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

**SPECIAL ISSUES OF PREFABRICATED BUILDINGS RESEARCHING, CALCULATING AND DESIGNING, INSTALLING OF THEIR ELEMENTS**

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| **Information about the course program** | **Accounting data** |
| **Education program**  The main education doctoral graduate program | **Specialty code**  08.06.01/14.01 |
| **Major**  Engineering and Construction Technologies  **Training program**  Building structures, buildings and constructions | **Training program code**  08.06.01 |
| **Level of training**  Researcher. Research teacher |
| **Federal State Educational Standard** | **The Ministry of Education and Science of the Russian Federation approval FSES HE order details:**  July 30, 2014 No. 873 |

**Eкaterinburg**

**2017**

**1. GENERAL CHARACTERISTIC OF THE course**

Special issues of prefabricated buildings researching, calculating and designing, installing of their elements

**1.1. Abstract of the course content**

The purpose of studying the discipline " Special issues of prefabricated buildings researching, calculating and designing, installing of their elements" is the improving of knowledge on a number of theoretical problems of research, calculation, design and operation of pre-fabricated buildings and their elements.

**1.3. Planned learning outcomes**

After mastering this course, the graduate student must acquire the following competencies:

* readiness to participate in the work of Russian and international research teams to solve scientific and scientific-educational tasks (UC-3);
* the ability to present the results of their research professionally in the form of scientific publications and presentations (GPC -5);
* the ability to develop new research methods and their application in independent research activities in the field of construction (GPC-6);
* the ability to develop physical and mathematical models of objects and processes in the design of engineering structures, structures and processes (PC-1);
* the ability to analyze and synthesize engineering structures, technologies and structures, develop new ones and develop existing methods for calculating and optimizing them (PC-2);
* the ability to use modern software systems design and calculation, knowledge of programming languages ​​in the field of design and technological training, computer-aided design products, systems and processes (PC-3).

As a result of mastering the course, the student must to:

Know:

* typology of pre-fabricated, including mobile, buildings and structures;
* State of the theory and practice of using pre-fabricated, including mobile, buildings and structures;
* features of the functional and technical requirements for pre-fabricated, including mobile, buildings and structures;
* features of work and calculation of thin-walled load-bearing metal structures for power loads;
* features of work and calculation of enclosing structures based on thin-walled metal profiles on non-force impacts;
* design features of pre-fabricated, including mobile, buildings and structures.

Be able to

* use the regulatory and technical base for the calculation and design of pre-fabricated buildings and structures;
* perform calculations of the overall and local stability of thin-walled load-bearing metal structures for power loads, taking into account the peculiarities of their work, including the flexural-torsional form;
* perform calculations of thin-walled metal enclosures for power and non-force loads and impacts, taking into account the peculiarities of their work.

Master (demonstrate skills and experience):

* skills in using software tools for mathematical modeling of thin-walled load-bearing metal structures;
* skills in using software for mathematical modeling of walling based on thin-walled metal profiles;
* skills to use software for mathematical modeling of non-force effects on heterogeneous walling;
* knowledge of the mathematical apparatus for solving problems;
* the ability to independently study and understand special scientific and methodological literature related to the problems of mathematical modeling, calculation and design of pre-fabricated buildings and structures and thin-walled metal structures.

**2. COURSE CONTENTS**

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| **Code** | **Section, topic** | **Content** |
| P1 | Types and features of pre-fabricated rear and structures | Typology of prefabricated buildings. Historical reference. Buildings complete supply. Mobile buildings and structures, especially their design solutions, typology. Collapsible and container buildings. Distinctive design features from traditional buildings. Features of the functional and technical requirements for prefabricated buildings and structures. Actual tasks in the field of pre-fabricated buildings and structures. |
| P2 | Properties and work of materials | The main properties and work of materials used in thin-walled metal structures of pre-fabricated buildings and structures. |

**7. METHODICAL AND INFORMATION SUPPORT**

**7.4. Search systems, databases, information and reference systems**

1) Search system «Google» (https://www.google.ru/). Free access from the Internet.

2) Search system «Scholar Google» (https://scholar.google.ru/). Free access from the Internet.

3) Electronic Scientific Archive of UrFU (http://elar.urfu.ru/). Free access from the Internet.

4) Scientific electronic library «eLIBRARY.ru» (http://elibrary.ru/). Free access from the Internet.

5) Scientific electronic library «CyberLeninka » (http://cyberleninka.ru/). Free access from the Internet.

6) Full-text database "SpringerLink" (https://rd.springer.com/). Free access from the UrFU corporate network.

7) Scopus reference database (http://www.scopus.com/). Free access from the UrFU corporate network.

8) The Abstract Database "Web of Science Core Collection" (http://apps.webofknowledge.com/). Free access from the UrFU corporate network.

9) Electronic library system “Lan” (http://e.lanbook.com/). Access: 1) free from the UrFU corporate network; 2) remote access via the Internet using logins and passwords. To obtain a login and password, you must register using any computer on the UrFU corporate network.

10) University Library Online Electronic Library System (http://biblioclub.ru/). Access: 1) free from the UrFU corporate network; 2) remote access via the Internet using logins and passwords. To obtain a login and password, you must register using any computer on the UrFU corporate network.

11) Electronic library system "Library Packer" (http://www.bibliocomplectator.ru). Access: 1) free from the UrFU corporate network; 2) remote access via the Internet using logins and passwords. To obtain a login and password, you must register using any computer on the UrFU corporate network.

12) Electronic database Polpred.com (http://polpred.com/). Access: 1) free from the UrFU corporate network; 2) remote access via the Internet using logins and passwords. To obtain a login and password, you must register using any computer on the UrFU corporate network.

13) Professional reference system"TechExpert". Access from any computer of the UrFU corporate network via the link posted on the Internet site of the National Security Service of UrFU (http://lib.urfu.ru/).

## 7.5. Electronic educational resources

1. Electronic resources of the UrFU zonal Scientific Library. URL:http://lib.urfu.ru/

**8. base of materials for current academic performance Evaluation and interim assessment**

**8.2.4. Sample questions for credit**

1. Typology of pre-fabricated buildings. Historical reference. Buildings complete supply. Mobile buildings and structures, especially their design solutions, typology. Collapsible and container buildings.

2. Distinctive design features from traditional buildings. Features of the functional and technical requirements for prefabricated buildings and structures. Actual tasks in the field of pre-fabricated buildings and structures.

3. The main properties and work of materials used in thin-walled metal structures of pre-fabricated buildings and structures.

4. Mobile buildings and facilities. Features typology, design solutions, applications. Differences from stationary buildings.

5. Actual tasks in the field of pre-fabricated buildings and structures.

6. Normative-technical base for the development and design of pre-fabricated buildings.

7. Pre-fabricated buildings from folding sections. Constructive solutions and features of the calculation.

8. Constructive solutions of stationary and collapsible pre-fabricated buildings and structures. Domestic and foreign experience.

9. The state of the theory and practice of using prefabricated buildings in Russia and abroad. Market analysis of prefabricated buildings. Methodical approaches to the formation of a unified normative-technical and information base for the design of pre-fabricated complexes.

10. technical foundations of the theory of the use of prefabricated buildings and settlements in normal conditions and emergency situations. The fast-built complex as a complex technical system. The system of patterns of development of pre-fabricated complexes. Models of prefabricated complexes. Scientific and technical basis for the development of prefabricated complexes.

11. Development of prefabricated complexes in the future. Scientific and technical basis of forecasting. Methods for predicting the development of pre-fabricated complexes. Ways and methods of improving collapsible and container buildings and complexes.

12. Theory and practice of evaluating the effectiveness and operation of prefabricated complexes. Methodological principles and methods for evaluating the effectiveness of prefabricated construction. Criteria for assessing the efficiency of operation of prefabricated complexes.

13. Information support of the market of pre-fabricated buildings and settlements. Models of consumer properties of pre-fabricated buildings and settlements. Information base modeling. The method of selecting indicators of the model.

14. Types of supporting structures of pre-fabricated buildings and structures, especially their work and design.

15. Types of enclosing structures of pre-fabricated buildings and structures based on metal profiles, especially their work on the combined effect of power and non-force loads and impacts.

16. Profiled sheets. Types, features of work and calculation. Two-layer and three-layer panels with metal skins. Features of work and calculation.

17. Features of the work of layered structures on power loads, including temperature effects.

18. Features of the calculation of light enclosing structures for the emission of heat. Regulatory and technical base for heat engineering calculations of enclosing structures based on thin-walled metal profiles.