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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University**

Academy of Engineering

(educational division (faculty/institute/academy) as programme developer)

Department of Construction Technology and Structural Materials

(department realizing the PhD program)

COURSE SYLLABUS

Construction materials and products

(course title)

Scientific specialty:

2.1.5. Construction materials and products

(scientific speciality code and title)

The course instruction is implemented within the PhD programmes:

Construction materials and products

(PhD program title)

1. DISCIPLINE (MODULE) GOAL

The purpose of mastering the discipline « Construction materials and products » is to gain knowledge, skills, and experience in the field of calculation of structures and structures that characterize the stages of competence formation and ensure the achievement of the planned results of the development of the educational program and also preparation for the candidate's examinations and obtaining knowledge, skills and experience in the field of construction.

2. REQUIREMENTS TO PHD-STUDENTS ON FINISHING THE COURSE

Mastering the discipline « Construction materials and products » is aimed at preparing for passing candidate exams, as well as mastering the competencies:

Proficiency in the methodology of theoretical and experimental research in the field of construction;

Proficiency in the culture of scientific research in the field of construction, including using the latest information and communication technologies;

Proficiency in methods for developing scientific and methodological foundations for research, improvement, theoretical, experimental and technical and economic justification for the use of various technical solutions and technologies in construction;

Proficiency in innovative scientifically based methods for designing structures and devices for obtaining water from natural sources, its preparation for various needs, transportation to places of consumption, subsequent processing with rational use in technological cycles, taking into account the requirements for ensuring environmental safety, increasing the cost-effectiveness and reliability of the functioning of water management systems in populated areas, industrial enterprises and territorial-industrial complexes.

3. WORKLOAD OF THE DISCIPLINE AND TYPES OF ACTIVITIES

The overall workload of the discipline « Construction materials and products » is 3 credit units (108 academic hours).

Types of activities		Total ac. hrs.	Semesters
			3
<i>Classroom activities (total), including:</i>		60	60
в том числе:			
Lectures (LC)		30	30
Laboratory activities (LA)		–	–
Practical lessons/Seminars (PC)		30	30
<i>Independent work</i>		48	48
<i>Intermediate certification (test with assessment/exam)</i>		–	–
Overall workload	ac. hrs.	108	108
	credits	3	3

4. CONTENT OF THE DISCIPLINE

Name of the discipline section	Contents of the section (topic)	Type of study work
Section 1. Basic properties of materials	Topic 1.1. Material performance in construction: factors affecting the material in the process Topic 1.2. Properties in relation to water. Properties in relation to heat Topic 1.3. Special properties of building materials	LC, PC
Section 2. Wood materials	Topic 2.1. The role of wood in construction. Wood structure. Wood and materials made from it	LC, PC

	Topic 2.2. The concept of materials and rocks. The role of natural stone materials in construction	
Section 3. Natural stone materials. Ceramic and glass materials	Topic 3.1. Brief information on the history of ceramics. Basic properties of ceramic materials. Classification of ceramic products. Topic 3.2. Wall ceramic materials. Ordinary ceramic brick Topic 3.3. The concept of materials and rocks. The role of natural stone materials in construction	LC, PC
Section 4. Metallic materials and products	Topic 4.1. Classification of metals. Basic properties of metals Topic 4.2. General information about metals and alloys Ferrous metals. Fundamentals of cast iron and steel production technology. Non-ferrous metals. Main types of non-ferrous metals Topic 4.3. Testing of concrete reinforcement. Technological testing of concrete reinforcement Topic 4.4. Types of ferrous metal construction products: rolled products, concrete reinforcement, pipes, profile sheets, decorative products.	LC, PC
Section 5. Mineral binders	Topic 5.1. General information about binders. Air binders. Clay as a binder. Topic 5.2. Portland cement: raw materials, main types of production, chemical and mineral composition.	LC, PC
Section 6. Organic binders	Topic 6.1. General properties of organic binders. Polymers and environmental issues.	LC, PC
Section 7. Fillers for concrete and mortar. Concrete.	Topic 7.1. The role of fillers in concrete and mortars. Active and reinforcing fillers. Topic 7.2. Basic information about concrete. Heavy concrete. Properties of concrete mix Topic 7.3. Properties of concrete. Design of concrete composition Topic 7.4. Laying and compacting concrete mix. Special types of heavy concrete	LC, PC
Section 8. Precast and monolithic reinforced concrete. Construction mortars.	Topic 8.1. General information about reinforced concrete, the role of reinforcement and concrete Topic 8.2. The concept of monolithic and precast reinforced concrete. Manufacturing of reinforced concrete products, technology basics. Topic 8.3. General information about building solutions. Their classification (by type of binder)	LC, PC

5. EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Room Type	Room Equipment	Specialized educational / laboratory equipment, software and materials
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		for mastering the discipline
Class for Seminars	Room for seminar-type classes, equipped with a set of specialized furniture, board (screen) and technical / multimedia gadgets	Not necessary
Self-Work Class	Room for self-working (can be used for lecture and seminars activities), equipped with a set of specialized furniture, board (screen) and technical / multimedia gadgets and computers with an access to EIPES	Not necessary

6. METHODOLOGICAL SUPPORT AND LEARNING MATERIALS

Main readings:

1. Pshenichny, G. N. Construction materials and products: activated concrete technology: a textbook for secondary vocational education / G. N. Pshenichny. - 2nd ed., corrected. and add. - Moscow: Publishing house Yurait, 2024. - 224 p. - (Vocational education). - ISBN 978-5-534-12539-9. - Text: electronic // Educational platform Yurait [website]. - URL: <https://urait.ru/bcode/542578>.
2. Barabanshchikov, Yu. G. Construction materials and products [Text]: a textbook for secondary vocational education / Yu. G. Barabanshchikov. - 5th ed., stereotypical. - Moscow: Academy, 2014.
3. Yudina, A. F. Metal and reinforced concrete structures. Montage: textbook for universities / A. F. Yudina. - 2nd ed., corrected and supplemented. - Moscow: Yurait Publishing House, 2019. - 302 p. - (Series: Specialist). - ISBN 978-5-534-06927-3. - Text: electronic // EBS Yurait [website]. - URL: <https://biblio-online.ru/bcode/434494> (date of access: 01.04.2019).

Additional readings:

1. Krivoshapko, S. N. Designs of buildings and structures: a textbook for secondary vocational education / S. N. Krivoshapko, V. V. Galishnikova. - Moscow: Yurait Publishing House, 2019. - 476 p. - (Series: Professional education). - ISBN 978-5-534-02348-0. - Access mode: HYPERLINK <https://biblio-online.ru/bcode/433396>
2. Dedyukh, R. I. Materials science and technology of structural materials. Fusion welding technology: a textbook for applied bachelor's degree / R. I. Dedyukh. - Moscow: Yurait Publishing House, 2019. - 169 p. - (Series: Universities of Russia). - ISBN 978-5-534-01539-3. — Text : electronic // EBS Yurait [website]. — URL: <https://biblio-online.ru/bcode/433979> (date accessed: 01.04.2019).
3. Yudina, A. F. Building structures. Installation : textbook for SPO / A. F. Yudina. — 2nd ed., corr. and add. — Moscow : Yurait Publishing House, 2019. — 302 p. — (Series : Professional education). — ISBN 978-5-534-07027-9. — Access mode : HYPERLINK <https://biblio-online.ru/bcode/442133>
4. Shambina S.L. Structural mechanics [Text/electronic resource]: Lecture notes. / S.L. Shambina. - Electronic text data. - M.: RUDN University Press, 2015. - 48 p.: ill. - ISBN 978-5-209-06779-5: 42.15. Access mode: http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=447028&idb=0

Internet sources:

ELS RUDN University and third party EBS, to which university students have access based signed contracts:

- RUDN Electronic Library System, <http://lib.rudn.ru/MegaPro/Web> ;
- ELS University Library Online, <http://www.biblioclub.ru> ;
- EBS Urayt, <http://www.biblio-online.ru> ;
- ELS Student Consultant, <http://www.studentlibrary.ru> ;
- EBS Lan, <http://e.lanbook.com> ;
- EBS Trinity Bridge <http://www.trmost.ru>

Databases and search engines:

- Electronic fund of legal and normative-technical documentation, <http://docs.cntd.ru> ;
- Yandex search system [https:// www .yandex.ru](https://www.yandex.ru) ;
- Google search system <https://www.google.com> ;
- Reference database Scopus , <http://www.elsevierscience.ru/products/scopus>

Educational and methodological materials for students' self-work studying the discipline / module:

A course of lectures on the discipline « Construction materials and products».

7. ASSESSMENT TOOLKIT AND GRADING SYSTEM FOR MIDTERM ATTESTATION OF STUDENTS IN THE DISCIPLINE (MODULE)

Assessment toolkit and a grading system to evaluate the level of competences (competences in part) formation as the course results are specified on the TUIS platform.

DEVELOPERS:

Associate Professor

A.S. Markovich

HEAD OF THE DEPARTMENT

Head of Department

S.B. Yazyev