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 higher education programme developer

COURSE SYLLABUS

Building materials: Special Topics
course title

Recommended by the Didactic Council for the Education Field of:
08.04.01 Civil Engineering
field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:
Civil Engineering and Built Environment
higher education programme profile/specialisation title

2024

1. COURSE GOAL(s)

The goal of the course Building materials: Special Topics is to formulate in students an idea of the functional relationship between material and structure, which determines the choice and optimization of material properties, based on the purpose of durability and operating conditions of structures; to study of the compositions, structure and technological bases for obtaining materials with specified functional properties using natural and man-made raw materials, instrumental methods of quality control and certification at the stages of production and consumption.

Course objectives are:

- consideration of materials as elements of the material-construction system, which ensure the functioning of structures with a given reliability and safety;
- study of methods for creating materials with the required service properties, including the appropriate choice of raw materials, waste disposal, methods of processing and assessing their quality, technological methods for forming a structure;
- study of the system of indicators of the quality of building materials and regulatory methods for their determination and evaluation using modern research equipment and statistical data processing.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The course Building materials: Special Topics implementation is aimed at the development of the following competences (competences in part):

Table 2.1. List of competences that students acquire during the course «Building materials: Special Topics»

Competence code	**Competence descriptor**	**Competence formation indicators** (within this course)
PC-1	Conducting scientific research in the field of construction	PC-1.2 Able to carry out, control, receive research results; PC-1.3 Able to analyze and process research results
PC-2	Development of project products based on the results of engineering and technical design for urban development activities	PC-2.1 Capable of performing engineering and technical design and developing design products for building structures, grounds and foundations; PC-2.2 Able to perform engineering and technical design and develop design products for engineering systems and engineering structures

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course Building materials: Special Topics refers to the *elective component* of (B1) block of the higher educational programme curriculum.

Within the higher education programme students also master other disciplines (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course Building materials: Special Topics.

Table 3.1. The list of the higher education programme components that contribute to the achievement of the expected learning outcomes as the internship results.

Competence code	**Competence descriptor**	**Previous courses / modules, internships**	**Subsequent courses / modules, internships**
PC-1	Conducting scientific research in the field of construction		Sustainability in Civil Engineering; Geometric Shaping and Analysis of Shells; Independent Research Work

			(obtaining basic skills of research work); Independent Research Work; Pre-Graduation Practice
PC-2	Development of project products based on the results of engineering and technical design for urban development activities		Life Cycle Economics of Buildings; Structural Design in Reinforced Concrete: Special Topics; Structural Dynamics; Structural Design in Steel: Special Topics; Modelling of Construction Processes; Applications of Finite Element Method for Civil Engineering problems; Sustainability in Civil Engineering; Optimization Methods in Civil Engineering; Structural Stability; Geometric Shaping and Analysis of Shells; Engineering Systems of Buildings; Desin Practice; Technological Practice; Pre-Graduation Practice

4. COURSE WORKLOAD

The total workload of the course Building materials: Special Topics is 5 credits.

Table 4.1. Academic activities types by periods of the higher education programme

Type of academic activities	**Total academic hours**	**Semester(s)**			
		1			
Contact academic hours	36	36			
including:					
Lectures (LC)	18	18			
Lab works (LW)	0	0			
Seminars (workshops / tutorials) (S)	18	18			
Self-studies academic hours	117	117			
Evaluation and assessment academic hours	27	27			
Course work / project, credits					

Type of academic activities		Total academic hours	Semester(s)			
			1			
Course workload	academic hours	180	180			
	credits	5	5			

5. COURSE CONTENTS

Modules	Contents (topics)	Academic activities types *
Section 1. Main properties of building materials	1. Properties, structure and composition of building materials 2. Physical properties and structural characteristics 3. Mechanical properties	LC, S
Section 2. Thermal insulation materials 1 part	1. Purpose and classification of thermal insulation materials 2. Technical properties of thermal insulation materials	LC, S
Section 3. Thermal insulation materials Part 2	1. Inorganic heat-insulating materials and products. 2. Organic thermal insulation materials and products.	LC, S
Section 4. Thermal insulation materials 3part	1. Organic thermal insulation materials and products. 2. Heat-insulating plastics	LC, S
Section 5. Roofing materials	1. General Provisions 2. Roll and mastic roofs 3. Roofs from sheet and piece materials	LC, S
Section 6. Painting materials 1 part	1. Nomenclature and characteristics 2. Binders for paints 3. Pigments	LC, S
Section 7. Paints and varnishes	1. Pigments 2. Fillers 3. Thinners and solvents 4. Varieties of painting compositions	LC, S
Section 8. Acoustic materials	1. General information 2. Sound-absorbing materials Soundproof1. General information 2. Sound-absorbing materials Soundproof	LC, S

* - to be filled in only for full -time training: LC - lectures; LW - lab work; S - seminars.

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Type of academic activities	Classroom equipment	Specialized educational / laboratory equipment, software and materials for course study (if necessary)
Lectures	An auditorium for conducting lectures, equipped with a set of specialized furniture;	

	a blackboard (screen) and technical means for multi-media presentations.	
Seminars	A classroom for conducting seminars, group and individual consultations, current and midterm assessment; equipped with a set of specialised furniture and technical means for multimedia presentations.	
Computer Labs	Not required	
Self-studies	A classroom for independent work of students (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the electronic information and educational environment	

7. RESOURCES RECOMMENDED FOR INTERNSHIP

Main readings:

1. Bafekrpour E. Advanced Composite Materials: Properties and Applications 2023. 1 c. ISBN 9783110574432 URL: https://doi.org/10.1515/9783110574432

Additional readings:

1. Maurizio Dapor, Simone Taioli, Nicola M. Pugno. New Frontiers in Multiscale Modelling of Advanced Materials 2022. 1 c. ISBN 9782889197552 URL: http://journal.frontiersin.org/researchtopic/3121/new-frontiers-inmultiscale-modelling-of-advanced-materials
2. G.M.L. Gladwell. Lecture Notes on Composite Materials: Contributed volume / G.M.L. Gladwell, B. Rene, S. Tomasz. -: Springer Netherlands, 2019. - (Solid Mechanics and Its Applications ; 154). http://lib.rudn.ru/MegaPro/UserEntry?Action=Rudn_FindDoc&id=327148&idb=0

Internet sources:

1. Electronic libraries (EL) of RUDN University and other institutions, to which university students have access on the basis of concluded agreements:
   - RUDN Electronic Library System (RUDN ELS) http://lib.rudn.ru/MegaPro/Web
   - EL "University Library Online" http://www.biblioclub.ru
   - EL "Yurayt" http://www.biblio-online.ru
   - EL "Student Consultant" www.studentlibrary.ru
   - EL "Lan" http://e.lanbook.com/
   - EL "Trinity Bridge"
2. Databases and search engines:
   - electronic foundation of legal and normative-technical documentation http://docs.cntd.ru/
   - Yandex search engine https:// www .yandex.ru/
   - Google search engine https://www.google.ru/
   - Scopus abstract database http://www.elsevierscience.ru/products/scopus/

The training toolkit and guidelines for a student:

1. Collection of lectures on the course Building materials: Special Topics.

* The training toolkit and guidelines for the course are placed on the internship page in the university telecommunication training and information system under the set procedure..

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL AS INTERNSHIP RESULTS

The assessment toolkit and the grading system* to evaluate the level of competences (competences in part) formation as the course Building materials: Special Topics results are specified in the Appendix to the internship syllabus.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

DEVELOPERS:

Associate Professor in the Department of Construction Technology and Structural Materials		M.I. Rynkovskaya
position, educational department	signature	name and surname
position, educational department	signature	name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

Head of the Department of Construction Technology and Structural Materials		A.V. Solovyeva
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HEAD OF
HIGHER EDUCATION PROGRAMME:

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