

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
TARAS SHEVCHENKO NATIONAL UNIVERSITY OF KYIV

«APPROVED»
L.V. Gubersky, Rector
06 February 2020

EDUCATIONAL AND PROFESSIONAL PROGRAM
Applied Geology

Higher Education Cycle: Second (Master's Degree)

(revised 19.12.19, approved 26.12.19, minutes #3)

Academic Degree: Master of Sciences

Specialism: Earth Sciences (Code number 103)

Field of Study: Natural Sciences (10)

Reviewed and approved by the
Research and Methodology Council
26 December 2019
Minutes # 3

Translation accuracy certified by
T. V. Pastushenko
Head of Languages Department
(Natural Science Faculties)
Правильність перекладу засвідчую

Enacted by the Rector's Order
dated 26 February 2020
78-32

Kyiv 2019

EXTERNAL APPROBATION

Reviews:

1. Reviewed by Professor D.V. Malytskiy, Doctor of Physical and Mathematical Science, Head of Seismic and Tectonic Research Department, Institute of Geophysics by S.I. Subbotin, Carpathians Branch.

2. Reviewed by Professor M.M. Pavlun, Doctor of Geological and Mineralogical sciences, Dean of the Faculty of Geology, Ivan Franko National University of Lviv.

PREFACE

Developed by a working group represented by:

Surname, name, patronymic of the leader and members of project group	Position (for part-time workers - primary place of employment, position)	The name of institution the lecturer graduated from (year of graduation, speciality, qualification according to the certificate of higher education)	Academic degree, code and name of scientific speciality, thesis subject; academic status and the department (specialty) it is certified by	Length of scientific-educational and/or scientific work	Information on scientific activity (main publications related, scientific research work, participation in conferences and seminars, work with graduate students and doctoral candidates, management of scientific work of students)	Information on professional development of the lecturer (name of the institution, type of certificate, subject, date of issue)
Leader of project group						
Kravchenko, Dmytro Volodymyrovych	Associate Professor of the Department of General and Historical Geology, ESI "Institute of Geology", Taras Shevchenko National University of Kyiv	Taras Shevchenko National University of Kyiv, 1999; specialty - geological survey, prospection and exploration of mineral deposits; qualification – Master in Geology.	Candidate of Geological sciences (2005), speciality 04.00.04 – Geotectonics, thesis subject: "Reological Types, Conditions and Formation Stages of Dislocational Tectonics of the Holovaniv Suture Zone and its Framing in the Middle Bug Area". Associate Professor of Department of General and Historical Geology.	16	<p>Author of more than 50 scientific and educational-methodological publications. Tutor of students' scientific research.</p> <p>Monographs:</p> <p>1. <i>Lukienko O.I., Yanchenko V.P., Kravchenko D.V.</i> (2018) Structural and paragenetic analysis (on tectonofacial basic) Volume 2: Mezozone and Katazone. K.: «Kyiv university», 374 p.</p> <p>Educational textbooks:</p> <p>1. <i>Shevchuk V.V., Lavrenyuk M.V., Kravchenko D.V.</i> (2013) Fundamentals of Stuctural Analysis. K.: «Kyiv university», 288 p.</p> <p>2. Geology of the area of field practice in geological mapping and structural analysis. (2019) http://www.geol.univ.kiev.ua</p> <p>Publications:</p> <p>1. <i>O.Ivanik, V.Shevchuk, D. Kravchenko, S.Shpyrko, V.Yanchenko, K.Gadiatska</i> Geological and Geomorphological Factors of Natural Hazards in Ukrainian Carpathians / Journal of Ecological Engineering. Volume 20, Issue 4, April 2019, pages 177–186 https://doi.org/10.12911/22998993/102964</p> <p>2. <i>Cherkashchenko B., Khymych V., Kravchenko D.</i>, Geometrical analysis of rocks jointing in the North-Western part of Horyshne-Plavninsko-Lavriekievske iron deposit / VIII</p>	<p>1. Internship at "Bonkov Invest Group Inc." (Islamic Republic of Mauritania) in Apr – May 2015, Feb – Mar 2018, Jan 2019" (certificate).</p> <p>2. Internship at "Dao Lao Co.ltd" (Laos People Democratic Republic) Dec 2012 – Jun 2013.– (certificate).</p> <p>3. English Qualification Exam (2014). Taras Shevchenko National University of Kyiv, Institute of Phylology (certificate No156).</p>

					Ukrainian scientific conference and school of young scientist «Modern questions of Geoscience». Kyiv, 18-20 April, 2018. P. 161-164. 3. <i>Shevchuk V.V., Kravchenko D.V., Mazko A.E.</i> Dynamic and kinematic conditions on the late stages of Paleoproterozoic granite formation and tectogenesis within the Pervomaisk fault zone (Ukrainian Shield) on results of microstructural analysis // <i>Geologist of Ukraine</i> (2013) – 2(42). P. 88-95.	
Members of project group						
Ivanik, Olena Mikhailivna	Head of Department of General and Historical Geology, Institute of Geology, Taras Shevchenko National University of Kyiv	Taras Shevchenko National University of Kyiv, Geographical Faculty, 1992, Speciality – geography, qualification – geographer-geomorphologist, teacher	Doctor of geological sciences, 04.00.05 - Geoinformatics, Thesis: “Modelling of natural hazards impact on functionality of transporting natural-technical systems” Professor of Department of General and Historical Geology.	23	Author of 160 publications, participant of International scientific conferences, Gold Member of European Association of Geoscience and Engineers (EAGE), supervisor of PhD students, coordinator of international and government projects Monographs: 1. <i>Ivanik O.M., Gozhik P.F.</i> Geological and geomorphological studies of the eastern Antarctic seas of the Southern Ocean. - Kyiv, 2004. - 144 p. 2. Geological-structural-thermo-atmospheric-geochemical substantiation of oil and gas potential of the Azov-Black Sea basin / <i>Gozhik P.F., Bagriy I.D., Ivanik O.M. et al - K. : Logos, 2010. - 419 p.</i> 3. <i>Ivanik O.M., Shevchuk V.V., Lavreniuk M.V.</i> Modeling of influence of hazardous geological processes on functioning of natural-technogenic systems: monograph. - Kyiv: Kyiv University, 2020. - 351. Educational textbooks: <i>Mitropolsky O.Yu., Ivanik O.M.</i> Marine geology. - Kyiv: Kyiv University", 2016. - 478 p. Publications: 1. <i>Ivanik O.M., Tustanovskaya L.V., Kravchenko D.V., Gadyatska K.P.</i> Adaptation of the method of structural-morphometric analysis to GIS for paleogeomorphological research of Kaniv Dnieper. - Bulletin of the Taras	1. Internship in British Geological Survey by the grant of Royal Society, 2005. 2. Qualification exam in English (Taras Shevchenko National University of Kyiv, Institute of Philology, Certificate N157, Level B2), 2014. 3. Scientific Internship, Visiting Professor, University of Natural Resources and Life Science, BOKU (Vienna, Austria), 2018 4. Scientific Internship, University of Lorraine (Nancy, France), 2019 5. Expert, National Agency For Higher Education Quality Assurance of Ukraine 6. Expert, National Research Foundation of Ukraine

					<p>Shevchenko National University of Kyiv. Geology. - 2020. - 2 (89). - 6-11 DOI: http://doi.org/10.17721/1728-2713.89.01</p> <p>2. Shevchuk V.V., Ivanik O.M, Lavreniuk M.V., Savelyev M.V. Development of algorithms and software components for modeling the stress-strain state of a rocks during the exploration of coal layers / Bulletin of Kyiv National University. Geology. - 2017. - Vol. 76. - P.85-92</p> <p>3. Ivanik O., Shevchuk V., Kravchenko D., Yanchenko V., Shpyrko S., Gadiatska K. Geological and Geomorphological Factors of Natural Hazards in Ukrainian Carpathians. Journal of Ecological Engineering. 2019; 20(4):177-186. doi:10.12911/22998993/102964.</p>
Shnyukov, Sergei Evgenovich	Head of Department of Geochemistry, Minerology and Petrography, Institute of Geology, Taras Shevchenko National University of Kyiv	Taras Shevchenko National University of Kyiv, Geological Faculty, 1977, Speciality – geology, qualification – engineer-geologist	Doctor of Geological Sciences, speciality 04.00.02 - Geochemistry, Thesis: "Geochemistry of impurity elements in the most common accessory minerals." Associate Professor of Department of Geology of Mineral Deposits	32	<p>Author of more than 60 scientific papers, supervises the scientific work of graduate students and students</p> <p>Publications:</p> <p>1. Lasareva I.I., Shnyukov S.Ey. Establishment of stages of formation of rare-metal mineralization by results of geochemical modeling of behavior of polyvalent cerium at formation of magmatic and magmatogenous-hydrothermal systems. The evolution of Precambrian granitoids and related minerals in connection with the Earth's energy and the stages of its tectonic-magmatic activation. <i>Collection of scientific works</i>. K: UkrDGRI, 2008. 279-287.</p> <p>2. Shnyukov S.Ey., Lasareva I.I., Hlon O.A. On the question of the possibility of determining the stage of formation of accessory minerals of magmatogenic-hydrothermal formations by means of geochemical modeling. The Ukrainian Mineralogical Society, 2008, № 5, 103-112.</p> <p>3. O.V.Andreyv, Y.O.Polkanov, S.E. Shnyukov, O.O. Andreyv, S.P. Savenko,</p>

					<p><i>L.M. Stepanyuk, O.A.Hlon. Monazites from the sedimentary cover of the Ukrainian Shield - witnesses of the Riphean-Wend-Paleozoic tectonic-magmatic activation of the south-west of the Eastern European platform . The evolution of Precambrian granitoids and related minerals in connection with the Earth's energy and the stages of its tectonic-magmatic activation. Collection of scientific works. K: UkrDGRI, 2008, 271-278.</i></p>	
--	--	--	--	--	--	--

Requirements of the higher education standards for the Second Cycle (Master') degree programs in specialism 103 "Earth Sciences" (approved by the order of the Ministry of Education and Science of Ukraine of 21 November 2019, # 1453) are complied with in the Program development.

1. Profile of the Applied Geology educational program

1 – General information	
Qualification level, specialism and qualification	<i>Obtained qualification: Master's Degree Program Subject Area: Earth Sciences (code 103) Program: Applied Geology</i>
Language(s) of tuition and examination	<i>English/ Ukrainian</i>
Scope and duration	120 credits ECTS, duration 4 semesters
Type of educational program	educational and professional
University and department performing the tuition according to the Program	<i>Taras Shevchenko National University of Kyiv, Ukraine Institute of Geology ESI (Educational and Scientific Institution)</i>
Partnership educational establishment	–
Official name of the Educational Program, academic level, qualification level of a partnership educational establishment	–
Accreditation	Accreditation certificate of the Ministry of Education and Science of Ukraine for specialism "Geology": series ND No.1188017 from 24.07.2015, Ministry of Education Order No.1709 from 28.07.2015, Specialism 103 – Earth Sciences
Academic cycle/ level	NQF of Ukraine – level 8 FQ-EHEA – second cycle EQF-LLL – level 7
Prerequisites	Bachelor diploma
Mode of attendance	Full-time
Years	2019-2022
Permanent web-address with Program description	http://www.geol.univ.kiev.ua/ua/edu/edu_programs/
2 – Goal of the educational program	
	Training of experts in integrated geological and geophysical study of composition, structure and formation history of multigenetic sedimentary complexes, modern geological processes, assessment of impact of hazardous processes on the infrastructure objects; analysis of geological risks and hazards.
3 - Outline of the educational program	
Field of Study (field / specialism / specialization)	Natural Sciences / Earth Sciences / Geology
Focus of the educational program	Applied education
Principal points of the educational program and specialization	Professional training in Applied Geology according to the Earth Sciences specialty (103 specialty code) is your guide for the solution of applied problems in stratigraphy and tectonics, including advanced modern geodynamics, and the application of this theoretical knowledge to the vital

	<p>challenges of predicting and mitigating geological hazards.</p> <p>Keywords: stratigraphy, tectonics, structural geology, micropaleontology, geological hazards, geophysics, geochemistry</p>
Key features	The educational program is aimed at the tuition and training of future experts in the geological, geophysical and simulation methods working with the problems of stratigraphy of sedimentary formations of various genesis, their structural and material evolution, and assessment of the impact of hazardous geological processes on the natural systems and infrastructure. The program has its background in the profound system of geological knowledge to be acquired within Bachelor's programs in Earth Sciences, Engineering or Geosciences.
4 – Eligibility of graduates for employment and further studies	
Job Options	Companies, enterprises and institutions, providing service or performing R&D works in structural investigations, stratigraphy, modeling of geological systems, interpretation of geophysical data, assessment of geological hazards impact on the natural and man-made objects.
Further study	Studies according to the Doctor of Philosophy (PhD) grade
5 – Tuition and evaluation	
Tuition and studies	General education style: problem-oriented. Lectures, educational seminars, practical training, labs, self-tuition with textbooks and syllabus, advisory hours with instructors. During the last education year, half of the year is dedicated to the preparation of the final paper (Master's Thesis), which is to be presented and discussed during meetings of instructors and students.
Evaluation	Oral and written exams, fail-pass graded and ungraded exams taking into account the score for performed trainings and labs, presentations, practical training results, cumulative final exam, defence of the Master's Thesis.
6 – Program competences	
Integral competence	Ability to handle specialized applied problems, related to the sedimentary formations of the Earth crust, assessment of hazardous geological processes and risks on the base of geological and geophysical research methods, as well as methods of simulation of natural and anthropogenic systems.
General expertise (GE)	<ol style="list-style-type: none"> 1. Flexibility and ability to adapt to non-standard situations at work, ability to generate fresh ideas related to the research in stratigraphy, structural geology, geophysical surveying, geohazards modeling and assessment. 2. Decision taking, ability to reveal and solve problems in the professional activity. 3. Professional communication with experts in other fields of knowledge. 4. Working in an international context and in a globalized informative environment. 5. Social responsibility and consciousness. 6. Abstract thinking, acquiring and analyzing new information in stratigraphy, structural geology, geophysical surveying and geological hazards assessment and modeling. 7. Elaboration and design of research projects in stratigraphy, structural geology, geological interpretation of geophysical methods, assessment of geological hazards, project management and execution control.
Professional skills (PS)	<ol style="list-style-type: none"> 1. Awareness of the authorship and copyright legislation and associated IP rights; adherence to national and international laws on intellectual property.

	<ol style="list-style-type: none"> 2. Knowledge and application of modern principles in environmental management, basics of the environmental legislation. 3. Conceptualization of the upper part of the Earth's crust and sedimentary layer as an integrated interdependent system, understanding main problems in their study. 4. Mastering modern research methods of the upper Earth's crust, including stratigraphy, structural geology, geophysics, assessment and modeling of geological hazards. 5. Ability to apply knowledge and practical skills of planning, management, motivation, control and monitoring of mining industry enterprises. 6. Ability to apply the acquired knowledge for land planing, regional development monitoring and design of strategic development programs. 7. Design and perform scientific research, ensure practical implementation of research results into industrial processes, write scientific papers. 8. Adherence to principles of professional ethics in the collaborative studies and when using the scientific results of other researchers. 9. Knowledge of fundamental principles of Earth sciences and basic concepts related to the structure of the Earth's crust and sedimentary layer, ability to use them for cultivation of a science-based world-view in the students. 10. Formulation of simulation tasks, design of models for objects and processes in the upper part of the Earth's crust and its sedimentary layer using mathematical methods, modern cartography, and Geographic Information Systems.
--	--

7 – Program outcomes (PO)

	<ol style="list-style-type: none"> 1. Analyze natural and man-made systems and structures of the upper part of the Earth's crust and its sedimentary layer. 2. Apply your knowledge and skills for the identification and solving of challenging problems and undertaking informed decisions in the questions related to stratigraphy, structural geology, geological interpretation of geophysical data, and geological risks management. 3. Communicate with experts in other fields of knowledge, including international context in the globalized information environment. 4. Develop and manage projects focused on the study of the geology of the upper part of the Earth's crust and its sedimentary layer, provide quality assessment and quality assurance of research activities. 5. Design and carry out scientific experiments, write research papers. 6. Assess geological risks, including their environmental impact, predict the evolution of hazardous geological processes in the context of natural systems and man-made infrastructure, provide expert conclusions for the geological exploration and production licensing and certification of natural reserves. 7. Know modern methods of research of the upper part of the Earth's crust and sedimentary layer, their application in production and research activities. 8. Master basic principles of structure, organization, management and production cycles of mining industry enterprises. 9. Develop and implement projects of land management, perform geologic planning, monitor regional development trends, design land management plans and programs. 10. Tackle practical challenges in tectonics, stratigraphy and geohazards monitoring using principles and methods of structural geology, micropaleontology, geochemistry and geophysics. 11. Use modern methods of modeling and processing of geological
--	--

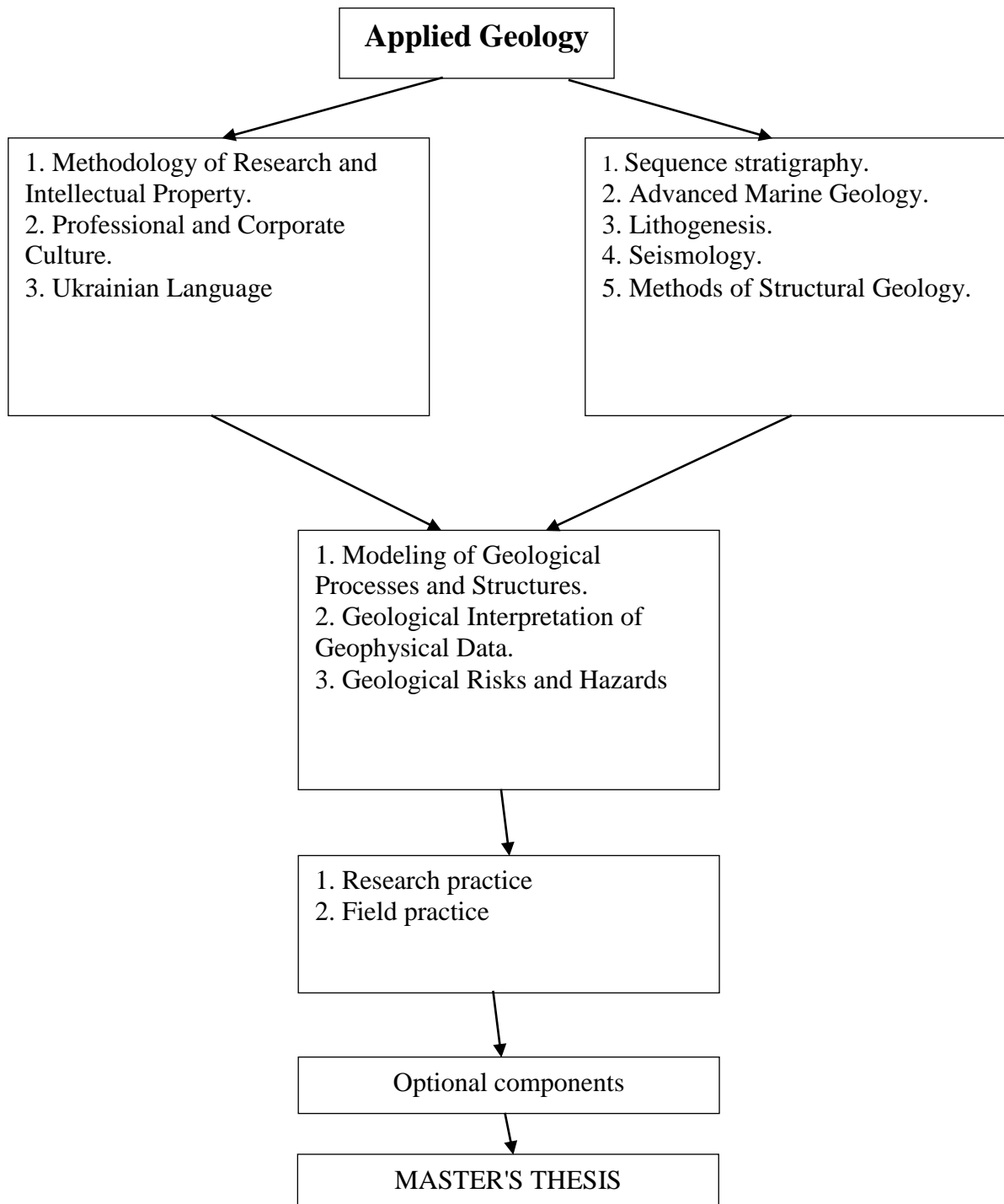
	<p>data at commercial innovation activities in tectonics, stratigraphy and geohazards analysis.</p> <p>12. Plan and guide innovation research projects in tectonics, stratigraphy and geohazards analysis, draw conclusions after the implementation of a project.</p> <p>13. Assess the environmental and economical impact of engineering works, plan environmental management activities.</p>
8 – Resource support of the Program at the University	
Professors and instructors	English proficiency at B2 level or higher.
Facilities, materials and equipment	<ol style="list-style-type: none"> 1. Laboratory of micropaleontology and biostratigraphy 2. Laboratory of geophysics 3. Petrography room with polarized light microscopes 4. Thin section workshop and laboratory 5. Materials and consumables for production of micropaleontology specimens and thin sections 6. X-Ray and microscopy laboratory 7. Classrooms with multimedia and projector equipment 8. Coverage of field works expenses incl. travel and accommodation allowances for students and instructors
Dataware support	<p>Software (10 personalized licenses or one network license) or open source products:</p> <ol style="list-style-type: none"> 1. QGIS 2. Petrel 3. Baker Hughes 4. Move 5. K-MINE
9 – Academic mobility	
National credit mobility	According to the cooperation agreements between Universities in Ukraine. In the first and second semester – provided that study subjects and credit scores of the partnership Institution match our curriculum; third semester – if a guest University ensures an adequate coverage of the academic program.
International credit mobility	Within the scope of Erasmus+ program. For the first and second semester – provided that study subjects and credit scores of the partnership Institution match our curriculum; third semester – if a guest University ensures an adequate coverage of the academic program.
Tuition of foreign students	<p>Bachelor diploma</p> <p>English proficiency at B2 level or higher.</p>

2. List and logical order of components of the educational and professional program

2.1. List of compulsory subjects

Code	Components of the educational program (study subjects, term papers (projects), practical training, graduation thesis)	ECTS credits	Final evaluation
1	2	3	4
Compulsory components (CC)			
CC 1.	Methodology of Research and Intellectual Property	3	Pass-fail exam
CC 2.	Professional and Corporate Ethics	3	Pass-fail exam
CC 3.	Ukrainian Language	3	Pass-fail exam
CC 4.	Sequence Stratigraphy	4	Exam
CC 5.	Advanced Marine Geology	4	Exam
CC 6.	Lithogenesis	4	Exam
CC 7.	Seismology	5	Exam
CC 8.	Methods of Structural Geology	4	Exam
CC 9.	Modeling of Geological Processes and Structures	8	Exam
CC 10.	Geological Interpretation of Geophysical Data	8	Exam
CC 11.	Geological Risks and Hazards	6	Exam
CC 12.	Research practice	4	Pass-Fail exam
CC 13.	Field practice	4	Pass-Fail exam
CC 14.	Master's Thesis	30	Thesis defence
Total scope of compulsory components:		90	
Optional components (OC) – 5 study subjects of your choice			
OC	<p>The Optional Block consists of 8-10 study subjects, where you can earn 6 ECTS credits per any item. The final list of options is approved by the Scientific Council at the Institute of Geology not later than before the end of the second semester of the first study year. The suggested list will take into account the availability of Instructors, research interests of the students and focus on the methodological part of your Master's Thesis. The optional subjects can help acquire expertise in the morphometric analysis, methods of near-surface geophysics, micropaleontology and biostratigraphy, remote sensing in geology, microstructural research, microscopy methods, isotope age dating, petrology, geochemistry and mineralogy, elaboration of geological database structures and their use in the industry.</p> <p>Final evaluation is performed via exams.</p>	6 (every item)	Exam
Total scope of optional components:		minimum number of ECTS credits - 30	
SCOPE OF EDUCATIONAL PROGRAM		120	

2.2. Block chart of the Program



3. Degree Certificate Attestation

The final attestation of students graduating from the Earth Sciences educational program is performed via the final **qualifying examination** and public defense of the qualification paper (**Master's Thesis**).

The qualifying examination is envisaged in both written form and orally. The student is to demonstrate his/her level of knowledge in the methods of geological and geophysical research and modeling, as well as their scope of applicability as determined by the tuition syllabus. Degree seekers are to show their skills in choosing and explaining an optimal set of methods to study a specific geological structure, and to justify the use of modeling techniques for checking or predicting research results.

The Master's Thesis is a final outcome of a scientific research project to be developed by a student. In their research project, the student should select research methods mastered during the study and to apply them for the investigation of a specific geological object/structure according to the proposed theme. Thesis paper should include literature survey and student's own results of the scientific and research activity. The written paper is then checked against plagiarism. One of the necessary prerequisites for the authorization of the Thesis to the habilitation procedure is *approbation* of the research results and outcomes: this can be done by presentations at scientific conferences and/or published research papers.

The Master's Thesis is subject to the procedure of public defence.

The attestation process is open to the public and is performed by an Examination Board acting according to the corresponding regulation documents of Kyiv University.

The professional qualification with specialty codes 2114.1 – Junior Research Associate (in Geology) or 2114.2 – Geologist is awarded by a special Decision of the Examination Board after successful accomplishment of the study program and completion and defense of the Qualification Thesis under the following minimal prerequisites: the average score of the study outcome (Supplement to the Diploma) should be 75 points or higher (out of 100); your mark for the research activity is 75 or higher; the qualification exam for the compulsory subjects is passed with 75 points or higher; and finally, the defence of the Master's Thesis is awarded with 75 points or better.

4. Correspondence matrix between program competences and components of the educational program

	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10	CC11	CC12	CC13	CC14	OC
GE 1			•									•	•	•	
GE 2	•								•	•	•				
GE 3	•	•	•	•											
GE 4	•														
GE 5		•													
GE 6	•			•		•		•		•					
GE 7	•								•	•	•				•
PS 1	•	•													
PS 2	•										•				
PS 3					•	•			•						•
PS 4	•						•	•	•	•					•
PS 5	•												•		
PS 6	•										•		•		
PS 7	•											•		•	
PS 8															
PS 9				•	•	•					•				
PS 10	•	•							•						

5. Coverage matrix of itemized program outcomes with corresponding components of the educational program

	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10	CC11	CC12	CC13	CC14	OC
PO 1	•								•	•	•				•
PO 2	•							•	•	•	•	•	•	•	•
PO 3	•	•	•											•	
PO 4												•	•		
PO 5	•											•	•	•	
PO 6												•	•	•	•
PO 7				•	•	•	•	•	•	•	•	•	•	•	•
PO 8													•		
PO 9											•				•
PO 10	•			•				•	•	•	•	•	•		
PO 11									•						
PO 12				•	•	•				•	•				
PO 13									•			•			