MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
UKRAINIAN STATE UNIVERSITY OF RAILWAY TRANSPORT

Considered and approved by the academic council of the Ukrainian State University of Railway Transport
Protocol No. 5 dated June 29, 2016

(Redaction after revision.
Protocol of the academic council meeting Ukrainian State University of Railway Transport
dated January 28, 2022, No. 1)
Put into operation
from the 2022/2023 academic year

Rector

Serhii Panchenko

EDUCATIONAL AND PROFESSIONAL PROGRAM "INDUSTRIAL AND CIVIL CONSTRUCTION"

HIGHER EDUCATION LEVEL	**second**
DEGREE OF HIGHER EDUCATION	**master**
FIELD OF KNOWLEDGE	**19 Architecture and construction**
SPECIALTY	**192 Construction and civil engineering**

Kharkiv – 2022

1. Preamble

The Law of Ukraine "On Higher Education" establishes that:

1) educational (educational-professional, educational-scientific) program is a single set of educational components (learning disciplines, individual tasks, practices, control measures, etc.) aimed at achieving the learning outcomes provided for by such a program, which gives the right to receive a specified educational or educational and professional (professional) qualification (qualifications);

2) the standard of higher education defines the following requirements for the educational program:

the amount of ECTS credits required to obtain the corresponding degree of higher education;

requirements for the level of education of persons who can start studying under this program, and the results of their studies;

list of mandatory graduate competencies;

the normative content of the training of higher education seekers, formulated in terms of learning outcomes;

attestation forms of higher education applicants;

requirements for the creation of educational training programs by field of knowledge, two fields of knowledge or a group of specialties (in the standards of the junior bachelor's level), interdisciplinary educational and scientific programs (in the standards of the master's and doctor of philosophy); requirements of professional standards (if available);

3) the educational program should contain:

a list of educational components, their logical sequence;

requirements for the level of education of persons who can start studying under this program;

the number of ECTS credits required to complete this program, as well as the expected learning outcomes (competencies) that the student of higher education must acquire;

4) educational institution, based on the relevant educational program, develops a curriculum that determines the list and volume of educational components in ECTS credits, their logical sequence, the form of organization of the educational process, the types and volume of educational classes, the schedule of the educational process, forms of current and final control that ensure achievement of program learning outcomes by the recipient of the corresponding degree of higher education. Individual study plans for each academic year are developed and approved for each student of higher education on the basis of the curriculum in the specified institution of higher education.

The educational program "Industrial and civil construction" in the redaction after revision

1) developed on the basis of the Methodological recommendations for the development of higher education standards (approved by the order of the Ministry of Education and Science of Ukraine No. 600 dated 01.06.2017 in the redaction of order of the Ministry of Education and Science of Ukraine No. 584 dated 30.04.2020) in the specialty 192 Construction and Civil Engineering of the field of knowledge 19 Architecture and Construction by the working group of the departments "Building Materials, Constructions and Structures" and "Construction Mechanics and Hydraulics" of the Ukrainian State University of Railway Transport including:

PLUGIN
Dmytro – Head of the Department of Building Materials, Constructions and Structures, D.Sc., group leader;

VATULYA
Glib – professor of the Department of Construction Mechanics and Hydraulics, D.Sc.;

TRYKOZ
Liudmyla – professor of the Department of Building Materials, Constructions and Structures, D.Sc.;

PLUGIN
Andrii – Head of the Department of Railway Track and Transport Structures, D.Sc.;

LOBYAK
Oleksii – Head of the Department of Construction Mechanics and Hydraulics, Ph.D.;

involving and taking into account the positions and needs of such stakeholders:

KONEV
Vitalii – Deputy Chief, Chief Engineer of the Branch Directorate "Center of Construction and Installation Works and Operation of Buildings and Structures", production structural unit "Kharkiv Directorate" JSC "Ukrainian Railway";

YANENKO
Oleksandr – director of Kharkiv branch "Kharkivdiproshlyakh" of SE "Ukrdiprodor»;

ALYOSHIN
Sergii – 1nd-year student (second (master) level) of the specialty 192 Construction and Civil Engineering;

2) approved at the meeting:
the Department of Building Materials, Construction and Structures dated December 26, 2021 (protocol No. 5);
the Scientific and Methodological Commission of the Faculty of Construction dated December 26, 2021 (protocol No. 5);
the Academic Council of the Faculty of Construction dated December 26, 2021 (protocol No. 5);
3) approved at the meeting of the academic council of the Ukrainian State University of Railway Transport dated January 28, 2022 (protocol No. 1).

2 PROFILE OF THE EDUCATIONAL AND PROFESSIONAL PROGRAM «INDUSTRIAL AND CIVIL CONSTRUCTION»

2.1. General description

Higher education level	Second (master) level
Higher education degree	Master
Field of knowledge	19 Architecture and construction
Specialty	192 Construction and civil engineering
Forms of obtaining education	institutional: full-time, extramural, remote
Educational qualification	Master of Construction and Civil Engineering
Diploma qualification	Higher education degree – Master Specialty – 192 «Construction and civil engineering» Educational and professional program – «Industrial and civil construction»
Description of the subject area	***Objects of study and activity:*** processes of design, creation, operation, preservation and reconstruction of building objects related to the construction or technical operation of industrial and civil buildings and structures, as well as transport engineering structures ***The purpose of training:*** acquisition of competencies that are sufficient for effective performance of tasks of an innovative nature at the appropriate level of professional activity. Learning goals: training of specialists for the design and construction of buildings, engineering structures and systems, manufacturing of building constructions, operation and reconstruction of construction objects, general methodological principles of professional activity, other competencies that are necessary for effective performance of tasks of the appropriate level of professional activity; training of specialists capable of solving comprehensively complex specialized theoretical and practical problems in the design, construction, operation and reconstruction of objects (systems), infrastructure of railway transport; acquisition of universal knowledge based on fundamental theories, concepts, ideas, principles, combined into a single worldview system, as a factor of further professional growth and the ability to pose, research, analyze and solve complex engineering tasks and problems in the field of railway transport;

	the ability to conduct research and/or innovative activities, critically analyze existing problems and propose new technical solutions and apply new technologies in the field of railway transport; the development of the spiritual needs of the individual, the formation of spirituality, spiritual culture, the creation of psychological and pedagogical conditions for spiritual development as the basis of the personal formation of a specialist, the development of the country's human potential; ensuring the possibility of creative self-realization of the individual by creating an educational environment that promotes self-discovery, self-esteem formation, self-development on the basis of academic freedom, mobility, integrity and student-centered learning; acquisition of social skills of business communication, management as an element of the specialist's professional activity. ***Theoretical content of the subject area*** includes knowledge of the theoretical foundations and special issues of construction and civil engineering, in particular: building materials, structural engineering, construction and reconstruction of railway engineering structures. **Methods, techniques and technologies:** methods of calculating building structures, methods of assessing the operational condition of buildings, methods of their repair, strengthening and restoration, as well as production technologies and means of construction, assembly and restoration works. **Tools and equipment:** experimental and measuring equipment, equipment and software necessary for field, laboratory and remote studies in construction and civil engineering; geodetic devices, climatic equipment, control and measuring devices necessary for the functioning of engineering systems, technological equipment for the manufacture of constructions and products, construction machines, devices and equipment, means of technological, informational, instrumental, metrological, diagnostic and organizational support of construction.
Academic rights of graduates	The possibility of studying in the program of the third (Ph.D) level of higher education and obtaining additional qualifications in the education system during life.

Employment of graduates	The field of professional activity is the creation of objects in the field of construction and civil engineering which includes design, construction (new construction, reconstruction, restoration, overhaul) and operation of objects.

2.2. Requirements for the education level of persons who can start studying under the educational and professional program.

Having a bachelor's degree, master's degree (educational and qualification level of a specialist).

2.3. The amount of ECTS credits required to obtain the corresponding degree of higher education

The volume of the master's educational program is 90 ECTS credits.

At least 35% of the volume of the educational program should be aimed at ensuring general and special (professional) competences in the specialty defined by the Standard of Higher Education.

The institution of higher education has the right to recognize and re-enroll ECTS credits obtained under the previous educational program of master's (specialist) training in another specialty. The maximum volume of ECTS credits that can be re-enrolled is established by the Standard of Higher Education and cannot exceed 25% of the total volume of the educational program.

2.4. Competence list of a master's degree graduate

Integral competence	The ability to solve complex specialized problems and practical tasks in the field of construction and civil engineering or in the learning process that involves conducting research and/or implementing innovation.
General competences	**GC01.** Skills in the use of information and communication technologies, the ability to search, process and analyze information from various sources. **GC02.** The ability to acquire specialized conceptual knowledge at the level of the latest achievements, which are the basis for original thinking and innovative activity. **GC03.** The ability to critically analyze problems in education and professional activity and at the border of subject areas. **GC04.** Ability to solve complex tasks and problems that require updating and integration of knowledge, among other things in conditions of incomplete/insufficient information and conflicting requirements, ability to plan and manage time. **GC05.** The ability to clearly and unambiguously convey one's own conclusions, as well as the knowledge and explanations that substantiate them, to specialists and non-specialists, in particular to

	people who are studying, in the state and foreign languages. **GC06.** The ability to manage complex actions or projects, responsibility for decision-making in unpredictable conditions, which requires the use of new approaches and forecasting, the ability to act socially responsibly and consciously. **GC07.** The ability to take responsibility for the development of professional knowledge and practices, the assessment of the strategic development of the team, the ability to evaluate and ensure the quality of the work performed. **GC08.** Ability to communicate with representatives of other professional groups of different levels (with experts from other fields of knowledge/types of economic activity), act on the basis of ethical considerations (motives).
Special (professional) competences.	**SC01.** Ability to apply appropriate quantitative mathematical, scientific and technical methods and computer software to solve engineering problems. **SC02.** Ability to work in a group on a large project. **SC03.** Ability to demonstrate knowledge and understanding of scientific facts, concepts, theories, principles and methods necessary to support the engineering discipline. **SC04.** Ability to demonstrate practical engineering skills. **SC05.** Ability to apply a systematic approach to solving engineering problems. **SC06.** Ability to understand the needs of users and clients and the importance of issues such as aesthetics in the design process. **SC07.** The ability to identify, classify and describe the effectiveness of systems and components based on the use of analytical and modeling methods. **SC08.** Ability to investigate and define a problem and identify constraints, including those related to conservation, sustainability, health and safety issues and risk assessments. **SC09.** Ability to identify and manage cost factors in plans and projects. **SC10.** Ability to understand and consider social, environmental, ethical, economic and commercial considerations affecting the implementation of technical solutions. **SC11.** Ability to manage projects and evaluate their results. **SC12.** Ability to use technical literature and other sources of information. **SC13.** Ability to demonstrate an understanding of the legal framework relevant to engineering activities, including personnel,

	health, safety and risk (including environmental risk) issues. **SC14.** Ability to demonstrate knowledge of the characteristics of specific materials, equipment, processes and products.
Program learning outcomes	
LO01. Calculate constructions in accordance with regulatory documentation in the field of construction. **LO02.** Perform calculations and design drawings of strengthening of concrete structures. **LO03.** Use information technologies to solve experimental and practical tasks in the field of professional activity. **LO04.** Implement effective measures to protect metal structures from corrosion using electrochemical methods, painting using new effective technologies and paints, special coatings, etc. in projects, including issues of personnel, health, safety and risk (including environmental risk). **LO05.** Implement effective measures to protect reinforced concrete structures from corrosion and destruction with protective resistant coatings, compaction of construction material, drainage, etc. in projects, including issues of personnel, health, safety and risk (including environmental risk). **LO06.** Develop projects for the production of repair and maintenance works using the technologies of injecting and tamping solutions for finishing the structure, spraying concrete works, injecting solutions into concrete and stone structures, surface shotcrete, elimination of stress cracks, sealing of seams, etc., including personnel issues, health, safety and risk (including environmental risk). **LO07.** To design optimal concrete compositions that ensure the elimination of long-term creep of concrete and deflection of structures, high impermeability, corrosion resistance and durability of structures. **LO08.** Develop a technological process for the implementation of works on strengthening and repairing structures, including issues of personnel, health, safety and risk (including environmental risk). **LO09.** Implement projects of reinforced concrete and metal structures and their elements. **LO10.** Use knowledge of the basics of the theory of reliability and durability, as well as data on the current state of structures to establish maintenance intervals for buildings and structures. **LO11.** Organize work on diagnostics of the technical condition of buildings and structures, including issues of personnel, health, safety and risk (including environmental risk).	

Correspondence of learning outcomes and competencies is shown in Table 1, correspondence of learning outcomes and educational components is shown in Table 2.

3. List of educational components and their logical sequence

Cycles of disciplines		Number of ECTS credits	Study duration (in semesters)	Final control form
1. Cycle of general training				
EC01	Civil Protection and Occupational Safety in the Branch	3	1	exam
EC02	Projects Management of Development of Territories, Cities and Regions	3	1	test
EC03	Energy Saving	3	1	test
EC04	HR Management	3	1	test
EC05	Business Communication Psychology	3	1	test
	The volume of normative educational components	15		
Disciplines of the student's free choice of the cycle of general training				
OC01	Discipline 1**	3,0	1	*
OC02	Discipline 2**	3,0	1	*
	The volume of optional educational components	6		
	The total volume of educational components of the cycle	21		
2. Cycle of professional training				
EC06	Testing and Reinforcement of Constructions and Structures	6	1	test
EC07	Reconstruction of Buildings	10,5	3	test, exam
EC08	Course paper in Reconstruction of Buildings	2	2	defense
EC09	Metal Constructions (Special Course)	5	2	exam
EC10	Course paper in Metal Constructions (Special Course)	1	1	defense
EC11	Reinforced Concrete Constructions (Special Course)	7	2	exam
EC12	Technology, Mechanization and Engineering and Technical Support of Construction	5	2	test, exam
EC13	Course paper in Technology, Mechanization and Engineering and Technical Support of Construction	1	1	defense
EC14	Supervising Technical Condition of Buildings	6	2	exam
EC15	Professional Management Practice	6	-	test
EC16	State Qualification Examination	1,5	-	exam
	The volume of normative educational components	51		
Disciplines of the student's free choice of the cycle of professional training				
OC03	Discipline 1**	6.0	1	*
OC04	Discipline 2**	6.0	1	*
OC05	Discipline 3**	6.0	1	*

	The volume of optional educational components	18		
	The total volume of educational components of the cycle	69		
	The total scope of the educational program	90		

* - the form of final control is determined by the curriculum

** - the educational component is determined based on the results of students' selection in accordance with the established procedure.

The logical sequence of study of educational components is determined by their sequence at the beginning of study. For educational components that are studied over several semesters, the beginning of studying the educational components is determined by the first semester of their study. The educational components of the next stage cannot be studied before or simultaneously with the beginning of studying the educational components of the previous stage.

The sequence of study of educational components:

1) educational components of the first stage:

Metal Constructions (Special Course)
Reinforced Concrete Constructions (Special Course)
Testing and Reinforcement of Constructions and Structures
Civil Protection and Occupational Safety in the Branch
Projects Management of Development of Territories, Cities and Regions

2) educational components of the second stage:

Reconstruction of Buildings
HR Management
Business Communication Psychology

3) educational components of the third stage:

Energy Saving
Supervising Technical Condition of Buildings
Technology, Mechanization and Engineering and Technical Support of Construction

4) educational components of the fourth stage:

Professional Management Practice

5) educational components of the fifth stage:

State Qualification Examination.

6) The sequence of studying other educational components is determined by the curriculum.

4. Attestation forms of higher education applicants

Master's attestation form	Attestation is carried out in the form of State Qualification Examination

Requirements for the State Qualification Exam	The comprehensive state qualification exam should check the achievement of learning outcomes defined by the educational and professional program. The requirements for the exam are determined by the relevant Regulations of the Ukrainian State University of Railway Transport.

5. Requirements for the existence of a system of internal quality assurance of higher education

The Ukrainian State University of Railway Transport operates a quality assurance system for educational activities and higher education quality (internal quality assurance system), which provides for the implementation of the following procedures and measures:

1) determination of the principles and procedures for ensuring the quality of higher education;

2) monitoring and periodic review of educational programs;

3) annual assessment of applicants for higher education, scientific and pedagogical staff of the institution of higher education and regular publication of the results of such assessments on the official website of the institution of higher education, on information stands and in any other way;

4) ensuring the advanced training of pedagogical, scientific and scientific-pedagogical employees;

5) ensuring the availability of the necessary resources for the organization of the educational process, including self-dependent work of students, according to the educational program;

6) ensuring the availability of information systems for effective management of the educational process;

7) ensuring the publicity of information about the educational program, degree of higher education and qualifications;

8) ensuring the an effective system of prevention and detection of academic plagiarism in scientific works of employees and students of higher education.

Table 1 Correspondence matrix of program learning outcomes and competencies

Program learning outcomes		Competencies																					
		General competencies								Special (professional) competencies													
	Integral competence	GC01	GC02	GC03	GC04	GC05	GC06	GC07	GC08	SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14
LO 01	+	+				+				+											+		
LO 02	+	+								+			+								+		
LO 03	+	+	+	+						+											+		
LO 04	+						+				+				+		+			+			+
LO 05	+						+				+				+		+			+			+
LO 06	+				+		+	+			+				+		+			+			+
LO 07	+						+				+	+								+			+
LO 08	+				+			+					+	+				+	+			+		
LO 09	+						+						+			+		+	+				
LO 10	+		+	+								+				+			+				
LO 11	+		+	+					+										+				

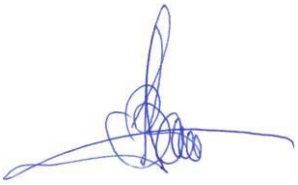
Table 2 – Correspondence matrix between learning outcomes and educational components

Program learning outcomes	Educational components															
	EC01	EC02	EC03	EC04	EC05	EC06	EC07	EC08	EC09	EC10	EC11	EC12	EC13	EC14	EC15	EC16
LO 01									+	+	+				+	+
LO 02						+	+	+			+				+	+
LO 03		+					+	+	+	+	+	+	+	+	+	+
LO 04	+		+	+	+				+	+						+
LO 05	+		+	+	+						+					+
LO 06	+		+	+	+						+					+
LO 07			+								+					+
LO 08	+	+		+			+	+	+	+	+	+	+		+	+
LO 09									+	+	+				+	+
LO 10		+				+	+	+				+	+	+	+	+
LO 11	+			+	+	+								+	+	+

Head of the Department of Building Materials, Constructions and Structures, D.Sc.

Dmytro PLUGIN

professor of the Department of Construction Mechanics and Hydraulics, D.Sc.

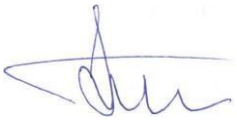


Glib VATULYA

professor of the Department of Building Materials, Constructions and Structures, D.Sc.

Liudmyla TRYKOZ

Head of the Department of Railway Track and Transport Structures, D.Sc.



Andrii PLUGIN

Head of the Department of Construction Mechanics and Hydraulics

Oleksii LOBYAK