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

BIM-Technology in Construction Management
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 BIM-Technology in Construction Management is the formation of students' understanding of BIM-technology and familiarization with the principles of using this technology in the organization and management of construction.

Objectives of the course:

- study of the basic principles of BIM technology;
- obtaining by students of theoretical knowledge and practical skills necessary for the use of BIM technology in the organization and management of construction;
- obtaining practical skills necessary to build 4D and 5D models of elements of construction projects.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The course BIM-Technology in Construction Management 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 «BIM-Technology in Construction Management»

Competence code	**Competence descriptor**	**Competence formation indicators** (within this course)
GC-2	Able to manage the project at all stages of its life cycle	GC-2.1 Formulates the goals and objectives of the project, determines the expected results
GC-7	Able: to search for the neces-sary sources of information and data, perceive, analyze, remember and transmit information using digital means, as well as using algorithms when working with data received from various sources to effectively use the information to solve problems ; to assess information, its reliability, to build logical conclusions on the basis of incoming information and data	GC-7.1 Searches for relevant sources of information and data, perceives, analyzes, remembers and transmits information using digital tools and algorithms when working with data from various sources in order to effectively use the information to solve problems; GC-7.2 Evaluates information, its reliability, builds logical conclusions on the basis of incoming information and data
GPC-3	Able to set and solve scientific and technical problems in the field of construction, construction industry and housing and communal services on the basis of knowledge of industry problems and experience in their solution	GPC-3.2 Able to set and solve scientific and technical tasks in the field of technology, organization, management of construction and operation of capital construction projects
GPC-4	Able to use and develop project and administrative documentation, as well as participate in the development of normative legal acts in the field of construction and housing and communal services	GPC-4.1 Able to use and develop project documentation; GPC-4.2 Able to use and develop administrative documentation; GPC-4.3 Able to use normative legal acts in the field of construction industry and housing and communal services, as well as to participate in their development
GPC-5	Able to conduct and organize design and survey work in the field of construction, housing and	GPC-5.1 Able to conduct and organize survey work in the field of construction and housing and communal services;

	communal services, carry out technical expertise of projects and designer's supervision of their compliance	GPC-5.2 Capable of conducting and organizing technical expertise of projects and author's supervision of their observance
GPC-7	Able to manage an organization operating in the construction industry and housing and communal services, to organize and optimize its production activities	GPC-7.1 Capable of planning and organizing work in the field of design, construction, operation of capital construction projects; GPC-7.2 Has knowledge in the field of operational management, management of works in the field of design, construction, operation of capital construction objects; GPC-7.3 Capable of controlling and accepting work in the design, construction and operation of capital construction projects; GPC-7.5 Able to develop measures to improve the efficiency of work in the design, construction, operation of capital construction projects
PC-3	Organizational, technical and technological preparation of construction production	PC-3.1 Able to carry out scheduling of construction works; PC-3.2 Knows how to choose the required material, labor resources and construction equipment for the production of works; PC-3.3 Knows how to choose suitable techniques, methods of work; PC-3.4 Able to plan control over the production of construction works, including compliance with safety during the production of works; PC-3.5 Able to develop organizational and technological documentation
PC-5	Organization of construction works at the capital construction facility	PC-5.1 Knows how to determine the required resources to perform the work; PC-5.2 Able to carry out scheduling of works; PC-5.3 Able to identify and take into account regulatory, legislative requirements, project requirements and organizational and technological documentation for the production of construction works; PC-5.4 Capable of performing operational management, monitoring the progress of work; PC-5.5 Able to carry out technical control, supervision, acceptance of construction works

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course BIM-Technology in Construction Management refers to the *core 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 BIM-Technology in Construction Management.

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
GC-2	Able to manage the project at all stages of its life cycle	Problem solving tecniques in Civil Engineering; Project management	Independent Research Work
GC-7	Able: to search for the neces-sary sources of information and data, perceive, analyze, remember and transmit information using digital means, as well as using algorithms when working with data received from various sources to effectively use the information to solve problems ; to assess information, its reliability, to build logical conclusions on the basis of incoming information and data	Problem solving tecniques in Civil Engineering; Digital technologies in construction; Geoinformation Systems and Applications	Introductory Practice; Independent Research Work
GPC-3	Able to set and solve scientific and technical problems in the field of construction, construction industry and housing and communal services on the basis of knowledge of industry problems and experience in their solution	Mathematical Modelling; Digital technologies in construction; Project management	Desin Practice; Technological Practice; Independent Research Work
GPC-4	Able to use and develop project and administrative documentation, as well as participate in the development of normative legal acts in the field of construction and housing and communal services	Digital technologies in construction; Project management	Desin Practice; Technological Practice
GPC-5	Able to conduct and organize design and survey work in the field	Digital technologies in construction; Project management	Desin Practice; Technological Practice

	of construction, housing and communal services, carry out technical expertise of projects and designer's supervision of their compliance		
GPC-7	Able to manage an organization operating in the construction industry and housing and communal services, to organize and optimize its production activities	Problem solving tecniques in Civil Engineering; Project management	Desin Practice; Technological Practice
PC-3	Organizational, technical and technological preparation of construction production	Project management; Modelling of Construction Processes	Technological Practice; Pre-Graduation Practice
PC-5	Organization of construction works at the capital construction facility	Project management; Modelling of Construction Processes	Technological Practice; Pre-Graduation Practice

4. COURSE WORKLOAD

The total workload of the course BIM-Technology in Construction Management is 3 credits.

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

Type of academic activities		**Total academic hours**	**Semester(s)**			
			3			
Contact academic hours		54	54			
including:						
Lectures (LC)		18	18			
Lab works (LW)		36	36			
Seminars (workshops / tutorials) (S)		0	0			
Self-studies academic hours		27	27			
Evaluation and assessment academic hours		27	27			
Course work / project, credits						
Course workload	academic hours	108	108			
	credits	3	3			

5. COURSE CONTENTS

Modules	Contents (topics)	Academic activities types *
Section 1. Basic concepts	BIM concept. Project implementation methods and BIM implementation. Levels of Development (LOD).	LC, LW
Section 2. Cloud-BIM for design/construction coordination and collision detection	Systems and a systematic approach in the management of a construction enterprise. Synergetic of the system. Efficiency of synergetic management of a construction enterprise.	LC, LW
Section 3. Construction planning and 4D modeling	Construction planning. Location Modeling Elements for Task Planning. Modeling 4D.	LC, LW
Section 4. Calculation of the scope of work and cost estimates 5D	Types of estimates. Conceptual estimate. detailed cost estimate. Calculation based on 5D models.	LC, LW

* - 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.	
Lab works	An auditorium for laboratory work, equipped with a set of specialized furniture and equipment.	Computer laboratory
Computer Labs	A classroom for conducting classes, group and individual consultations, current and mid-term assessment, equipped with personal computers (in the amount of 14 pcs), a board (screen) and technical means of multimedia presentations.	Software: Autodesk Revit Autodesk Navisworks
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. “BIM and Construction Management: Proven Tools, Methods, and Workflows”, Brad Hardin, Dave McCool, John Wiley & Sons,2023.

2. BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors, Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston, Wiley, 2016.
3. Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations, McGraw Hill Professional, Kymmell, Willem, 2018.

Additional readings:

1. Talapov, VV BIM technology: the essence and features of the implementation of information modeling of buildings / VV Talapov. Moscow: DMK-Press, 2016.- 410 p.

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 BIM-Technology in Construction Management.

* 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 BIM-Technology in Construction Management 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:

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position, educational department	signature	name and surname
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HEAD OF EDUCATIONAL DEPARTMENT:

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