calculation and graphic work for students of the educational program" Industrial and civil construction" in specialty 192 "Construction and civil engineering" Educational level - the second (master's degree). Authors: V.M. Mytynskyi, I.V. Voytenko, O.H. Yeresko. Odesa, 2023, 40 p.
2. Krus Yu. AT. Basics and foundations: Workshop: teaching. manual. - Type 2nd, revision. and add. - Rivne: NUVHP, 2019. 247 p. ; Illustration: 59; tab.: 83; Bibliogr.: 47.
3. Soil mechanics, foundations and foundations: textbook / L. M. Shutenko, O. G. Rud, O. IN. Kichaeva and others. ; under the editorship L. M. Shoutenka; trans. from Russian ; Kharkiv, national city university farm named after AT. M. Beketova. - Kharkiv: XNUMX named after AT. M. Beketova, 2017. 563 p.
4. Methodical instructions for practical classes in the discipline "Fundamentals in special conditions" for students of OPP and ONP of the second (master's) level of the field of knowledge 19 "Architecture and construction" specialty 192 "Construction and civil engineering". Authors: Novsky O.V., Tkalich A.P. and Yeresko O.H. Odesa, 2020, 40 p.
5. Synopsis of lectures on the academic discipline "Functions in special conditions" for students of the educational and professional program "Industrial and civil construction" by specialty 192 "Construction and civil engineering" of the second (master's) level. Authors: Mytynskyi V.M., Novsky O.V.. Odesa, 2024, 68 p.
6. Methodological recommendations for the educational discipline "Fundamentals in special conditions" to practical classes for students of the educational and scientific program "Industrial and civil construction" in the specialty "192 Construction and civil engineering" of the second (master's) educational level. Authors: Novsky O.V., Yeresko O.G.. Odesa, 2024. 47 p.

Additional sources of information

7. Zotsenko M.L. and others. "Engineering geology, soil mechanics, foundations and foundations. Poltava 2004. 562p.
8. Methodical instructions for practical classes and execution of calculation and graphics works on the discipline "Fundamentals in special conditions" for students of specialty 192 "Construction and civil engineering". Authors: Novsky O.V., Loginova L.O. and Yeresko O.H. Odesa, 2017, 42 p.

9. Yu.F. Tugaenko. Processes of deformed soils in the bases of foundations, piles and pile foundations // Odessa, "Astroprint" 2008. 216p.
10. DBN V.1.1-24:2009 Protection from dangerous geological processes. Basic provisions designing.
11. DSTU-N B V.1.1-38:2016 Guidelines on engineering protection of territories, buildings and structures against flooding and flooding.