MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION

Federal State Autonomous Education “Ural Federal University named after the first President of Russia B.N. Yeltsin”

Institute of Construction and Architecture

Signed and Approved

Vice-rector for Research

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ V.V. Kruzhaev

«\_\_\_» \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2018 г.

COURSE PROGRAM

**COMPLEX ENGINEERING IMPROVEMENT OF URBAN TERRITO**RIES

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| **The list of information about the work program of the discipline** | **Credentials** |
| **Educational Program**   Level of training of highly qualified personnel | **Code of EP**  07.06.01/02.01 |
| **Direction of training**  Architecture  **Directivity:**  Urban planning, planning of rural settlements | **Code of direction and level of preparation** 07.06.01 |
| **Level of preparation**  Researcher. Research-instructor |
| **FSES** | **Details of the order of the Ministry of Education and Science of the Russian Federation on the approval of the FSES:**  of July 30, 2014, № 873  (Ed. 04/30/2015) |

**Ekaterinburg**

**2018**

**1. GENERAL CHARACTERISTICS OF THE DISCIPLINE**

**1.1. Annotation of the content of the discipline**

**1.1. Purpose of the discipline**

The purpose of studying the discipline "Integrated Engineering Improvement of Urban Areas" is to deepen knowledge on a number of theoretical problems and master the fundamentals of the engineering design of towns and rural settlements.

The tasks of the discipline are to study:

 basics of functional zoning of the territory.

 reconstruction of the planning structure of the city, city service system, residential development, engineering equipment.

 measures for the protection and regulation of the air quality of the city.

 fundamentals of engineering and transport provision of the population.

 methods of engineering development and preparation of territories for urban planning.

 fundamentals of engineering design improvement of a residential area.

 strategic approaches in urban planning.

 application of modeling in urban planning.

Place of discipline-module in the structure of the educational program

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| --- | --- | --- |
| 1 | Prerequisites | "The history of science (by industries)";  "Research methods";  "Urban planning, planning of rural settlements" |
| 2 | Corequisites | "Research Seminar" |
| 3 | Postrequisites | Final state certification |

**1.2. Language of implementation of the discipline - Russian**

**1.3. Planned learning outcomes of the discipline**

The result of training in the framework of the discipline is the formation of the following competencies:

A graduate student or applicant must master the following competencies:

• the knowledge of the regulatory framework in the field of engineering surveys, the principles of designing buildings, structures, planning and building settlements (PC-1);

• the ability to analyze and synthesize the current state of urban planning facilities, engineering and transport systems, develop new and develop existing methods for calculating and optimizing them (PC-2);

• the knowledge of software of modern design and calculation systems, knowledge of programming languages ​​in the field of engineering training, development of social and engineering and transport infrastructure of cities by means of computer-aided design of processes (PC-3);

• the ability to develop technical tasks and feasibility studies for the creation of high-tech research on the development of social and engineering and transport infrastructure of cities (PC-4).

**As a result of mastering the discipline, a graduate student should:**

**Know:**

• legal and regulatory frameworks and principles for the preparation and development of relevant urban planning documents;

• the main trends and principles of urban planning, problems of settlement,

• features of planning and development of rural settlements,

• methodology for designing engineering and transport support for the territories, locating and planning the production base of cities and territories, social, cultural and domestic enterprises, recreational areas, as well as town planning monitoring and problems of the environmental safety of the settlements.

**Be able to:**

• use the scientific and methodological principles of urban planning and territorial planning, develop territorial schemes of settlement

• know the methods and means of urban planning and design;

• use in the practice of designing and forecasting a software system for urban planning design, methods of modeling the tasks of territorial planning and development of engineering and transport infrastructure.

**Acquire:**

• skills in applying the methods and means of urban planning and design;

• independence to study and understand special (industry) scientific and methodological literature related to the problems of urban planning.

**2. CONTENT OF THE DISCIPLINE**

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| --- | --- | --- |
| **Code of**  **sections, topics** | **Section, topic of the discipline** | **Content** |
| 1 | Problems and challenges of engineering improvement | Problems and tasks of integrated engineering improvement of urban and rural areas, the development of engineering infrastructure  The current state and development prospects |
| 2 | General plan of the city or rural settlement | The role and importance in the new socio-economic conditions of the master plan of a city or rural settlement, directions and boundaries of development of territories of urban and rural settlements, zoning of territories, development of engineering, transport and social infrastructures, sanitary well-being. |

**4.3. Indicative topics of independent work**

**4.3.1. Indicative list of homework topics**

1. The role and importance of the master plan of a city or rural settlement in the new socio-economic conditions, directions and boundaries of development of territories of urban and rural settlements, zoning of territories, development of engineering, transport and social infrastructures

2. Goals and objectives of regulating the use of urban and rural settlements in the implementation of urban planning activities. Types of territorial zones: residential areas; social and business, production; zones of engineering and transport infrastructure; recreational areas; agricultural use zones; special purpose; zones of military facilities, other zones of restricted areas

3. Architectural and planning problems of reconstruction and development of cities and rural settlements. Tasks of a combination of tradition and innovation in planning and building. The value of the protection of monuments of architecture and valuable urban environment in the new environment. The use of features of the natural landscape and traditional methods of building in the formation of the architectural and artistic image of cities and rural settlements. town planning requirements for the preservation of objects of historical and cultural heritage and specially protected natural areas, ecological and sanitary well-being.

4. Motorization of cities. Problems of cities in connection with the high level of automobilization and their solution in domestic and foreign practice. The nature of the use of passenger cars on trips. Problems of organizing places for permanent and temporary storage of cars in different urban areas.

5. The current state and prospects of development of engineering and transport systems in cities of various sizes and rural settlements. The goals and objectives of urban planning solutions of the road network. Improvement of road systems in cities. Reconstruction of transport hubs in large cities using underground space, their planning and design characteristics

6. The concept of the development of mass passenger transport in cities in a historical aspect and at the present stage. Organization of public passenger street and off-street transport. New types of transport Organization of pedestrian areas in central areas of cities

7. Problems of engineering preparation of territories for urban development. The tasks of engineering training in the system of measures to improve the living conditions of the population in existing and under construction cities, during the development of individual territories. Evaluation factors and parameters of natural and climatic conditions for housing and civil and industrial construction

8. Engineering preparation and restoration of disturbed areas. Urban assessment of disturbed areas. Types and classification of violations. Engineering measures for the development of disturbed areas with their various urban planning use. Features of the vertical layout when restoring disturbed areas. Ecological problems of restoring disturbed areas and technical and economic indicators

9. Problems of water supply and sewage, fuel and energy facilities. Underground urbanization, the development of schemes for the integrated use of underground space. Reforming housing and communal services in cities and rural settlements

10. Protection of territories from flooding in the conditions of reconstruction of urban development. The main causes of flooding. Methods of protection against flooding. The influence of the general plan of the city on the choice of method of protection. The influence of the general plan of the city on the choice of method of protection. The concept of the rate of drainage of urban land with a different nature of their use. Calculation of the predicted level of groundwater. Methods to protect the territory from flooding. Classification of measures to combat the flooding of the territory under development. Preventive actions.

11. Drains and drainage devices. Drainage classification. Design elements of the drainage system. The use of modern materials. Drainage calculations. Hydrogeological calculation of horizontal tubular drains. Construction of depression curves. Basics of hydraulic calculation of drains. Protection against flooding in the reconstruction of urban development. Designing local drainage systems and connecting them to the drain. The use of new materials and structures for the protection of buried underground parts of buildings and structures, as well as utilities

12. Transport and sociological research. Types of surveys, purpose and objectives, methods of conducting. Justification of the volume of the sample when conducting surveys of movements, resettlement, attendance of objects of various functional purposes. The study of patterns of labor and unearned. Methodical bases of carrying out inspections of transport, pedestrian and passenger loading. Processing and results of transport and sociological surveys

13. Urban sanitation system. Principles of organization, structure. Utilization of solid household waste. Classification of municipal waste, composition, accumulation rates. Collection, transportation and disposal of waste production and consumption. Recycling and disposal of waste production and consumption. Organization of disposal of production and consumption wastes. Cleaning urban areas

**7. TRAINING-METHODOLOGICAL AND INFORMATION SUPPORT OF THE DISCIPLINE**

**7.4. Databases, information and reference and search engines**

1. "The Regional Scientific Library of UrFU" (http://lib.urfu.ru)

2. "ConsultantPlus" (http://www.consultant.ru)

3. “GARANT system” (http://www.garant.ru/products/ipo/system/)

4. Wikipedia (https://ru.wikipedia.org/wiki/Zaglavnaya\_strana)

5. “ELS of the Lan publishing center” (http://e.lanbook.com)

6. “ELS JURAYT” (http://www.biblio-online.ru/home?5)

7. "ELS" University Library Online "" (http://biblioclub.ru)

8. “ELD RSL” (http://diss.rsl.ru)

9. “SCOPUS” (http://www.scopus.com)

10. “Scientific Electronic Library” (http://elibrary.ru/defaultx.asp)

**7.5.Electronic educational resources**

1. "A single window of access to educational resources"

(access mode: http://window.edu.ru)

**8.2.4. List of indicative questions for the term**

1. Problems and tasks of integrated engineering improvement of urban and rural areas, development of engineering infrastructure

2. The role and importance of the master plan of the city or rural settlement in the new socio-economic conditions.

3. Goals and objectives of regulating the use of urban and rural settlements in the implementation of urban planning activities. Types of territorial zones:

4. Architectural and planning problems of reconstruction and development of cities and rural settlements.

5. Problems of cities in connection with the high level of automobilization and their solution in domestic and foreign practice.

6. The current state and prospects of development of engineering and transport systems in cities of various sizes and rural settlements.

7. Problems and tasks of engineering preparation of territories for urban development.

8. Engineering preparation and restoration of disturbed areas. Urban assessment of disturbed areas

9. Underground urbanization, development of schemes for the integrated use of underground space

10. Protection of territories from flooding in the conditions of reconstruction of urban development

11. Protection against flooding in conditions of reconstruction of urban development. Designing local drainage systems and connecting them to the drain

12. Transport and sociological research. Types of surveys, purpose and objectives, methods of conducting.

13. Urban sanitation system. Principles of organization, structure.