

MINISTRY of EDUCATION and SCIENCE of UKRAINE

Ternopil Ivan Puluj national technical university

EDUCATIONAL PROGRAM

«Civil Engineering»

of the second (educational-professional) level of higher education

on specialty 192 – Civil engineering

branch of knowledge 19 – Architecture and construction

Qualification: Master of Science in Civil Engineering

Approved by Academic Council

Head of Academic Council

_____ / P.V. Yasniy /

(Minutes № 5 of March 23, 2021)

Educational program is launched in 2021-2022 academic year.

Letter of Approval
of educational-professional program

Discussed and approved on the Structural Mechanics Department Meeting

Meeting Minutes № 6 of February 17, 2021

Head of the Department

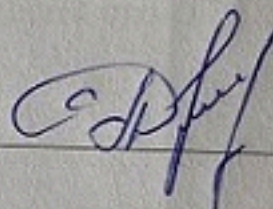


V.P. Yasniy

Discussed and approved by the Academic Council of the Faculty of Engineering
of Machines, Structures and Technologies.

Minutes № 5 of February 22, 2021

Head of the Faculty Academic Council



R.Y. Leshchuk

PREFACE

The educational-professional program (EPP) “Civil Engineering” for training the candidates for higher education on the second (Master’s) level on specialty “Civil engineering” includes 90 credit ECTS necessary to obtain the proper degree of higher education; list of graduates’ competences; standard content of training of higher education candidates specified in the learning outcomes terms; forms of attestation of higher education candidates; requirements to the availability of the system of internal assurance of the higher education quality.

The program conforms to the Law of Ukraine “On Higher Education”, Resolution of the Cabinet of Ministers of Ukraine of 29.04.2015 № 266 “On Approval of the List of Fields of Knowledge and Specialties for which the candidates for higher education are trained”, the Order of MES of Ukraine dated 06.11.2015 № 1151” About Peculiarities of Introduction of the List of Branches of Knowledge and Specialties on which the Candidates for Higher Education Are Trained”, Resolution of the Cabinet of Ministers of Ukraine of 30.12.2015 № 1187 “ License terms of educational activity of educational institutions “ and the project of Standard of higher education of the second (Master’s) level of branch of knowledge 19 – Architecture and construction, of the specialty 192 - Civil engineering.

The Syllabus was developed by the work project group of Specialty 192 - Civil Engineering consisting of:

1. Pidhurskyy M. I. – D.Sc. in Engineering, Professor, Prof. of the Manufacturing Engineering Department – Head of the Program;
2. Soroachak Andrii – Ph.D. in Engineering Science, Associate Prof. of the Structural Mechanics Department – a member of the project group;
3. Kononchuk Oleksandr – Ph.D. in Engineering Science, Associate Prof. of the Structural Mechanics Department - a member of the project group;
4. Kachka Oksana – chief engineer of LLC “Perspective resource”
5. Sheptak Andrii – student of group МБНМ-51.

Reviews of external stakeholders:

1. Lylo V. Y. – managing director of LLC «Ternopilbud»;
2. Yankovyy S.Y. – director of LLC "Engineering-construction company "Architect";
3. Kaspruk B.P. – director of LLC "SMARTTECHBUD".

1. Master's Educational-Scientific Program in Specialty 192 "Civil Engineering"

Components	Description of educational-professional program
1 – General information	
Full name of higher educational establishment and a structural subdivision	Ternopil I.Puluj national technical university, Structural Mechanics Department
Higher education level and full name of qualification	Second (Master of Science) level, Master of Science in Civil Engineering
Program official name	Civil Engineering
Diploma type and number of credits according to the program	Master of Science Degree, Single Honours, 90 credits ECTS, 1 year and 4 months of study
Accreditation	Accreditation commission of Ukraine (National agency of higher education quality assurance), Ukraine Certificate of accreditation HД № 2087434. Valid to July 1 st , 2024
Cycle/level	HPK of Ukraine - 7 th level, FQ-EHEA – the second cycle, EQF-LLL – 7 th level
Requirements	Candidates for the "Master's" degree should be awarded with the degree of Bachelor, Master of Science (educational-qualification level "specialist"). The applicants with the degree of Bachelor in the specialty 192 – Civil engineering are admitted on the competitive basis due to taking into account the results of the certificate of Ukrainian Center for Educational Quality Assessment in English and the entrance exam on specialty. In addition, the applicants with Bachelor's and/or Master's (of educational-qualification level "specialist") degree obtained in another specialty are supposed to have an interview. The entrance requirements are specified by «Admission Policy of the Ternopil I.Puluj national technical university» approved by the University academic council.
Language(s) of instruction	Ukrainian, English (some courses)
Educational program validity	Till next accreditation
Permanent Internet address of educational program description	http://tntu.edu.ua/storage/pages/00000484/op192b.pdf
2 – Purpose of the educational-professional program	
Training of highly-qualified specialists able to solve complex engineering-technical problems and scientific-research problems in the field of construction and civil engineering.	
3 – Characteristics of the educational-professional program	
Subject area	<p>Objects of study and activity: scientific principles, technologies, objects and structures, design processes, construction technologies, maintenance and reconstruction of construction objects and engineering systems.</p> <p>Purpose of study: form in the candidates for higher education a complex of knowledge, skills and abilities required for solving complex engineering-technical problems and/or scientific-research problems in the field of construction and civil engineering</p> <p>Theoretical content of the course: concepts, conceptions, principles, ways</p>

	<p>and methods of buildings and engineering facilities construction and maintenance.</p> <p>Methods, techniques and technologies: experimental methods of study of materials and processes, methods of physical and mathematical modelling, design techniques, construction technologies of construction objects and engineering systems.</p> <p>Tools and equipment: test-measuring devices, hardware and software necessary for full scale, laboratory and online studies in construction and civil engineering.</p>
Educational program orientation	Educational-professional academic.
Main focus of the educational program and specialization	<p>Special education on specialty “Construction and civil engineering” enables students to gain competences for further professional, scientific or teaching career.</p> <p>Key words: building structures design, project management in construction, building structures and buildings study, modern computer technologies in construction.</p>
Distinctive features	The educational-professional program includes compulsory competences which deepen the professional and research competences and knowledge of special sections of fundamental and profession-oriented disciplines and, in this way, they orient the graduates on the specialization urgency of their professional and scientific career.
4 – Graduates suitability for employment and further education	
Suitability for employment	Managers of enterprises, companies and organizations in the field of construction; managers, chief engineers, construction site supervisors, foremen in construction; managers on architecture and construction, technical control, analysis and advertisement; engineers in the field of civil engineering; technologists (construction materials); lecturers in universities and other higher educational establishments; experts in project and program management.
Further education	Possibility of study on the program of the third educational-scientific level of higher education and get some extra qualifications within the education system.
5 – Teaching and Assessment	
Teaching and study	<p>Passive (explanatory-illustrative); active (problem, game, interactive, project, information-computer self-developing)- according to dominating techniques and ways of teaching.</p> <p>Group and integrative study – according to forms of organization.</p> <p>Positional and context study, collaboration technology – according to pedagogical cooperation orientation.</p>
Assessment	<p>Students’ progress in study is estimated according to 4-mark (“excellent”, “good”, “satisfactory”, “unsatisfactory”) and verbal (“passed”, “not passed”) systems.</p> <p>Kinds of control: current, theme, random, final, self-control.</p> <p>Forms of control: oral and written questioning, tests, design projects, term papers and projects, laboratory reports, presentations, reports on internship programs and scientific-research papers, certification exam etc.</p> <p>Forms of term assessment: current, self-control, exams, credits using electronic system of study TNTU Atutor.</p> <p>The final attestation is in the form of public defense of Qualification paper which is tested against any academic plagiarism and is placed on the official site of the structural subdivision of the educational establishment.</p>
6 – Program competences	
Integral competence	Ability to solve research and/or innovation problems in the field of

	construction and civil engineering.
General competences	<p>GC01. Ability of abstract thinking, analysis and synthesis.</p> <p>GC02. Be able to conduct research at appropriate level.</p> <p>GC03. Adaptability to new environments and situations.</p> <p>GC04. Be able to make reasonable decisions.</p> <p>GC05. Be able to estimate and guarantee the quality of the work done.</p> <p>GC06. Have a strong desire to protect the environment.</p>
Special (professional, subject area) competences	<p>SC01 Be able to integrate specialized conceptual knowledge in the field of construction and civil engineering in combination with keeping to current normative-legal documents in the field of architecture and construction to solve complex engineering problems according to the specialization.</p> <p>SC02. Be able to develop and introduce projects in the field of construction and civil engineering.</p> <p>SC03. Ability in safety assurance at complex processes management in the field of construction and civil engineering.</p> <p>SC04. Be able to examine, test, diagnose and make calculations at solving the problems in the field of construction and civil engineering.</p> <p>SC05. Ability in building and study of case, object and process models in the field of construction and civil engineering.</p> <p>SC06. Ability in conventional software available in construction to solve complex engineering problems in the field of construction and civil engineering.</p> <p>SC07. Ability in clear explaining personal knowledge, conclusions and reasons to specialists and non-specialists of construction industry.</p> <p>SC08. Be able to integrate knowledge from other branches to solve complex problems in broad or multidisciplinary contexts.</p>
7 – Program learning outcomes (PLO)	
Study results:	<p>LO01. Design buildings and structures (according to the specialism) including with the use of program systems of computer aided design aimed at their reliability and durability providing, making sustainable design and engineering decisions, technical-economic substantiation taking into account specific characteristics of the construction object, determining the most efficient mode of its operation and take measures on resource- and energy saving.</p> <p>LO02. Apply specialized conceptual knowledge which involves the latest scientific achievements and also critical comprehension of modern problems in the field of construction and civil engineering to solve complex problems of professional activity.</p> <p>LO03. Carry out a technical expertise of construction and civil engineering objects design (according to the specialization), providing the control of design meeting the requirements of technical documents, design tasks, specifications and other current codes and standards in the field of architecture and construction.</p> <p>LO04. Provide operation, maintenance and quality control of construction and civil engineering objects.</p> <p>LO05. Speak and write state and foreign languages to discuss professional problems and results of the activity in the field of architecture and construction.</p> <p>LO06. Apply modern mathematical methods to analyze statistical data, calculation and improvement of the design parameters and technological processes of building and structures construction.</p> <p>LO07. Develop measures on labor and environment safety at research conducting and in production activity.</p> <p>LO08. Be informed of the latest achievements in the chosen specialty, apply them to create innovations.</p>

	<p>LO09. Select the modern materials, technologies and methods to conduct the process of site work taking into account architecture-planning, structural part of the project and construction company base</p> <p>LO10. Collect necessary information using scientific-technical literature, databases, and other sources, analyse and estimate it.</p> <p>LO11. Keep to the norms of academic honesty, know the main legal norms on intellectual property security, commercialization of the results of scientific research, invention and design activities.</p> <p>LO12. Be able to solve problems of construction and civil engineering in new or unknown environments with little or limited information taking into account social and ethics responsibility aspects.</p>
8 – Program implementation resources	
Staff assistance	<p>According to staff assistance requirements to educational activity providing for certain level of HO (Appendix 2 to License terms and conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine of 30.12.2015 № 1187 with amendments to the Resolution of the Cabinet of Ministers of Ukraine №347 of 10.05.2018.</p> <p>In particular, the program implementation is provided by highly qualified staff with scientific degrees and titles with great experience in teaching, pedagogical, scientific-research, managerial and innovative work in specialty. The academic staff involved in the teaching of profession-oriented disciplines has scientific degrees in specialty and approved level of scientific and professional activity. All lecturers are the authors of textbooks, monographs, articles, participants of national and international scientific conferences.</p>
Materials and facilities	<p>According to technological requirements to materials and facilities support of educational activity of certain level of HO (Appendix 4 to License terms and conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine of 30.12.2015 № 1187 with amendments to the Resolution of the Cabinet of Ministers of Ukraine №347 of 10.05.2018.</p> <p>A number of specialized laboratories and computer classrooms of TNTU with special software are used for conducting research.</p>
Information support and teaching – learning materials	<p>According to technological requirements to teaching methods and information support of educational activity of certain level of HO (Appendix 5 to License terms and conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine of 30.12.2015 № 1187 with amendments to the Resolution of the Cabinet of Ministers of Ukraine №347 of 10.05.2018.</p> <p>Available:</p> <ul style="list-style-type: none"> - e-resources of teaching and learning materials of the courses (textbooks, teaching materials, lecture notes, study manuals); - periodicals; - E-archives of TNTU (monographs, articles, extended abstracts); - all library resources available via the university site, or in the library hall itself . <p>Teaching and learning materials of educational process are in the electronic repository of the university ELARTU, which is available: http://elartu.tntu.edu.ua/handle/123456789/8983. Electronic courses of the department are available for students in the system of electronic and distance learning ATUTOR: https://dl.tntu.edu.ua/browse.php?access=&category=22&speciality=0&search=&include=all&filter=Filter. The problem of providing students with textbooks and study guides is being solved by the department in two parallel ways: literature publishing by the department lecturers and their buying or subscribing by the university library. During their study the</p>

	students are able to use special software to design buildings and facilities, mathematical processing of the research results. The teaching materials are constantly updating and adapting according to the stakeholders' preferences.
9. Requirements to the applicants	
<p>1. Candidates for the “Master’s” degree must be awarded with the degree of Bachelor, Master of Science (educational-qualification level “specialist”). The applicants with the degree of Bachelor in the specialty 192 – Civil engineering are admitted on the competitive basis due to taking into account the results of the certificate of Ukrainian Center for Educational Quality Assessment in English and the entrance exam on specialty.</p> <p>2. The applicants with Bachelor’s and/or Master’s (of educational-qualification level “specialist”) degree obtained in another specialty are supposed to have an interview.</p> <p>3. Meeting other requirements specified by the terms of admission in “Admission policy of the Ternopil I.Puluj national technical university” approved by the Academic council.</p>	
9 – Academic mobility	
National credit mobility	<p>According to the bilateral agreements of the Ternopil I.Puluj national technical university and other universities of Ukraine some individual agreements can be signed on academic mobility for study and research in universities and scientific institutions of Ukraine.</p> <p>Some leading specialists of the universities of Ukraine may be involved into the scientific work supervision of the applicants according to the individual agreement’s terms.</p> <p>The credits received in other universities of Ukraine are credited according to the document of academic mobility.</p>
International credit mobility	<p>According to the bilateral agreements of the Ternopil I.Puluj national technical university and educational institutions of the countries-partners, agreement of international academic mobility. In particular, the university has signed the agreements of academic and scientific cooperation with the leading universities of Poland: Opole polytechnic university and Lublin polytechnic.</p> <p>Individual academic mobility is possible due to the participation in programs of the project Erasmus +</p>
Foreign students training	<p>Training is provided on standard terms or according to the individual schedule in a foreign language or Ukrainian (after Ukrainian language course completion by foreign applicants).</p>

2. List of Syllabus educational components and their logical sequence.

2.1. List of Syllabus educational components

Table 2.1

Syllabus educational components and their characteristics

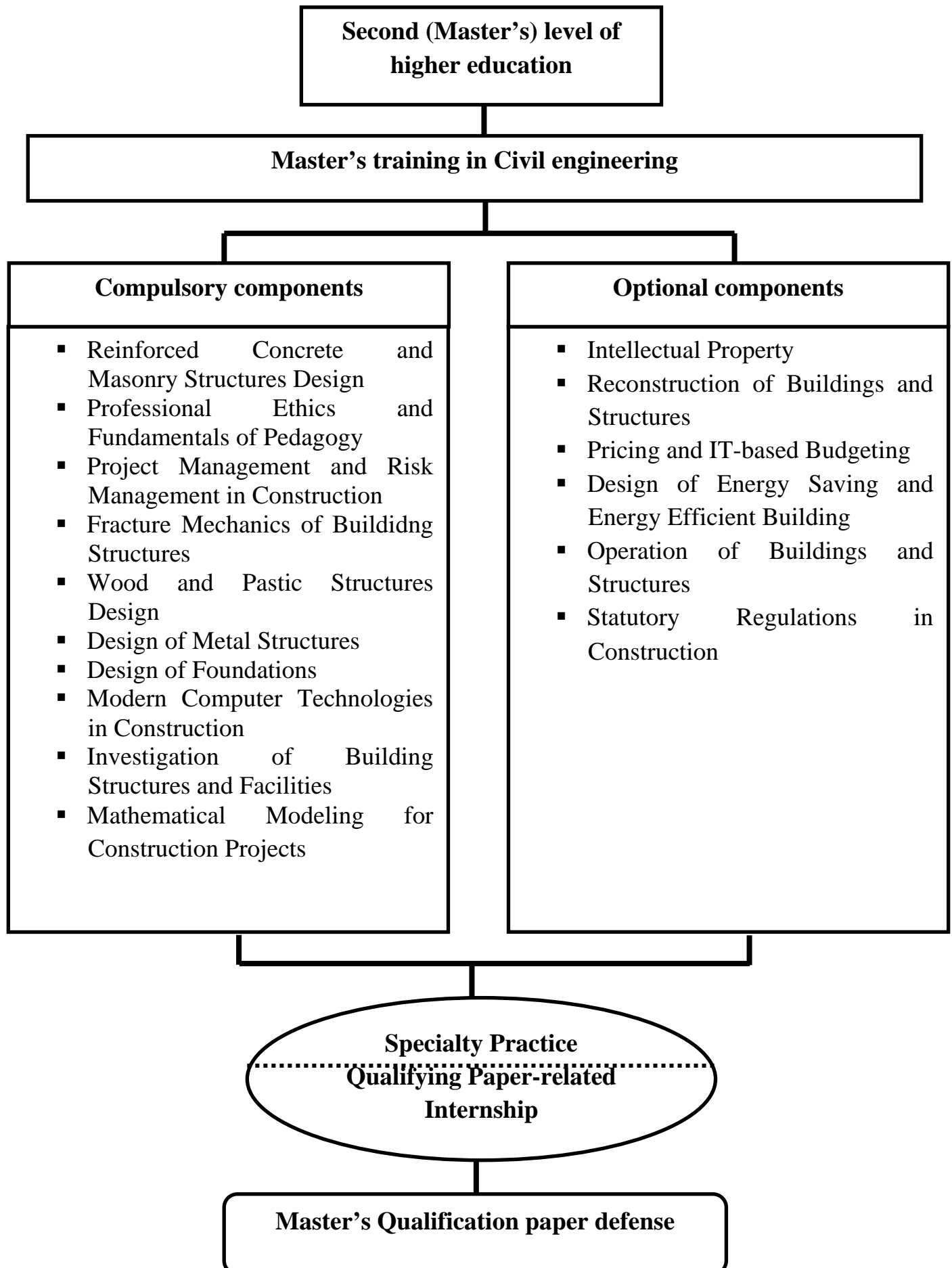
A/d code	Syllabus educational components (academic disciplines, practices, qualification work)	Number of credits	Semester	Form of final control
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1. Compulsory components EP				
CC 1.	Reinforced Concrete and Masonry Structures Design	4,0	10	Exam
CC 2.	Professional Ethics and Fundamentals of Pedagogy	4,0	10	Credit tests
CC 3.	Project Management and Risk Management in Construction	4,0	9	Credit tests
CC 4.	Fracture Mechanics of Building Structures	4,0	10	Credit tests
CC 5.	Wood and Plastic Structures Design	4,0	9	Exam
CC 6.	Design of Metal Structures	4,0	9	Exam
CC 7.	Design of Foundations	4,0	9	Exam
CC 8.	Modern Computer Technologies in Construction	4,0	9	Exam
CC 9.	Investigation of Building Structures and Facilities	4,0	10	Exam
CC 10.	Mathematical Modeling for Construction Projects	4,0	9	Credit tests
Practical training				
CC 11.	Specialty Practice	9,0		Grading tests
CC 12.	Qualifying Paper-related Internship	7,5		Grading tests
Total credits of compulsory components:		56,5		
2. Optional components EP				
10 semester				
OC 1	Intellectual Property	4,0	10	Credit tests
OC 2	Reconstruction of Buildings and Structures	4,0	10	Exam
11 semester				
OC 3	Pricing and IT-based Budgeting	4,5	11	Exam
OC 4	Design of Energy Saving and Energy Efficient Building	4,0	11	Credit tests
OC 5	Operation of Buildings and Structures	4,0	11	Exam
OC 6	Statutory Regulations in Construction	4,0	11	Credit tests
Total credits of optional components:		24,5		
Master's Graduation Thesis Writing		7,5		Credit tests
TOTAL CREDITS OF EDUCATIONAL COMPONENT OF EP			88,5 credits	
Master's Graduation Thesis Defense		1,5		Credit tests
TOTAL FOR MASTER'S TRAINING			90,0 credits.	

An educational institution has the right to change a name of a discipline or to broaden the list of optional courses according to the established procedure.

2.2. Structure-logic scheme of EP

Logic scheme of the structure of educational program components study



5. Matrix of accordance of learning outcomes specified by the standards to educational program components

	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11	CC 12
LO 1			+		+	+	+		+	+	+	+
LO 2			+		+	+	+			+		+
LO 3			+					+				
LO 4					+	+	+					+
LO 5		+							+	+	+	
LO 6			+		+	+	+			+	+	+
LO 7			+									
LO 8	+	+							+			+
LO 9	+				+	+	+			+	+	+
LO 10	+			+	+	+	+			+	+	+
LO 11	+				+	+	+				+	+
LO 12	+				+	+	+			+	+	+