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**DESCRIPTION OF
1.5-YEAR MASTER'S DEGREE PROGRAMME IN
CONSTRUCTION AND CIVIL
ENGINEERING**

General Entry
<p>Name of the Study Programme Construction and Civil Engineering</p>
<p>Cycle /Level National Qualification Framework of Ukraine: 7th level; Qualifications Framework for the European Higher Education Area (QF for EHEA): 2nd cycle; European Qualifications Framework for Lifelong Learning (EQF for LLL): Level 7</p>
<p>Type of Degree & Duration Master's, full-time, 1 year 5 months, 90 credits</p>
<p>Institution Chernihiv Polytechnic National University, Chernihiv, Ukraine</p>
<p>Objective(s) of a Study Programme Formation the set of knowledge, abilities and skills necessary for solving complex engineering and/or scientific research problems related to energy efficiency, sustainability of the life cycle of buildings and the urban environment</p>
<p>Access to Professional Activity The graduate can work in positions related to: head of enterprises, institutions and organizations, heads and supervisors of departments (subdivisions) in construction, chief engineer of the project, chief designer, product development manager, research manager, construction project manager, project builder, civil engineer, geotechnical engineer, structural engineer, product development manager, institutions of higher education, and scientific institutions.</p>
<p>Discipline(s) / Subject area(s) The BIM-based disciplines for designing of buildings and structures in an energy efficient and sustainable manner is the pillar of this program</p>
<p>General / Specialist Focus Develop and use the cutting-edge technologies in the design, inspection, restoration of constructional objects and their technical expertise by using of BIM technologies. During the program developing the modern national, world and region features of the construction and engineering development had been taken into consideration by the project group. The latter provide for a theoretical knowledge, practical skills and abilities in observation and reconstruction of buildings and structures by using of BIM technologies. During the development, the historical and architectural features of the Chernihiv region were also taken into account, with the emphasis on the restoration of the outdated housing stock and objects damaged as a result of war. The program was developed in accordance with the Concept of Implementation of Building Information Modelling Technologies (BIM-technologies) in Ukraine (Decree No. 152-r of the Cabinet of Ministers of Ukraine dated February 17, 2021). The program is based on scientific principles considering the current state of construction industry development and is aimed at formation of competencies in students that provide of their comprehensive professional, intellectual, social and creative development, taking into account new realities and challenges for the implementation of engineering, scientific research and innovative (including international) activities. While programme creation, attention was paid to the application of BIM technologies in architecture, engineering and construction aimed at promoting the best EU experience in the development and implementation of educational methodologies and specific knowledge and practical skills related to energy efficiency and sustainability of building`s life cycle and the urban environment. The latter is based on the requirements established by the UN Agenda for the</p>



period until 2030, with a special emphasis on the Sustainable Development Goals No. 7, 10, 11, as well as the priorities of the EU "Green course" and an economy that works for people, in accordance with the international project The BRIDGE.

Orientation

The SP is a professional and applied programme. The program is focused on mastering knowledge, abilities and skills aimed at training specialists and research scientists in the field of building information modelling (BIM) and management of processes and construction objects at all stages of their life cycle, taking into consideration the up-to-date requirements of energy efficiency and sustainability in the construction sector.

Teaching & Learning Approaches

Student-centered learning, self-learning, problem-oriented learning, e-learning in the University's MOODLE system, etc.

Main teaching and learning methods are: combination of lectures, practical workshops, implementation of projects, laboratory workshops of research feature, qualification work.

Assessment Methods

The evaluation system is made up of current, intermediate, and semester control of knowledge in academic disciplines, assessment of practice results, and certification. Current control is implemented in form of survey, defense of laboratory and practical work, presentations at seminar classes, express control, checking the results of individual tasks, control of assimilation of educational material planned for independent processing. Intermediate control is implemented in form of tests. ntermediate control is implemented in form of tests.

Semester control is carried out in the form of differentiated test, semester exam, course work (project) defense, and qualification work.

Distinctive Features

The program considers of the national and world`s trend in the development of construction and engineering including state-of-the-art BIM technologies, combining disciplines that provide the study of theoretical knowledge, practical skills and skills in surveying and reconstruction of buildings and structures.



Needs analysis of the labour market and other stakeholders

Needs of the labour market

The educational programme should ensure that the training content is consistent with the labour market needs and the prospects for the development of the energy efficiency sector, cooperation with enterprises and private construction firms, as well as cooperation with foreign partners.

Master graduates in Construction and Civil Engineering are requested to have:

Specific skills

1. Ability to integrate specialized conceptual knowledge in the field of construction and civil engineering, in combination with compliance of current regulatory and legal documents in the field of architecture and construction, and with the use of BIM technologies to solve complex engineering problems in the constructional industry.
2. Ability of project development and implementation in the field of construction and civil engineering.
3. The ability to ensure the safety while managing of complex processes in the field of construction and civil engineering.
4. The ability to conduct surveys, tests, diagnosis and calculations while solving problems in the field of construction and civil engineering.
5. The ability to build and explore construction and civil engineering`s situational models, objects and processes.
6. The ability to use BIM-technologies in solving problems of energy efficiency and sustainability of the building`s life cycle of and the urban environment as a whole.
7. The ability to clearly and unambiguously convey one's own knowledge, conclusions and arguments to specialists and non-specialists in the construction industry.
8. Ability to integrate knowledge from other fields to solve complex problems in broad or multi-disciplinary contexts.
9. Basic knowledge of the main national, European and international normative and legal acts in the field of construction.
10. Ability to use knowledge and understanding to assess threats and risks in industrial and civil construction.
11. Ability to carry out scientific / professional examination of research (scientific), professional / creative projects.
12. The ability to control and check the quality indicators of building materials, products and structures, the quality of construction, technological operations. Ability to process existing project documentation.

Soft skills

- The ability to communicate in a foreign language.
- The ability to communicate on professional issues orally and in writing, as well as learn information by reading sources in one of the foreign languages.

Communication skills

- The ability to convey clearly own knowledge, conclusions and argumentations to specialists and non-specialists in the construction industry.
- Ability to work in a team



- Analytical abilities and problem-solving skills
- Decision-making skills
- Planning and organization skills

Educational needs of the other stakeholders

No other stakeholders outside of those of the labour market have been consulted.

Study objectives

The main aim of the Master`s degree is to provide of in-depth competencies in the "Construction and Civil Engineering" speciality with an emphasis on practical skills specifically in the design, construction, inspection, testing, operation energy efficiency and reconstruction of buildings and structures based on a BIM technologies.

Objectives of educational programme:

- acquiring comprehensive knowledge and competences in diagnosis, design, planning, construction, control, audit and analysis of processes in the field of construction and civil engineering based on information models;
- integration of education, research, innovation and production;
- development of skills and abilities that will allow students to independently solve complex issues in the organisation and development of projects in the field of design, construction, reconstruction and operation of buildings, using modern materials, technologies and techniques, equipment and information processing technologies;
- ensure that the training content is consistent with the labour market needs and the prospects for the development of construction and civil engineering related with energy efficiency and sustainability of buildings and urban environment`s life cycle;
- promoting national and universal cultural values.

Programme Learning Outcomes

After completion of the learning process at this programme the students are expected to be able to:

- 1) Design buildings and structures (according to specialization), including of CAD systems application (BIM-technologies), to ensure of their reliability and durability, making rational design and technical decisions, technical and economic substantiation, considering the peculiarities of the constructional object, determination of the optimal mode of its functioning and implementation of resource and energy saving measures.
- 2) Apply specialized conceptual knowledge, including modern scientific achievements including up-to-date BIM-technologies, as well as critical understanding of current problems in the field of construction and civil engineering to solve the complex problems of professional activity.
- 3) Conduct technical examination of projects in construction and civil engineering, monitoring compliance of projects and technical documentation, design tasks, technical conditions, energy efficiency requirements and other applicable regulatory and legal documents in the field of architecture and construction.
- 4) Carry out the operation, maintenance and quality control of construction and civil engineering facilities based on a BIM-technologies.
- 5) Communicate fluently in national and foreign languages orally and in writing to discuss professional problems and results of activities in the field of architecture and construction.
- 6) Apply an up-to-date mathematical methods for statistical data analysis, calculation and optimization of design parameters and technological processes of construction of buildings and structures, use of modern methods and means of three-dimensional scanning, modeling (BIM-technologies) and additive technologies.



- 7) Develop and manage of labour and environmental protection measures while research and production activities, the ability to ensure the health and working capacity of employees.
- 8) Track down the latest achievements in chosen specialization, and their application for innovations creation.
- 9) Select the cutting-edge materials, technologies and methods of construction, considering the architectural and planning, constructive part of the project and the base of the construction organization.
- 10) Gather the necessary information using scientific and technical literature, databases and other sources, analyze and evaluate it.
- 11) Solve the problems of construction and civil engineering in new or unfamiliar environments in the presence of incomplete or limited information, taking into account the aspects of social and ethical responsibility, to solve professional tasks taking into account the requirements of labor protection.
- 12) Apply building information modelling using the principles of energy efficiency, reliability and sustainable development to manage the life cycle of historical, modern buildings and structures and objects damaged as a result of military operations.

Curriculum

The curriculum of the Master`s degree in Construction and Civil Engineering for the academic year 2025-26 is shown in attachment (Tables “Curriculum - Academic Year 2025-26”).

The curriculum of the Master in Construction and Civil Engineering contains two main majors: 1) BIM technologies in architecture and construction; 2) Inspection and reconstruction of buildings and structures.

For each course unit of the curriculum the following information are given:

- year and semester of delivery;
- ECTS credits;
- the total scope of the course units;
- lectures, practical/laboratory workshops, independent work.

Programme Units

Characteristics of the course units

Characteristics of the course units are provided in the specific course syllabus, where the following information are given:

- name;
- number of ECTS credits;
- course year and semester;
- specific learning outcomes of the course unit;
- contents;
- teaching and learning methods;
- typologies of educational activities or teaching techniques, also in terms of number of hours/credits for each technique;
- methods of monitoring;
- assessment criteria;
- assessment metrics;
- criteria of attribution of the final grade;
- prerequisites;
- educational material of reference.



Characteristics of the graduation exam

The characteristics of the graduation exam are also given in course syllabes which contain the following information:

- workload, in terms of ECTS credits;
- requirements to be fulfilled by the final work;
- criteria for the attribution of the dioloma grade.

Admission, Recognition, Progression and Attestation

Admission

Students who have a bachelor's degree and have passed the exam can be enrolled in the Master's degree in Construction and Civil Engineering.

Recognition

Certificate of accreditation of the EP, issued by the National Agency for Higher Education Quality Assurance No. 4011 dated 23.02.2023.

The certificate of accreditation is valid until 01.07.2032.

Progression

Students' progression in their studies is regulated by the following criteria:

Score in points	Score in ECTS	Evaluation according to the national scale (differentiated credit)	
		for the exam (differentiated credit), course project (jobs), practices, certifications	for credit
90 – 100	A (<i>perfectly</i>)	perfectly	counted
82-89	B (<i>very well</i>)	well	
75-81	C (<i>well</i>)		
66-74	D (<i>satisfactorily</i>)	<i>satisfactorily</i>	
60-65	E (<i>enough</i>)		
0-59	FX (<i>unsatisfactorily</i>)	unsatisfactory with the possibility of reassembly	not counted with possibility repeated drafting

Admission to the next year

To be transfer to the 2nd year students must pass all exams and tests.

Admission to the graduation exam

To be admitted to the graduation exam students must have accumulated all the ECTS credits established in the curriculum, except the credits attributed to the graduation exam.

Attestation

Attestation of graduates of Master's education programme in Construction and Civil Engineering is carried out in the form of public defence of qualification work. The qualification work aims to determine the general scientific, technical, professional and cultural levels of an applicant for a master's degree by controlling his knowledge and skills, assessing the ability to independent



analysis the task, formulate a goal, tasks and conclusions, submit in writing and orally the material of the work and present the results during the public defence. The qualification work must not contain academic plagiarism, fabrication, or falsification. The attestation ends up with the issuance of a document 'Master's diploma and Diploma Supplement' on the awarding of a master's degree with the assignment of the master's qualification in construction and civil engineering.

Teaching staff

All scientific and pedagogical workers providing the educational program are active scientists, publishing their works in the domestic and foreign scientific press. All of educational staff possess the extensive experience of scientific, pedagogical, and practical work.

Among the teachers are representatives of national professional associations: the Academy of Engineering of Ukraine; Industrial cluster of Chernihiv region; All-Ukrainian public organization "Ukrainian Society of Soil Mechanics, Geotechnics and Foundation Construction" has state honors and awards, which contributes to ensuring the proper conditions for thorough acquisition of knowledge and practical skills necessary for their further professional activities.

All scientific and pedagogical workers of the department, who provide teaching of professionally oriented disciplines, have scientific degrees and scientific titles in the relevant specialty.

The teaching staff, which ensures the implementation of the educational program, meets the requirements defined by the Licensing conditions for conducting educational activities of educational institutions.

Material and technical support

Material and technical support of the Department of Welding Technologies and Construction allows to ensure fully the educational process throughout the entire cycle of students training under the Construction and Civil Engineering Master's degree educational program.

All lectures, laboratory and practical classes are carrying out in laboratories and subject classrooms equipped with technical teaching aids, measuring devices, laboratory stands, robots, etc. Laboratories are equipped with modern personal computers and up-to-date software (Revit, Building technologies: Esimate, AutoCAD, Lira, etc.) and are connected to both local and global computer networks.

Partnerships

Partnerships for carrying out training periods outside the University

1. Slovak University of Technology in Bratislava, Bratislava, Slovakia.
2. Private enterprise Architectural workshop "ATTIK".
3. Kyiv National University of Construction and Architecture.
4. Lviv Polytechnic National University.
5. Private Joint Stock Company "Budindustria".