

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
“Igor Sikorsky Kyiv Polytechnic Institute”**

APPROVED

by the Academic Council

of Igor Sikorsky Kyiv Polytechnic Institute

(protocol № 10 from December 13, 2021)

Chairman of the Academic Council

_____ Mykhailo ILCHENKO

GEOENGINEERING

EDUCATIONAL AND PROFESSIONAL PROGRAM

second (master's) level of higher education

specialty	184 Mining
branch of knowledge	18 Production and technologies
qualification	Master Degree in Mining

Put into effect by order of the Rector
Igor Sikorsky Kyiv Polytechnic Institute
from February 15, 2022 № HOH/75/2022

PREAMBLE

DEVELOPED by the project group:

Head of the project group:

Hayko Gennadiy Ivanovich, Doctor of Technical Sciences, Professor, Professor of the Department of Geoengineering

Members of the project group:

Vovk Oksana Oleksiivna, head department, professor, Doctor of Technical Sciences

Viktor Georgiyovych Kravets, professor, professor, Doctor of Technical Sciences

Tverda Oksana Yaroslavivna, associate professor, Doctor of Technical Sciences

Han Anatoliy Leonidovych, associate professor, associate professor, Ph.D.

Lyubov Valentynivna Shaidetska, associate professor, Ph.D.

Aksyutenko Polina Serhiivna, student of the IV year, group OC-81

The department of geoengineering is responsible for the training of students of higher education according to the educational program

AGREED:

Scientific-methodical commission SMCU of Igor Sikorsky Kyiv Polytechnic Institute, specialty 184 Mining

Head of SMCU 184 _____ Oksana VOVK

(protocol № 2 from December 8, 2021)

Methodical Council of Igor Sikorsky Kyiv Polytechnic Institute

Head of Methodical Council _____ Yuriy YAKYMENKO

(protocol № 2 from December 9, 2021)

Professional expertise by interested persons (stakeholders) is taken into account:

Azer Shukurov
Deputy Chairman of the Board of Directors

Krut Oleksandr Anatoliyovych
Director of the State Enterprise "State Research and Design Institute of the Coal Industry", Doctor of Technical Sciences

Kukuyashnyi Eduard Viktorovych
Director of the State Enterprise "Directorate for Construction of Facilities"

Stakeholder reviews are attached.

According to the monitoring results of the educational and professional program Geoengineering of the second (master's) level of higher education, specialty 184 Mining, approved by the decision of the Academic Council dated March 15, 2021, protocol № 3, taking into account the proposals of the participants of the educational process who are involved in the implementation of the Educational and Professional Program (EPP), proposals of graduates, employers and other external stakeholders, it was updated, namely, professional competences were strengthened: from the practical component due to the introduction of educational components "Surface Complex of Mining Enterprises", "Geocontrol of Mining Production Processes".

The revision of the educational program was carried out in compliance with the order of the Rector of Igor Sikorsky Kyiv Polytechnic Institute № HOH/248/2021 dated October 22, 2021 "On updating the educational programs of Igor Sikorsky Kyiv Polytechnic Institute".

EPP was discussed after receiving all wishes and suggestions of stakeholders and approved at an extended meeting of the Department of Geoengineering (protocol № 7 dated December 8, 2021)

1. PROFILE OF THE EDUCATIONAL PROGRAM in the specialty 184 Mining

1 – General information	
Full name of the higher education institution and institute/faculty	Educational and Scientific Institute for Energy Saving and Energy Management
The degree of higher education and the title of the qualification in the original language	The degree is a master's degree Qualification – master of mining
The official name of the EPP	Geoengineering
Type of diploma and scope of EPP	Master's degree, single, 90 ECTS credits, study period is 1 year 4 months
Availability of accreditation	Accreditation Certificate HД № 1192622 from September 25, 2017
Cycle/level of higher education	National Qualifications Framework - 7th level QF-EHEA – the second cycle EQF-LLL – 7th level
Precondition	Having a bachelor's degree
Language of teaching	English
Program validity period	Until the next accreditation
Internet address of the permanent placement of the EPP	Placed in open access on the website: http://geobud.kpi.ua section "General information", "Educational programs" https://osvita.kpi.ua/ section "Educational programs"
2 - The purpose of the educational program	
Training of specialists in the field of production and technology, able to solve complex scientific and practical problems of geoengineering on the basis of conducting research and creating innovations related to the geo-construction development of the subsoil and underground space of megacities, able to ensure professional interaction of representatives of the scientific and technical community in the conditions sustainable innovative development of society and meet the transformation of the labor market through interaction with employers and other stakeholders.	
3 – Characteristics of the educational program	
Subject area	Fundamental and applied bases of analysis, modeling, design, development, production, testing, operation of mining technologies used during the construction of underground structures of megacities, namely, subway structures, underground communication systems, underground transport systems, underground objects of the service sector, underground parking lots and garages in urban areas.
Orientation of the EPP	Educational and professional
The main focus of the EPP	Special education in geostructural subsoil development, design, construction, ensuring reliable operation, reconstruction or renovation of underground facilities of various purposes in accordance with specialty 184 Mining. Key words: mining, geotechnologies, underground construction, geological environment, metropolis, underground structures, georesources, minerals.

Features of the EPP	The implementation of the program involves a significant scientific and research component, innovative orientation of educational components, involvement of highly qualified professionals - practitioners, industry experts, representatives of employers - in classroom classes.
4 – Suitability of graduates for employment and further education	
Suitability for employment	Types of economic activity: - construction work specialized in one aspect, combining different types of structures, and requiring specialized skills or equipment. - underground works. Professions: enterprise manager, research engineer, mining engineer, production management engineer, construction and equipment operation engineer, etc. Professional job titles (according to ДК 003:2015)
Further education	Continuation of studies at the third (educational and scientific) level of higher education and/or acquisition of additional qualifications in the adult education system.
5 – Teaching and assessment	
Teaching and learning	The general learning style is task-oriented. Teaching is carried out in the form of: lectures, seminars, practical (laboratory) classes in small groups (up to 8 people), independent work with the possibility of consultations with the teacher, individual classes, the use of information and communication technologies (e-learning, online lectures, OCW, distance courses) by individual educational components. The intended use of blended learning models.
Evaluation	Current and semester control in the form of laboratory reports, presentations, written and oral exams and the defense of the qualification work are evaluated in accordance with the criteria of the Rating Evaluation System.
6 – Program competencies	
Integral competence	The ability to solve complex tasks and problems of mining, including in the process of teaching others, which involves conducting research and implementing innovations.
General competences (GC)	3K 1. The ability to act in a new situation related to work by profession and the ability to generate new ideas in the field of mining. 3K 2. The ability to communicate with specialists and experts of various levels in other fields of knowledge. 3K 3. The ability to work in an international context and in a global information environment by profession. 3K 4. The ability to act socially responsibly and consciously. 3K 5. Understanding the need to comply with copyright and related intellectual property rights; perception of state and international systems of legal protection of intellectual property.

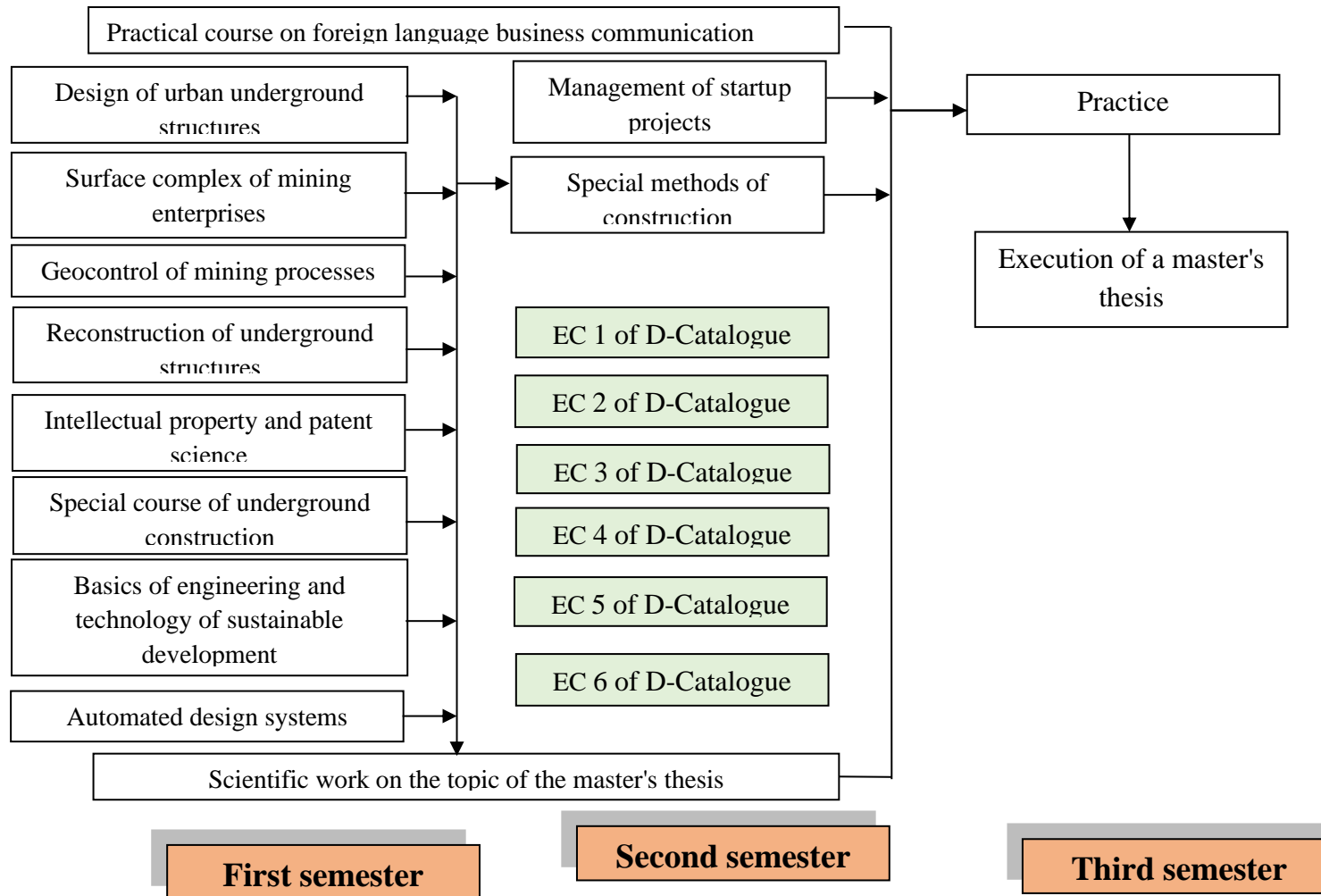
Special competences (SC)	<p>CK 1. Ability to identify, pose, solve problems and make informed decisions in professional activities.</p> <p>CK 2. Ability to perform theoretical and experimental studies of parameters and modes of operation of systems and technologies of mining and geoconstruction enterprises.</p> <p>CK 3. Ability to develop and implement innovative products and measures to improve and increase the technical level of mining systems and technologies, ensuring their competitiveness.</p> <p>CK 4. Ability to develop project documentation (technical assignment, technical proposals, sketch project, technical project, working project) for mining and geoconstruction systems.</p> <p>CK 5. Ability to organize production processes and technical management of systems and technologies of mining and geoconstruction enterprises.</p> <p>CK 6. The ability to perform design works of special construction methods, mineral development facilities, take special measures for the reconstruction of underground structures and mining enterprises.</p> <p>CK 7. Ability to implement general principles of complex optimization during project development.</p>
7 – Program learning results	
<p>PH 1. To act in a new situation related to work by profession and the ability to generate new ideas in the field of mining.</p> <p>PH 2. Communicate freely with specialists and experts of various levels in other fields of knowledge.</p> <p>PH 3. To work in an international context and in a global information environment by profession.</p> <p>PH 4. To act socially responsibly and consciously.</p> <p>PH 5. To comply with copyright and related intellectual property rights; perception of state and international systems of legal protection of intellectual property.</p> <p>PH 6. Identify, pose, solve problems and make informed decisions in professional activities.</p> <p>PH 7. To carry out theoretical and experimental studies of parameters and modes of operation of systems and technologies of mining and geoconstruction enterprises.</p> <p>PH 8. Develop and implement innovative products and measures to improve and increase the technical level of mining systems and technologies, ensuring their competitiveness.</p> <p>PH 9. Develop project documentation (technical assignment, technical proposals, sketch project, technical project, working project) for mining and geoconstruction systems.</p> <p>PH 10. Organize production processes and technical management of systems and technologies of mining and geoconstruction enterprises.</p> <p>PH 11. Carry out design works for special construction methods, mineral development facilities, take special measures for the reconstruction of underground structures and mining enterprises.</p> <p>PH 12. Implement general principles of complex optimization during project development.</p>	
8 – Resource support for program implementation	
Personnel support	<p>In accordance with the personnel requirements for ensuring the implementation of educational activities for the corresponding level of higher education (Appendix 2 to the Licensing Conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine № 1187 from March 12, 2015 in the current version.</p>

Material and technical support	In accordance with the technological requirements for the material and technical support of the educational activity of the corresponding level of higher education (Appendix 4 to the License Terms), approved by the Decree of the Cabinet of Ministers of Ukraine № 1187 from March 12, 2015 in the current version.
Informational and educational and methodological support	In accordance with the technological requirements for educational and methodological and informational support of educational activities of the corresponding level of higher education (Appendix 5 to the Licensing Terms), approved by Resolution of the Cabinet of Ministers of Ukraine № 1187 from March 12, 2015 in the current version.
9 – Academic mobility	
National credit mobility	The possibility of academic mobility, the possibility of double graduation, etc.
International credit mobility	The possibility of international academic mobility (Erasmus+K1), the possibility of a double degree, of long-term international projects that involve the included study of students, etc.
Education of foreign students of higher education	Studies are conducted in English, and Ukrainian is studied as a foreign language

2. LIST OF EDUCATIONAL PROGRAM COMPONENTS

Code	Components of the educational program (educational subjects, course projects/works, practices, qualification work)	Number of ECTS credits	Final control form
Compulsory educational components			
General training cycle			
3O 1	Intellectual Property and Patenting	3	credit
3O 2	Basics of Engineering and Sustainable Development Technologies	2	credit
3O 3	Practical Foreign Language Course for Business Communication	3	credit
3O 4	Management of Startup Projects	3	credit
Vocational training cycle			
ΠO 1	Surface Complex of Mining Enterprises	3	credit
ΠO 2	Geocontrol of Mining Processes	3	credit
ΠO 3	Underground Enterprises Reconstruction	3,5	examination
ΠO 4	Specialized Course On Underground Construction	3,5	credit
ΠO 5	Computer-Aided Design System	3,5	credit
ΠO 6	Special Methods of Building	3,5	examination
ΠO 7	Municipal Underground Structures Engineering	3,5	examination
ΠO 8	Municipal Underground Structures Engineering. Course project	1,5	credit
Research component			
ΠO 9.1	Scientific Work on the Topic of Master's Thesis. Part 1. Fundamentals of the scientific research	2	credit
ΠO 9.2	Scientific Work on the Topic of Master's Thesis. Part 2. Scientific Work on the Topic of Master's Thesis	2	credit
ΠO 10	Practice	14	credit
ΠO 11	Master's Thesis Implementation	12	defense
Selective components of EPP			
Cycle of professional training			
ΠIB 1	Educational Component 1 of D-catalogue	4	credit
ΠIB 2	Educational Component 2 of D-catalogue	4	credit
ΠIB 3	Educational Component 3 of D-catalogue	4	credit
ΠIB 4	Educational Component 4 of D-catalogue	4	credit
ΠIB 5	Educational Component 5 of D-catalogue	4	credit
ΠIB 6	Educational Component 6 of D-catalogue	4	credit
The total amount of compulsory components:		66	
The total volume of selective components:		24	
The volume of educational components that ensure the obtaining of competencies defined by the standard of higher education		66	
GENERAL SCOPE OF THE EDUCATIONAL PROGRAM		90	

3. STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL PROGRAM



4. FORM OF CERTIFICATION OF HIGHER EDUCATION ACQUIRES

Attestation of students of higher education under the Geoengineering educational program with the specialty 184 Mining is carried out in the form of a defense of a qualification work (master's thesis) and ends with the issuance of a document of the established model on awarding him with a master's degree with the qualification: master of mining under the educational and professional program "Geoengineering".

Attestation is carried out openly and publicly.

The master's thesis is checked for plagiarism and, after defense, is placed in the depository of the National Technical Library of the University for free access.

5. MATRIX OF CORRESPONDENCE OF PROGRAM COMPETENCES TO THE COMPONENTS OF THE EDUCATIONAL PROGRAM

	301	302	303	304	Π01	Π02	Π03	Π04	Π05	Π06	Π07	Π08	Π09	Π010	Π011
3K1	+	+		+			+					+			+
3K2			+	+									+	+	+
3K3		+	+	+										+	
3K4	+	+		+									+	+	
3K5	+			+											+
CK1				+				+	+	+		+			+
CK2					+	+		+		+				+	
CK3	+	+			+		+								+
CK4								+	+		+	+			
CK5					+	+		+		+					
CK6					+	+	+	+	+	+	+	+			
CK7						+		+	+		+	+			+

6. MATRIX OF PROVIDING PROGRAM LEARNING RESULTS BY RELEVANT COMPONENTS OF THE EDUCATIONAL PROGRAM

	301	302	303	304	Π01	Π02	Π03	Π04	Π05	Π06	Π07	Π08	Π09	Π010	Π011
PH1	+	+		+			+					+			+
PH2			+	+									+	+	+
PH3		+	+	+										+	
PH4	+	+		+										+	
PH5	+		+												
PH6				+		+		+	+		+	+			+
PH7					+	+		+		+					+
PH8	+	+		+	+		+							+	+
PH9									+		+	+			
PH10						+		+		+	+				
PH11					+		+	+	+	+	+	+			
PH12						+			+			+	+		+

REVIEW

Educational and professional program on geoenvironmental knowledge
18 Production and technology specialties,
184 Mining second (master's degree) level of higher education

The presented educational and professional Geoenvironmental program on training of specialists in the second (master's) level of higher education is aimed at training professionals in the field of production and technology. The program provides the amount of knowledge that will allow specialists to solve complex problems and actual problems of geoenvironmental on the basis of engineering surveys, scientific research and implementation of innovative solutions in the direction of development of the underground space of modern megacities and the ability to implement and ensure professional interaction of representatives of the scientific, technical and business community in the conditions of sustainable innovative development of society in solving complex specialized problems and practical problems in the mining area.

The presented educational and professional geoenvironmental program takes into account the domestic and foreign experience on training applicants of the second (master's degree) level of higher education. The developers of the program are recommended to distinguish educational components of professional orientation, which will ensure competence and provide programmatic learning outcomes.

The overall impression after reading the educational and professional program is positive. We believe that taking into account the recommendations made will contribute to further improving the quality of training of higher education applicants in the second level of higher education in mining area.

Azer Shukurov

Deputy Chairman of
the Board of Directors



Signature/stamp
17/11/2021



МІНІСТЕРСТВО ЕНЕРГЕТИКИ УКРАЇНИ
ДЕРЖАВНЕ ПІДПРИЄМСТВО
«ДЕРЖАВНИЙ НАУКОВО-ДОСЛІДНИЙ, ПРОЕКТНО-КОНСТРУКТОРСЬКИЙ
І ПРОЕКТНИЙ ІНСТИТУТ ВУГІЛЬНОЇ ПРОМИСЛОВОСТІ
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18.11.2021 № 216-357

Рецензія-відгук
на освітньо-професійну програму «ГЕОІНЖЕНЕРІЯ»
за спеціальністю 184 Гірництво
галузі знань 18 Виробництво та технології
другого (магістерського) рівня вищої освіти
у Національному технічному університеті України
«Київський політехнічний інститут імені Ігоря Сікорського»

Метою освітньо-професійної програми є підготовка магістрів за спеціальністю 184 Гірництво, здатних розв'язувати складні задачі геоінженерії на основі проведення наукових досліджень та здійснення інновацій, що пов'язані з раціональним освоєнням підземного простору мегаполісів і гірничих підприємств.

Унікальність даної освітньо-професійної програми полягає в системній спрямованості освітніх компонентів на вирішення проблем геобудівельного освоєння надр з метою ефективного геотехнічного та міського підземного будівництва, а також геоінженерних задач видобутку корисних копалин.

Структура освітньо-професійної програми добре узгоджена із сформульованими цілями і завданнями навчального процесу. Заслуговує на позитивну оцінку деталізованість, а водночас продуманість і вмотивованість опису придатності випускників до працевлаштування. При формуванні цілей і програмних результатів навчання враховано позиції і потреби стейкхолдерів. Перелік та обсяг нормативних дисциплін відповідають структурнологічній схемі підготовки здобувачів вищої освіти за спеціальністю 184 Гірництво.

Навчальний процес базується на застосуванні інноваційних технологій навчання, зокрема інформаційних технологій та охоплює самостійну дослідницьку діяльність здобувачів освіти, за змістом та обсягом необхідну для досягнення заявлених цілей програми.

Таким чином освітньо-професійна програма «Геоінженерія», яка реалізується в Інституті енергозбереження та енергоменеджменту КПІ ім. Ігоря Сікорського, відповідає вимогам професійних стандартів у сфері підготовки кадрів вищої кваліфікації в області гірництва та підземного будівництва, потребам ринку праці фахівців гірничого профілю.

Директор
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Підпис (печатка)
18.11.2021

МІНІСТЕРСТВО ЕНЕРГЕТИКИ УКРАЇНИ
ДЕРЖАВНЕ ПІДПРИЄМСТВО
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MINISTRY OF ENERGY OF UKRAINE
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29.11.2021р. № 10/510/2

РЕЦЕНЗІЯ-ВІДГУК

на освітньо-професійну програму «ГЕОІНЖЕНЕРІЯ»
за спеціальністю 184 Гірництво, галузі знань 18 Виробництво та технології
другого (магістерського) рівня вищої освіти

Національного технічного університету України

«Київський політехнічний інститут імені Ігоря Сікорського»

У Національному технічному університеті України «Київський політехнічний інститут імені Ігоря Сікорського» сформувався унікальний для української інженерної освіти напрямок підготовки фахівців з освоєння міського підземного простору, з геобудівельного освоєння надр, який представлений в освітньо-професійній програмі «Геоінженерія». Вона містить всі необхідні для такого типу документації структурні елементи та являє систему навчально-методичних компонентів, які регламентують цілі, очікувані результати, зміст, умови та технології реалізації навчального процесу, що охоплює собою коло найважливіших знань з гірничих та геобудівельних технологій, а також систему оцінки якості підготовки випускника.

Під час опанування програми студентами, передбачено набуття цілої низки компетентностей, що формують як дослідницьку, так і практичну складову, забезпечують здатність працювати в міжнародному контексті та в глобальному інформаційному середовищі за фахом. При формуванні цілей і програмних результатів навчання враховано позиції і потреби провідних роботодавців.

Компоненти освітньої програми (ОП) включають цикли загальної та професійної підготовки, дослідницький (науковий) компонент і вибіркові компоненти ОП. Серед особливостей циклу професійної підготовки слід зазначити збалансованість гірничих та геобудівельних компонентів, логічну послідовність і ґрунтовну базу освітніх дисциплін, а також їх сучасні та інноваційні аспекти, які знаходять більш повне розкриття в дисциплінах за вибором.

Змістове наповнення програми підтверджує наявність усіх структурних елементів, які є обов'язковими, і, таким чином, дає можливість поглибити фахові знання та оволодіти загальнонауковими методами і принципами досліджень гірничої та геобудівельної проблематики, сприяє формуванню загальної дослідницької культури та професійної етики.

Таким чином представлена освітньо-професійна програма «Геоінженерія» відповідає сучасному рівню розвитку науки та практики освітньої діяльності, що дозволяє рекомендувати її до використання в освітньому процесі.

Директор ДП «Дирекція
по будівництву об'єктів»



Едуард КУКУЯШНИЙ