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

Modelling of Construction Processes
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 <u>Modelling of Construction Processes</u> is to provide students with the skills and knowledge of model-based workflows in the construction management using Building Information Modelling (BIM) technologies.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The course <u>Modelling of Construction Processes</u> 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 <u>«Modelling of Construction Processes»</u>

Competence code	Competence descriptor	Competence formation indicators (within this course)
PC-2	Development of project products based on the results of engineering and technical design for urban development activities	PC-2.3 Is able to perform organizational and technological design and develop construction organization projects and work production 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 <u>Modelling of Construction Processes</u> 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 <u>Modelling of Construction Processes</u>.

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.

Comp etence code	Competence descriptor	Previous courses / modules, internships	Subsequent courses / modules, internships
PC-2	Development of project products based on the results of engineering and technical design for urban development activities	Digital technologies in construction; Structural Design in Steel; Nanotechnology in Civil Engineering; Structural Design in Reinforced Concrete; Building materials: Special Topics	Life Cycle Economics of Buildings; 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
PC-3	Organizational, technical and technological preparation of construction production	Project management	Life Cycle Economics of Buildings; BIM-Technology in Construction Management; Technological Practice; Pre-Graduation Practice
PC-5	Organization of construction works at the capital construction facility	Project management	Life Cycle Economics of Buildings; BIM-Technology in Construction Management; Technological Practice; Pre-Graduation Practice

4. COURSE WORKLOAD
The total workload of the course <u>Modelling of Construction Processes</u> is <u>5</u> credits.

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

Type of academic activities	Total academic hours	Semester(s)				
		2				
Contact academic hours	72	72				
including:						
Lectures (LC)	36	36				
Lab works (LW)	0	0				
Seminars (workshops / tutorials) (S)	36	36				
Self-studies academic hours	72	72				

Type of academic activities		Total academic hours	Semester(s)				
			2				
Evaluation and assessment academic hours		36	36				
Course work / project, credits			2				
Course workload	academic hours	180	180				
	credits	5	5				

5. COURSE CONTENTS

Modules	Contents (topics)	Academic activities types *
Section 1. BIM Technology	The concept of BIM. Project delivery methods and BIM implementation. Levels of Development (LOD). Applications in construction management	LC, S
Section 2. Cloud-BIM for design/construction coordination & clash detection	BIM for buildability scenario forecasting. Interference management. Clash detection	LC, S
Section 3. Construction Planning and 4D Simulation	Construction planning. Elements to model location for scheduling tasks. 4D simulations	LC, S
Section 4. Quantity Takeoff and Cost Estimating	Types of estimates. Conceptual estimate. Detailed estimate. Model-based calculation	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	A classroom for conducting classes, group and individual consultations, current and mid-term assessment, equipped with personal computers (in the amount of 14	Software: Revit, Renga

	pcs), a board (screen) and technical means of multimedia presentations.	
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, 2024.

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 <u>Modelling of Construction Processes</u>.

* 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 <u>Modelling of Construction Processes</u> 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		Elsheikh A.M.
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
position, educational department	signature	name and surname

HEAD OF
HIGHER EDUCATION PROGRAMME:

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