Federal State Autonomous Educational Institution of Higher Education
"Peoples' Friendship University of Russia named after Patrice Lumumba"

ACADEMY OF ENGINEERING
(name of the main educational division (faculty/institute/academy) as higher education programme developer)

COURSE SYLLABUS

LIFE CYCLE ECONOMICS OF BUILDINGS / ЭКОНОМИКА ЖИЗНЕННОГО ЦИКЛА ЗДАНИЙ
(name of the discipline/module)

Recommended by the Didactic Council for the Education Field of:

08.04.01 CONSTRUCTION
(code and name of field of studies/speciality)

The course instruction is implemented within the professional education programme of higher education:

CIVIL ENGINEERING AND BUILT ENVIRONMENT
(name of higher education programme profile/specialisation)

2025 г.

1. COURSE GOAL(s)

The goal of the course Life Cycle Economics of Buildings is to provide students with the skills and knowledge needed to effectively use the principles of engineering economy in construction.

Course objectives:

- To establish an understanding of engineering economy principles.
- To provide the students with essentials of life cycle economics of building.
- To familiarize students with the analysis methods.
- To present some applications.

2. REQUIREMENTS FOR LEARNING OUTCOMES

The course Life Cycle Economics of Buildings 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 «Life Cycle Economics of Buildings»

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-2.2 Within the scope of the tasks, identifies the available resources and limitations; GC-2.4 Monitors the progress of the project, adjusts the schedule in accordance with the results of the control, evaluates the performance of the project
GC-6	Able to identify and implement the priorities of their own activities and ways to improve them on the basis of self-assessment	GC-6.1 Analyzes tasks, projects, and their goals. Defines its resources and their limits (personal, situational, temporary, etc.) for the successful completion of the task; GC-6.2 Prioritize and choose the appropriate tools and methods for achieving goals and managing time
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-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 communal services, carry out technical expertise of projects and designer's supervision of their compliance	GPC-5.1 Able to conduct and organize survey work in the field of construction and housing and communal services; GPC-5.2 Capable of conducting and organizing technical expertise of projects and author's supervision of their observance
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-3.2 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-5	Organization of construction works at the capital construction facility	PC-5.1 Knows how to determine the required resources to perform the work

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course Life Cycle Economics of Buildings 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 Life Cycle Economics of Buildings.

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 techniques in Civil Engineering; Project management	Independent Research Work
GC-6	Able to identify and implement the priorities of their own activities and ways to improve them on the basis of self-assessment	Problem solving techniques in Civil Engineering; Project management	Introductory Practice; Independent Research Work
GC-7	Able: to search for the necessary 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	Problem solving techniques in Civil Engineering; Digital technologies in construction; Geoinformation Systems and Applications	Introductory Practice; Independent Research Work

	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		
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	Design Practice; Technological Practice
GPC-5	Able to conduct and organize design and survey work in the field of construction, housing and communal services, carry out technical expertise of projects and designer's supervision of their compliance	Digital technologies in construction; Project management	Design Practice; Technological Practice
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: Special Topics; Structural Dynamics; Structural Design in Reinforced Concrete; Building materials: Special Topics; Structural Design in Steel: Special Topics; Modeling of Construction Processes	Design Practice; Technological Practice; Pre-Graduation Practice
PC-3	Organizational, technical and technological preparation of construction production	Project management; Modeling 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 Life Cycle Economics of Buildings 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)		0	0
Seminars (workshops / tutorials) (S)		36	36
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. Introduction	Topic 1.1. Engineering economy. Decision making process. Topic 1.2. Costs. Concepts of engineering economics analysis.	LC, S
Section 2. Time value of money	Topic 2.1. Time value of money. Cash flow/time diagram. Topic 2.2. Single payment. Topic 2.3. Uniform series payments. Uniform infinite series. Topic 2.4. Arithmetic gradient uniform series payments	LC, S
Section 3. Economic Evaluation	Topic 3.1. Economics evaluation. Planning horizon. Life cycle costing. Topic 3.2. Present worth analysis. Equivalent uniform annual worth analysis. Topic 3.3. Rate of return method. Topic 3.4. Benefit/cost ratio method. Payback period.	LC, S
Section 4. Applications	Topic 4.1. Depreciation. Estimating equipment costs (rentals). Topic 4.2. Sensitivity analysis. Breakeven analysis	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 specialized 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 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 specialized furniture and computers with access to the electronic information and educational environment	

7. RESOURCES RECOMMENDED FOR INTERNSHIP

Main readings:

1. Basics of engineering economy. Published by McGraw-Hill, a business unit of The McGraw-Hill Companies, Inc., 1221. Avenue of the Americas, New York, NY 10020

2. Newnan, D.G., Eschenbach, T.G., Lavelle, J.P., and Lewis, N.A. (2020). Engineering Economic Analysis, 14th Ed. Oxford University Press.

Additional readings:

1. Economic and Financial Analysis for Engineering and Project Management. ISBN 9780367399382. Published October 7, 2019 by CRC Press. 221 Pages

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 Life Cycle Economics of Buildings.

* 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 Life Cycle Economics of Buildings 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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