

Ministry of Education and Science of Ukraine



ODESA STATE ACADEMY OF CIVIL ENGINEERING AND ARCHITECTURE

Institute of Hydrotechnical Construction and Civil Engineering
Construction and Technology Institute
Department of Heating and Gas Supply and Ventilation
Department of Production of Construction Products and Structures

SILABUS

educational component – EC 4

Modern building materials, engineering networks and equipment

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	6 credits ECTS (180 academic hours)
Types of classroom training	Lectures, practical classes
Individual tasks	2 calculated and graphical works
Forms of final (term) control	credit

Lecturer(s):

Olga Khomenko, PhD., Assoc. Prof. of the Department of Heating and Gas Supply and Ventilation,
olgahomenko_tgp@ukr.net

Volodymyr Martynov, PhD., Assoc. Prof. of the Department of Production of Construction Products and Structures, ogasa_psk@ukr.net; martynov2@ogasa.org.ua

When studying the educational component, higher education students will develop the following skills and competences to calculate labor cost estimates, calendar schedules, calculation information on the need for main and auxiliary materials for the installation of main and internal engineering systems. The program provides an introduction to the basics of structure formation building materials, presenting them in the form of open dynamic systems, which allows to highlight their structural elements and connections between them. Analysis of structure formation, selection parameters of the structure of materials allows you to associate their properties with these parameters.

Requirements for studying the educational component: Heat and gas supply and ventilation, Heating, Physics, Chemistry.

Program learning outcomes:

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

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

PLO 8. To use the technical Ukrainian language orally and in writing.

PLO 9. Ability to design structures from modern materials; evaluate work and the tense 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 10. The ability to independently solve the problems of choosing optimal energy sources, including among non-traditional ones, and in the conditions of production activity - independently solve the problems of choice the most efficient heat, water, and energy supply systems.

PLO 11. Ability to design modern engineering networks; solve assessment issues and equipment to ensure their operational suitability, using modern technologies of construction and repair of these systems.

PLO 12. 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 17. The ability to find optimal solutions when creating certain types of construction products taking into account architectural and planning requirements, strength, durability, safety.

Differentiated program learning outcomes:

to know:

- the main modern scientific and technical solutions and developments in the field of highways heating and gas supply;
- equipment used in modern heating and gas supply systems;
- mechanisms used for the installation of main pipelines;
- basic provisions of technology and organization of work in the production of modern construction materials;
- the main systemic regularities of the structure formation of modern building materials;
- methods and methods of synthesis of the structure of building materials for the purpose of obtaining materials with the required properties;

to possess:

- skillfully perform design and technological documentation for the installation of trunk lines and internal engineering systems;
- the ability to read assembly diagrams and specifications of main and internal engineering systems;
- methods of determining the main physical and mechanical properties of construction materials

to be able to:

- control the use of modern technologies for the installation of internal engineering systems;
- consider the structure of the material from the standpoint of a systemic approach, analyze and create necessary structures of materials with rational methods of their production and ensuring the necessary properties.

Thematic plan

1. Modern technologies and features of installation of underground heat supply networks and gas supply by open method and trenchless method.
2. Construction technology of steel and polyethylene gas pipelines. Equipment for welding of polyethylene gas pipelines.
3. Modern technologies for installation of polyethylene gas pipelines in difficult geological conditions (fake territories, seismic areas). Construction of polyethylene gas pipeline transitions pipes through artificial and natural obstacles. Ballasting and fastening of gas pipelines with polyethylene pipes.
4. Modern technologies for installing heat networks from pre-insulated steel pipes in polyethylene shells. Modern urban engineering networks and collectors.
5. Modern technologies of rehabilitation and renovation of pipelines. Mechanisms, equipment, tools.
6. Properties of polymers and composite materials (structure, aggregate states, aging and stabilization). Polymer pipes and connecting elements. Shaped parts for the thermistor welding.
7. Connection of polyethylene pipes. Connection of steel pipes. The transition of the steel pipe to polyethylene Equipment for welding polyethylene gas pipelines. Welding thermoplastics.
8. General information. Basic properties of building materials. Their connection with functional purpose of the material.
9. Structure of building materials. Processes of structure formation and destruction building materials. Methods of assessing the nature of the structure. The connection of the structure of the

material with its properties

10. Ceramic products. Classification. Raw materials. Technological schemes and stages production.

11. Non-woody concrete. Historical reference. General information. Classification and properties. Raw materials. Dry construction mixes (SBS).

12. Dry construction mixtures (SBS). General concepts. Classification and nomenclature. Raw materials The basis of SBS manufacturing technologies. Properties of SBS.

13. Results. Modern methods of cognition. A systematic approach. Polystructural theory composite building materials. Basics of synthesis of new materials.

Score criteria and diagnostic tools

The minimum and maximum score for the «credit» in the educational component «Modern building materials, engineering networks and equipment» ranges from 60 points to 100 points.

The educational component includes the following task – 2 calculated and graphical works.

1. Calculation and graphic work consists of calculation of labor costs, calendar costs schedules, calculation of information on the need for basic and auxiliary materials. It is performed in the form of an A1 format letter and an explanatory note.

2. Calculated - graphic work is related to the issues of determining the main ones properties of building materials and a description of modern construction technology materials. The work is performed in the form of an explanatory note in A4 format and drawings.

Term control is carried out in the form of credit. The credit score is set on the basis of the results of the current tasks control during the semester.

Information support

Main sources of information

1. DBN V.2.5-41:2009 "Gas pipelines from polyethylene pipes".
2. DBN V.2.5-20:2018 "Gas supply".
3. DBN V.2.5-39:2008 "External networks and structures. Thermal networks".
4. DBN V.2.5-39:2008 "Engineering equipment of buildings and structures. External networks and buildings Thermal networks".
5. Khomenko O.I., D.V. Bass player Methodical guidelines for the development of a course project "Technology of installation of heating and ventilation systems". Odesa, ODABA. 2018. 103 p.
6. DSTU B V.2.7-7:2008 Building materials. Small concrete wall products. Technical conditions. K. 2009.
7. DSTU B.V. 2.7-18-95. Building materials. Concrete is light. General technical conditions. K. 2010.
8. DSTU B.V. 2.7-18-95. Building materials. Concrete is light. General technical conditions. K. 2010.
9. Martynov V.I., Kazmirchuk N.V, Gara A.O. Methodical guidelines for the educational component "Modern building materials" for performing calculation and graphic work for students educational level - "Master" (forms of study - full-time and part-time). – Odesa: ODABA, 2020. 23 p.

Additional sources of information

10. Wozniak O.T., Savchenko O.O., Myronyuk H.V. Heating and gas supply and ventilation: Study guide. Lviv: Lviv Polytechnic, 2013. 276 p.
11. Shulga M.O., Aleksakhin O.O., Shushlyakov D.O. Heating and gas supply and ventilation: Study guide. Kharkiv: XNUMG, 2014. 191 p.
12. Runova R.F., Sheinich L.O., Gelevera O.G., Gots V.I. Basics of production of wall and finishing materials. Kyiv: KNUBA, 2011. 354 p.
13. Dworkin L.Y., Dworkin O.L. Construction concretes and mortars. - Kyiv: "Osnova", 2008. 445 p.