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 PROGRAM "INDUSTRIAL AND CIVIL CONSTRUCTION"

HIGHER EDUCATION LEVEL	**first**
DEGREE OF HIGHER EDUCATION	**bachelor**
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 Standard of Higher Education of the first (bachelor's) level in the specialty 192 Construction and Civil Engineering of the field of knowledge 19 Architecture and Construction, approved by the order of the Ministry of Education and Science of Ukraine No. 333 dated 18.03.2021, 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:

ROMANENKO
Oleksandr – associate professor of the Department of Building Materials, Constructions and Structures, Ph.D., group leader;

KALININ
Oleg – associate professor of the Department of Building Materials, Constructions and Structures, Ph.D.;

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

PLUGIN
Dmytro – Head of the Department of Building Materials, Constructions and 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»;

KOVAL
Oleksandr – 2nd-year student (first (bachelor) 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 PROGRAM «INDUSTRIAL AND CIVIL CONSTRUCTION»

2.1. General description

Higher education level	First (bachelor) level
Higher education degree	Bachelor
Field of knowledge	19 Architecture and construction
Specialty	192 Construction and civil engineering
Forms of obtaining education	institutional: full-time, extramural, remote
Educational qualification	Bachelor of Construction and Civil Engineering
Diploma qualification	Higher education degree – Bachelor Specialty – 192 «Construction and civil engineering» Educational program– «Industrial and civil construction»
Description of the subject area	***Objects of study and activity:*** technologies, buildings and engineering structures, processes of their design, creation, operation, preservation and reconstruction. ***The purpose of training:*** a set of knowledge, abilities and skills that are necessary for solving complex specialized problems and solving practical issues in the field of construction and civil engineering. 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; acquisition of universal knowledge based on fundamental theories, concepts, ideas, principles, combined into a single worldview system, as a factor of further professional growth; 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:*** notions, concepts, principles, ways and methods of creating and maintaining buildings and engineering structures. Contains theoretical foundations of construction technologies, theories, principles, concepts and methods of fundamental and general engineering sciences, knowledge of 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:** experimental research methods of materials and processes, methods of physical and mathematical modeling, design methods, manufacturing technologies of constructions, materials and products, technologies of building construction and engineering structures, destruction of construction objects and waste disposal. **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 second (master's) 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 program.

Persons can apply to obtain the educational level of "bachelor" if they have completed general secondary education, the educational level of "junior bachelor" and the educational and professional degree of "professional junior bachelor" (educational and qualification level of "junior specialist").

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

The volume of the bachelor's educational program based on full general secondary education is 240 ECTS credits.

On the basis of the degree "specialist junior bachelor", "junior bachelor" (educational qualification level "junior specialist"), the higher education institution has the right to recognize and re-enroll ECTS credits obtained within the framework of the previous educational program of training a professional junior bachelor, junior bachelor (junior specialist), with a volume of no more than 60 ECTS credits.

At least 50% of the volume of the educational program should be aimed at ensuring general and special (professional) competences in the specialty defined by the standard.

The amount of ECTS credits intended for practices (introduction, surveying, production, technological, etc. - according to specialization) is determined within 12-24 ECTS credits.

2.4. Competence list of a bachelor's degree graduate

Integral competence	The ability to solve complex specialized problems and solve practical tasks in the field of construction and civil engineering, which are characterized by complexity and systematicity, based on the application of basic theories and methods of fundamental and applied sciences.
General competences	**GC01.** Ability to abstract thinking, analysis and synthesis. **GC02.** Knowledge and understanding of the subject area and professional activity. **GC03.** The ability to communicate in the national language, both orally and in writing, with representatives of other professional groups of various levels in order to convey information and personal experience in the field of professional activity to specialists and non-specialists. **GC04.** Ability to communicate orally and in writing in a foreign language, working in an international context using modern means of communication. **GC05.** Ability to use information and communication technologies. **GC06.** Ability to search, process and analyze information from various oral, written and electronic sources.

	GC07. Ability to work in a team using interpersonal skills. **GC08.** The ability to communicate with representatives of other professional groups at different levels (with experts from other fields of knowledge/types of economic activity) in order to convey information and own experience in the field of professional activity to specialists and non-specialists. **GC09.** The ability to realize one's rights and responsibilities as a member of society; awareness of the value of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine. **GC10.** The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technologies, to use various types and forms of motor activity for active recreation and leading a healthy lifestyle.
Special (professional) competences. General professional competences.	**SC01.** Ability to use conceptual scientific and practical knowledge of mathematics, chemistry and physics to solve complex practical problems in construction and civil engineering. **SC02.** Ability to critically understand and apply basic theories, methods and principles of economics and management for rational organization and management of construction production. **SC03.** The ability to design construction structures, buildings, structures and engineering networks, taking into account engineering and technical and resource-saving measures, legal, social, ecological, technical and economic indicators, scientific and ethical aspects, and modern requirements of regulatory documentation in the field of architecture and construction, environmental protection and labor safety. **SC04.** The ability to choose and use appropriate equipment, materials, tools and methods for designing and implementing technological processes of construction production. **SC05.** Ability to use computerized design systems and specialized application software to solve engineering problems in construction and civil engineering. **SC06.** Ability to perform engineering activities in the field of construction, compilation and use of technical documentation. **SC07.** Ability to take responsibility for developing and making decisions in the field of architecture and construction in unpredictable work contexts. The ability to evaluate and take into account the climatic, engineering-geological and ecological features of the

	construction area when designing and erecting construction objects. **SC08.** Awareness of the principles of designing suburban territories, knowledge of the principles of designing urban territories and infrastructure objects and urban economy. **SC09.** Ability to organize and manage the professional development of individuals and groups in the field of architecture and construction. **SC10.** Possessing knowledge of manufacturing technology, technical characteristics of modern building materials, products and structures, the ability to use them effectively in the design and construction of construction objects. **SC11.** The ability to develop constructive solutions of construction objects based on knowledge of the nomenclature and structural forms, the ability to calculate and design load-bearing and enclosing building structures. **SC12.** Ability to develop and evaluate technical solutions of engineering networks. The ability to work with geodetic devices and use topographic materials in the design and construction of construction objects and engineering networks. **SC13.** Ability to perform and analyze economic calculations of the cost of construction objects. **SC14.** Mastery of technological processes in the construction, equipping and operation of buildings and structures and installation of engineering systems and networks. **SC15.** The ability to develop a rational organization and management of construction production during the construction, operation, repair and reconstruction of objects, taking into account the requirements of labor protection. **SC16.** Understanding the reliability requirements and means of ensuring the reliability of building structures, buildings, structures and engineering networks.
Program learning outcomes	
LO01. Apply basic theories, methods, and principles of mathematical, natural, social, humanistic, and economic sciences, modern models, methods, and decision-making support software to solve complex construction and civil engineering problems. **LO02.** Participate in research and development in the field of architecture and construction. Apply basic professional and scientific knowledge in the field of social, humanitarian and economic sciences in cognitive and professional activities. **LO03.** Present the results of one's own work and argue one's position on professional issues to specialists and non-specialists, communicating freely in the state and foreign languages, demonstrate oral and written communication skills, using interpersonal interaction skills using modern means of communication. **LO04.** Design and implement technological processes of construction production,	

using appropriate equipment, materials, tools and methods.

LO05. Use and develop technical documentation at all stages of the life cycle of construction products.

LO06. Apply modern information technologies to solve engineering and management problems of construction and civil engineering.

LO07. Collect, interpret, and apply data, including by searching, processing, and analyzing information from various sources.

LO08. Rational use of modern construction materials, products and structures based on knowledge of their technical characteristics and manufacturing technology.

LO09. Design construction structures, buildings, structures, engineering networks and technological processes of construction production, taking into account engineering and technical and resource-saving measures, legal, social, ecological, technical and economic indicators, scientific and ethical aspects, and modern requirements of regulatory documentation, time and other restrictions in the field of architecture and construction, environmental protection and labor safety.

LO10. Make and implement rational decisions on the organization and management of construction processes during the construction of construction objects and their operation, repair and reconstruction, taking into account labor protection requirements.

LO11. Assess the compliance of projects with the principles of designing urban territories and infrastructure facilities and urban economy.

LO12. Have in-depth cognitive and practical proficiency/skills, mastery and innovation at the level necessary to solve complex specialized tasks in the field of construction and civil engineering

LO13. Organize and manage the professional development of individuals and groups in the field of architecture and construction.

LO14. Develop constructive solutions of the construction object on the basis of knowledge of the nomenclature and structural forms, the ability to calculate and construct building structures and their connection nodes.

LO15. Perform and analyze economic calculations of the cost of construction objects.

LO16. Design technological processes of construction and equipment of buildings (structures) and installation of engineering systems and networks.

LO17. Assess the influence of climatic, engineering-geological and ecological features of the construction of the territory during the design and construction of construction objects.

LO18. Ensure reliable and safe operation of construction structures of buildings, structures and engineering networks.

LO19. Determine and evaluate the load and stress-deformation state of soil foundations and supporting structures of buildings (structures), including using modern information technologies.

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	Ukrainian Language (Professional Aspect)	3.0	1	exam
EC02	History of Ukraine (2 semester) and History of Ukrainian culture (1 semester)	6.0	2	exam
EC03	Foreign Language (Professional Aspect)	6.0	3	test, exam
EC04	Higher mathematics	9.0	3	exam
EC05	Chemistry	3.0	1	exam
EC06	Methods and software and technical means of engineering calculations	3.0	1	test
EC07	Physics	6.0	2	test, exam
EC08	Theoretical mechanics	3.0	1	exam
EC09	Philosophy	3.0	1	exam
EC10	Life safety and basics of labor protection	3.0	1	exam
	The volume of normative educational components	45		
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	*
OC03	Discipline 3**	3,0	1	*
OC04	Discipline 4**	3,0	1	*
	The volume of optional educational components	12		
	The total volume of educational components of the cycle	57		
2. Cycle of professional training				
EC11	General Course of Railway	3.0	1	test
EC12	Descriptive Geometry, Engineering and Computer Graphic	6.0	2	test, exam
EC13	Engineering Geodesy	6.0	2	test, exam
EC14	Engineering Geology	3.0	1	test
EC15	Strength of Materials and Basics of Theory of Elasticity and Plasticity	9.0	2	exam, exam
EC16	Basics of Ecology	3.0	1	test
EC17	Metrology, Standardization and Basics of Automation	3.0	1	test
EC18	Electrical Engineering and Power Supply	3.0	1	test
EC19	Communicative management	3.0	1	test
EC20	Construction Material Science	6.0	2	test, exam
EC21	Architecture of Buildings and Structures	5,0	2	test
EC22	Course paper in Architecture of Buildings and Structures	1	1	defence
EC23	Soil Mechanics, Bases and Foundations	5,0	1	exam

EC24	Course paper in Soil Mechanics, Bases and Foundations	1	1	defence
EC25	Structural Mechanics	6,0	2	exam, exam
EC26	Railway Buildings	5,0	2	exam, exam
EC27	Course paper in Railway Buildings	1		defence
EC28	Water Supply and Draining	3	1	test
EC29	Metal Constructions	5,0	2	test, exam
EC30	Course paper in Metal Constructions	1	1	defence
EC31	Civil Engineering Economy	6,0	1	exam
EC32	Technical Mechanics of Liquid and Gas	3	1	test
EC33	Reinforced Concrete and Stone Constructions	5,0	2	exam, exam
EC34	Course paper in Steel and Concrete and Stone Constructions	1	1	defence
EC35	Automated Layout Systems	3	1	test
EC36	Practical training	18		test
EC37	Execution and defense of qualification thesis	9		defence
	The volume of normative educational components	123		
Disciplines of the student's free choice of the cycle of professional training				
OC05	Discipline 1**	6.0	1	*
OC06	Discipline 2**	6.0	1	*
OC07	Discipline 3**	6.0	1	*
OC08	Discipline 4**	6.0	1	*
OC09	Discipline 5**	6.0	1	*
OC10	Discipline 6**	6.0	1	*
OC11	Discipline 7**	6.0	1	*
OC12	Discipline 8**	6.0	1	*
OC13	Discipline 9**	6.0	1	*
OC14	Discipline 10**	6.0	1	*
	The volume of optional educational components	60		
	The total volume of educational components of the cycle	183		
	The total scope of the educational program	240		

* - 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:

Ukrainian Language (Professional Aspect)
History of Ukraine (2 sem.) and History of Ukrainian Culture (1 sem.)
Foreign Language (Professional Aspect)
Philosophy
Higher Mathematics
Chemistry
Methods and software and technical means of engineering calculations
Physics
Theoretical Mechanics
Life safety and basics of labor protection

2) educational components of the second stage:

General Course of Railway
Descriptive Geometry, Engineering and Computer Graphic
Engineering Geodesy
Engineering Geology
Basics of Ecology
Construction Material Science
Strength of Materials and Basics of Theory of Elasticity and Plasticity
Metrology, Standardization and Basics of Automation
Technical Mechanics of Liquid and Gas
Architecture of Buildings and Structures
Railway Buildings

3) educational components of the third stage:

Structural Mechanics
Soil Mechanics, Bases and Foundations
Electrical Engineering and Power Supply
Water Supply and Draining
Metal Constructions
Communicative management
Civil Engineering Economy
Reinforced Concrete and Stone Constructions
Automated Layout Systems

4) educational components of the fourth stage:

Pre-diploma practice

5) educational components of the fifth stage:

Defense of qualification thesis.

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

4. Attestation forms of higher education applicants

Bachelor's attestation form	Attestation is carried out in the form of public defense of the qualification thesis

Requirements for the qualifying bachelor thesis	The qualifying bachelor thesis involves solving a complex specialized project task in the field of construction and/or civil engineering. The qualifying bachelor thesis should not contain academic plagiarism, fabrication, or falsification. The qualifying bachelor thesis must be published on the official website or in the repository of the Ukrainian State University of Railway Transport, or the website of its structural brunch.
Requirements for public defense	The requirements for the public defense of a qualifying bachelor thesis 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																											
	Integral competence	General competencies										Special (professional) competencies																
		GC01	GC02	GC03	GC04	GC05	GC06	GC07	GC08	GC09	GC10	SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
LO01	+	+	+	+	+		+			+	+	+	+														
LO02	+	+	+	+	+	+	+	+				+	+		+	+	+	+									
LO03	+			+	+	+		+	+								+										
LO04	+													+	+								+				
LO05	+													+			+										
LO06	+					+		+								+	+										
LO07	+	+			+		+																				
LO08	+											+		+	+	+					+						
LO09	+								+	+			+	+							+	+		+	+	+	
LO10	+								+				+	+											+	+	
LO11	+																	+	+								
LO12	+	+	+							+	+		+														
LO13	+							+			+									+							
LO14	+															+						+					
LO15	+												+											+			
LO16	+														+			+					+		+	+	
LO17	+													+				+					+				+
LO18	+															+		+									+
LO19	+																					+					+

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	EC17	EC18	EC19	EC20	EC21	EC22	EC23	EC24	EC25	EC26	EC27	EC28	EC29	EC30	EC31	EC32	EC33	EC34	EC35	EC36	EC37
LO 01		+		+	+	+	+	+	+	+																					+						+
LO 02		+	+						+							+																				+	+
LO 03	+		+																+																	+	+
LO 04							+	+									+			+																	+
LO 05																	+												+	+			+	+		+	+
LO 06						+						+																							+		+
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LO 09										+			+	+	+	+	+						+	+	+				+	+	+		+	+	+	+	+
LO 10										+			+						+				+	+													+
LO 11											+										+	+				+	+										+
LO 12						+																													+	+	+
LO 13																			+																	+	+
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LO 17														+		+							+	+													+
LO 18																		+										+				+					+
LO 19															+										+				+	+			+	+			+

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