

**Ministry of Education and Science of Ukraine  
Dnipro University of Technology**

**Department of Geology and Mineral Prospecting**



"APPROVED"  
Head of Department

Zhiltsova I.V. \_\_\_\_\_

"02" July 2024

**WORK PROGRAM OF THE ACADEMIC DISCIPLINE**

**"Petrography and Lithology"**

Field of knowledge ..... 10 Natural Sciences  
Specialty ..... 103 Earth Sciences  
Educational level..... first (bachelor's)  
Educational program..... Geology  
  
Status ..... mandatory  
Total workload..... 7 ECTS credits (210 hours)  
Type of summative assessment..... exam  
Period of study..... 3-4<sup>th</sup> semester  
Language of instruction ..... Ukrainian

Teachers: Associate Professor Ishkov V.V., Associate Professor Kozii Ye.S.

Prolonged: for 20\_\_/20\_\_ academic year \_\_\_\_\_ (\_\_\_\_\_) «\_\_»\_\_ 20\_\_ year  
(signature, full name, date)  
for 20\_\_/20\_\_ academic year \_\_\_\_\_ (\_\_\_\_\_) «\_\_»\_\_ 20\_\_ year  
(signature, full name, date)

Dnipro  
DUT  
2024

Work program of the academic discipline "Petrography and Lithology" for bachelors of the educational and professional program "Geology" of the specialty 103 Earth Sciences / Dnipro University of Technology, Department of Geology and Mineral Prospecting. - D.: DUT, 2024. - 17 p.

Developer:

– Ishkov Valerii Valeriiovich, Associate Professor, Candidate of Geological and Mineralogical Sciences, Associate Professor of the Department of Geology and Mineral Prospecting.

The work program regulates:

- the purpose of the discipline;
- the disciplinary learning outcomes formed on the basis of the transformation of the expected learning outcomes of the educational program;
- basic disciplines;
- the volume and distribution by forms of organization of the educational process and types of educational classes;
- the discipline program (thematic plan by types of educational classes);
- an algorithm for assessing the level of achievement of disciplinary learning outcomes (scales, tools, procedures and assessment criteria);
- tools, equipment and software;
- recommended sources of information.

The work program is intended for the implementation of a competency-based approach when planning the educational process, teaching the discipline, preparing students for control measures, monitoring the implementation of educational activities, internal and external control of ensuring the quality of higher education, accreditation of educational programs within the specialty.

Approved by the decision of the Scientific and Methodological Commission of specialty 103 Earth Sciences (protocol No. 6 dated 04.07.2024).

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## 1 AIM OF THE ACADEMIC DISCIPLINE

In the educational and professional programs of the Dnipro University of Technology of the specialty 103 Earth Sciences, the distribution of program learning outcomes (PLO) for the organizational forms of the educational process is done. In particular, the following learning outcomes are attributed to the discipline Ф5 "Petrography and Lithology":

ПП01	Collect, process and analyze information in the field of Earth Sciences.
ПП05	Be able to conduct field and laboratory research.
ПП07	Apply models, methods, and data from physics, chemistry, biology, ecology, mathematics, information technology, etc. when studying the natural processes of formation and development of geospheres.
ПП06	Identify the main characteristics, processes, history, and composition of the Earth as a planetary system and its geospheres.
ПП08	To substantiate the choice and use of field and laboratory methods for the analysis of natural and anthropogenic systems and objects.
ПП10	Analyze the composition and structure of geospheres at different spatial and temporal scales.

**The aim of the discipline** – formation of competencies in higher education students regarding the study of rocks of igneous, metamorphic and sedimentary origin and their complexes and the use of identified regularities in geological activities.

The implementation of the aim requires the transformation of program learning outcomes into disciplinary outcomes and adequate selection of the content of the academic discipline according to this criterion.

The academic discipline "Petrography and Lithology" is taught to bachelors of specialty 103 "Earth Sciences" in the 3<sup>rd</sup> and 4<sup>th</sup> semesters and consists of two content modules: "Petrography" (3<sup>rd</sup> semester) and "Lithology" (4<sup>th</sup> semester)

## 2 EXPECTED DISCIPLINARY LEARNING OUTCOMES

For the first content module: "Petrography", the following disciplinary learning outcomes are assigned:

<b>Disciplinary learning outcomes (DLO)</b>		
<b>cipher ППН</b>	<b>cipher ДРН</b>	<b>content</b>
ПП01	ПП01.1- Ф5	To know the theoretical foundations of the study of igneous and metamorphic rocks
ПП05	ПП05.1- Ф5	Be able to identify and describe the main petrographic types of igneous and metamorphic rocks
ПП06	ПП06.1- Ф5	Be able to analyze the composition and structure of igneous and metamorphic rocks to draw conclusions about their genesis, place in

		classification and associated mineral resources
ПП07	ПП07.1- Φ5	To know the processes of formation and classification of igneous and metamorphic rocks for the analysis of natural complexes of the lithosphere
ПП08	ПП08.1- Φ5 ПП08.2- Φ5	To know petrographic methods of studying igneous and metamorphic rocks Be able to use petrographic methods for studying igneous and metamorphic rocks
ПП10	ПП10.1- Φ5	Know the possible mineral resources associated with igneous and metamorphic rocks

For the second content module: "Lithology", the following disciplinary learning outcomes are assigned:

<b>Disciplinary learning outcomes (DLO)</b>		
<b>cipher ПPH</b>	<b>cipher ПPH</b>	<b>cipher ПPH</b>
ПП01	ПП01.1- Φ5	To know the theoretical foundations of sedimentary rock diagnostics
ПП05	ПП05.1- Φ5	Be able to diagnose and describe the main petrographic types of sedimentary rocks
ПП06	ПП06.1- Φ5	Be able to analyze the characteristics of sedimentary rocks to draw conclusions about the conditions of their formation
ПП07	ПП07.1- Φ5	To know the processes and conditions of formation and classification of sedimentary rocks
ПП08	ПП08.1- Φ5	To know the studying methods of sedimentary rocks
	ПП08.2- Φ5	Be able to apply petrographic methods for studying sedimentary rocks
ПП10	ПП10.1- Φ5	To know the practical importance of sedimentary rocks

### 3 BASIC DISCIPLINES

<b>Discipline name</b>	<b>Outcomes achieved learning</b>
Б2 Physics Б4 Chemistry	apply theories, principles, methods and concepts of fundamental and general engineering sciences during the mastering of special disciplines and activities in the specialty.
Φ1 General Geology Φ2 Mineralogy	understand and apply knowledge of the processes, history and composition of the Earth as a natural system; know the systematics and diagnostic properties of minerals.

### 4 VOLUME AND DISTRIBUTION BY THE FORMS OF ORGANIZATION OF THE EDUCATIONAL PROCESS AND TYPES OF TRAINING CLASSES

<b>Type of classes</b>	<b>Distribution by form of study, hours</b>							
	<b>Full-time</b>			<b>Part-time</b>		<b>Extramural</b>		
	Volume	classroom lessons	Self-study	classroom lessons	Self-study	Volume	classroom lessons	Self-study
lectures	105	43	62			105	6	99

practical								
laboratory	105	43	62			105	4	101
seminars								
TOTAL	210	86	124			210	10	200

### Content module 1. Petrography (3<sup>rd</sup> semester)

Type of classes	Distribution by form of study, hours							
	Full-time			Part-time		Extramural		
	Volume	classroom lessons	Self-study	classroom lessons	Self-study	Volume	classroom lessons	Self-study
lectures	60	26	34			60	6	54
practical								
laboratory	60	26	34			60	4	56
seminars								
TOTAL	120	52	68			120	10	110

### Content module 2. Lithology (4<sup>th</sup> semester)

Type of classes	Distribution by form of study, hours							
	Full-time			Part-time		Extramural		
	Volume	classroom lessons	Self-study	classroom lessons	Self-study	Volume	classroom lessons	Self-study
lectures	45	17	28			45	4	41
practical								
laboratory	45	17	28			45	4	41
seminars								
TOTAL	90	34	56			90	8	82

## 5 DISCIPLINE PROGRAM BY TYPES OF CLASSES

### Content module 1. Petrography (3<sup>rd</sup> semester)

Cipher DLO	Types and topics of training classes	Volume of components, hours
	LECTURES	60
ПП01.1- Φ5 ПП05.1- Φ5 ПП08.1- Φ5	<b>1 Petrography of igneous and metamorphic rocks.</b> The subject and tasks of petrography, its place among other sciences. The main methods of studying rocks. Petrography of igneous rocks. Material composition of igneous rocks.	6
ПП01.1- Φ5 ПП05.1- Φ5	<b>2 Forms of bedding and structure of igneous rocks.</b> Forms of bedding of igneous rocks. Texture and structure as characteristics of rocks composition. Textures of igneous rocks. Structures of igneous rocks.	6
ПП10.1- Φ5	<b>3 Classification and nomenclature of igneous rocks.</b> Classification by conditions of bedding and structures. Classifications by chemical composition. Classifications by mineral composition.	4

	Petrographic (chemical-mineralogical) classifications.	
ΠΡ05.1- Φ5 ΠΡ06.1-Φ5	<b>4 Mafic and ultramafic igneous rocks.</b> General information. Mafic rocks of normal alkalinity. Mafic rocks of the subalkaline and alkaline series. Ultramafic rocks of normal alkalinity. Ultramafic rocks of the subalkaline and alkaline series. Ultramafic rocks of non-silicate composition (carbonatites).	6
ΠΡ05.1- Φ5 ΠΡ06.1-Φ5	<b>5 Medium igneous rocks.</b> General information. Intermediate igneous rocks of normal alkalinity. Intermediate rocks of the subalkaline series. Intermediate rocks of the alkaline series.	4
ΠΡ05.1- Φ5 ΠΡ06.1-Φ5	<b>6 Felsic igneous rocks.</b> General information. Felsic igneous rocks of normal alkalinity. Felsic rocks of the subalkaline series. Felsic rocks of the alkaline series.	4
ΠΡ07.1- Φ5 ΠΡ10.1-Φ5	<b>7 Processes of igneous rocks formation.</b> Composition and physical properties of magma. Laws of crystallization of magmatic melts. Occurrence and evolution of magmas. Concept of associations, formations and complexes of igneous rocks	6
ΠΡ05.1- Φ5 ΠΡ08.1- Φ5	<b>8 Metamorphic rocks.</b> Factors of metamorphism. Classification of metamorphic processes. Material composition of metamorphic rocks. Textures and structures of metamorphic rocks.	6
ΠΡ07.1- Φ5 ΠΡ10.1-Φ5	<b>9 Classification and typification of metamorphic rocks, their facies affiliation.</b> Systematics and classification of metamorphic rocks. Concept of metamorphic facies. Nomenclature of metamorphic rocks.	4
ΠΡ05.1- Φ5 ΠΡ06.1-Φ5	<b>10 Contact-thermal and regional metamorphism and their products.</b> Conditions of formation and features of contact-thermal metamorphic rocks. Mineral parageneses of regional metamorphism. Regional-metamorphic rocks of moderate pressure facies. Regional-metamorphic rocks of high pressure facies.	6
ΠΡ05.1- Φ5 ΠΡ07.1- Φ5 ΠΡ06.1-Φ5	<b>11 Metasomatic rocks and products of autometasomatism.</b> Conditions of rocks formation and their classification. Products of alkaline metasomatism. Products of neutral metasomatism and autometamorphism. Rocks of acid metasomatism.	4
ΠΡ05.1- Φ5 ΠΡ07.1- Φ5	<b>12 Cataclastic and impact metamorphism and ultrametamorphism.</b> Metamorphic rocks of dynamic metamorphism. Ultrametamorphic rocks. Impact metamorphism rocks	4

<b>LABORATORY CLASSES</b>		<b>60</b>
ΠΠ01.1- Φ5	1 Study of the igneous rocks composition.	6
ΠΠ05.2- Φ5	2 Study of the igneous rocks structure.	6
ΠΠ06.1-Φ5	3 Study of mafic and ultramafic igneous rocks.	6
ΠΠ08.2- Φ5	4 Study of intermediate igneous rocks.	6
	5 Study of felsic igneous rocks.	6
	6 Study of the metamorphic rocks composition.	6
	7 Study of the metamorphic rocks structure.	6
	8 Study of metamorphic rocks of contact-thermal and regional metamorphism.	6
	9 Study of metasomatic rocks and products of autometasomatosi	6
	10 Study of rocks of dynamic metamorphism and ultrametamorphism.	6
	<b>TOTAL</b>	<b>120</b>

### Content module 2. Lithology (4<sup>th</sup> semester)

<b>Cipher DLO</b>	<b>Types and topics of training classes</b>	<b>Volume of components, hours</b>
	<b>LECTURES</b>	<b>45</b>
ΠΠ05.1-Φ5 ΠΠ08.1-Φ5	1 Lithology is the science about sedimentary rocks. The subject and tasks of lithology, its place among other sciences. Sedimentary rocks are the main object of lithology. The main methods of studying sedimentary rocks.	3
ΠΠ05.1-Φ5 ΠΠ10.1-Φ5	2 Composition and classification of sedimentary rocks. Mineral composition of sedimentary rocks. Chemical composition of sedimentary rocks. Classification of sedimentary rocks.	3
ΠΠ01.1- Φ5 ΠΠ05.1-Φ5	3 Structure and properties of sedimentary rocks. Textures of sedimentary rocks. Structures of sedimentary rocks. Physical properties of sedimentary rocks.	3
ΠΠ07.1- Φ5 ΠΠ10.1- Φ5	4 Theory of lithogenesis. Stages of formation of sedimentary rocks. Types of lithogenesis. Stage of hypergenesis. Transportation of sedimentary material. Sedimentogenesis and sedimentary differentiation. Stage of diagenesis. Catagenesis and metagenesis.	5
ΠΠ05.1-Φ5 ΠΠ06.1-Φ5	5 Clastic and volcanogenic-clastic sedimentary rocks. General characteristics. Cement of clastic sedimentary rocks. Classification of clastic sedimentary rocks. Characteristics of the main representatives of the class. Practical significance of clastic and volcanogenic-clastic sedimentary rocks.	3
ΠΠ05.1-Φ5 ΠΠ06.1-Φ5 ΠΠ10.1-Φ5	6 Clay sedimentary rocks. General information. Composition and classification of clay sedimentary rocks. Structure and properties of clay sedimentary rocks. Conditions for the formation of clay sedimentary rocks. Practical significance of clay sedimentary rocks.	3
ΠΠ05.1-Φ5 ΠΠ10.2-Φ5	7 Aluminous, ferruginous and manganese sedimentary rocks. General information. Characteristics of aluminous sedimentary rocks. Characteristics of ferruginous sedimentary rocks. Characteristics of manganese sedimentary rocks. Practical significance of rocks.	3



PP05.1-Φ5 PP06.1-Φ5 PP10.1-Φ5	8 Carbonate sedimentary rocks. General characteristics and classification. Characteristics of the main representatives of the class. Genesis of carbonate rocks. Practical significance of carbonate rocks.	3
PP05.1-Φ5 PP06.1-Φ5	9 Siliceous sedimentary rocks (silicites). General characteristics and classification. Silica minerals of siliceous sedimentary rocks. Characteristics of silicites. Practical significance of siliceous sedimentary rocks.	3
PP05.1-Φ5 PP06.1-Φ5 PP10.1-Φ5	10 Phosphate sedimentary rocks. General characteristics and classification. Mineral composition and methods of studying phosphate rocks. Characteristics of the main representatives of the class. Genesis of phosphate sedimentary rocks. Practical significance of phosphate sedimentary rocks.	3
PP05.1-Φ5 PP06.1-Φ5 PP07.1- Φ5 PP10.1-Φ5	11 Salt sedimentary rocks (evaporites). General characteristics and classification. Characteristics of the main representatives of the class. Conditions for the formation of salt sedimentary rocks. Practical significance of salt sedimentary rocks.	3
PP05.1-Φ5 PP10.1-Φ5 PP06.1-Φ5	12 Solid caustobiolites. Oil shales and coals are solid caustobiolites. Source material of caustobiolites and processes of their formation. Principles of classification and material composition of caustobiolites. Characteristics of the main representatives of the class.	3
PP07.1- Φ5 PP10.1-Φ5	13 Sedimentary facies and facies analysis The concept of facies and genetic types of sedimentary formations. Facies groups. Characteristics of marine facies. Characteristics of transitional facies from continental to marine. Characteristics of continental facies. Facies analysis.	3
PP07.1- Φ5 PP10.1-Φ5	14 Sedimentary formations. The concept of “formation” and the main features of formations. Evolution and cyclicity of the sedimentary process. Regularities of the distribution of the main types of sedimentary rocks. Practical significance of the study of formations.	3
<b>LABORATORY CLASSES</b>		45
PP05.2- Φ5	1 Study of the sedimentary rocks composition.	4
PP08.2- Φ5	2 Study of the sedimentary rocks structure.	4
	3 Study of clastic sedimentary rocks.	4
	4 Study of clay sedimentary rocks.	4
	5 Study of aluminous, ferruginous and manganese sedimentary rocks.	4
	6 Study of carbonate sedimentary rocks.	4
	7 Study of siliceous sedimentary rocks.	4
	8 Study of phosphate sedimentary rocks.	4
	9 Study of salt sedimentary rocks.	4
	10 Study of salt sedimentary rocks.	4
PP10.1- Φ5	11 Lithological-facies analysis of sedimentary rocks.	5
	<b>TOTAL</b>	<b>90</b>

## 6 ASSESSMENT OF LEARNING OUTCOMES

Certification of student achievements is carried out through transparent procedures based on objective criteria in accordance with the University

Regulations "On the Assessment of Learning Outcomes of Higher Education Students". The achieved level of competencies relative to the expected ones, identified during control activities, reflects the real result of the student's learning of the discipline.

### **6.1 Grading Scales**

Assessment of academic achievements of students of the Dnipro University of Technology is carried out according to rating (100-point) and institutional grading scales. The latter is necessary (due to the official absence of a national scale) to convert (transfer) of mobile students' grades.

#### *The scales of learning outcomes assessment of DUT students*

<b>Rating</b>	<b>Institutional</b>
90...100	відмінно / Excellent
74...89	добре / Good
60...73	задовільно / Satisfactory
0...59	незадовільно / Fail

Discipline credits are scored if the student has a final grade of at least 60 points. A lower grade is considered to be an academic debt that is subject to liquidation in accordance with the Regulations on the Organization of the Educational Process of DUT.

### **6.2 Tools and procedures**

The content of diagnostic tools is aimed at monitoring the level of formation of knowledge, skills, communication, autonomy and responsibility of the student according to the requirements of the National Qualifications Framework (NQF) up to the 6th qualification level during the demonstration of learning outcomes regulated by the work program.

During the control activities, the student should perform tasks focused exclusively on the demonstration of disciplinary learning outcomes (section 2).

Diagnostic tools provided to students at the control activities in the form of tasks for current and final control are formed by specifying the initial data and the method of demonstrating disciplinary learning outcomes.

Diagnostic tools (control tasks) for current and final control of the discipline are approved by the department.

Types of diagnostic tools and assessment procedures for current and final control of the discipline are given below.

### *Diagnostic tools and assessment procedures*

CURRENT CONTROL			FINAL CONTROL	
training session	diagnostic tools	procedures	diagnostic tools	procedures
lectures	control tasks for each topic	task completion during lectures	comprehensive control work (CCW)	determining the weighted average result of current controls;  CCW completion during the exam at the student's request
laboratory lessons	control tasks for each topic	task completion during laboratory classes		
	or individual assignment	task completion during independent work		

During the current control, lecture classes are evaluated by determining the quality of performance of specific control tasks. Laboratory classes are evaluated by the quality of performance of a control or individual task.

If the content of a certain type of classes is subordinated to several components of the description of the NQF qualification level, then the integral value of the assessment can be determined taking into account the weighting coefficients set by the teacher.

If the level of results of current controls for all types of educational activities is at least 60 points, the final control is carried out without the participation of the student by determining the weighted average value of current grades.

Regardless of the results of the current control, each student during the exam has the right to perform the CCW, which contains tasks that cover key disciplinary learning outcomes. The number of specified CCW tasks should correspond to the time allotted for completion. The number of CCW options should ensure individualization of the task.

The value of the assessment for the performance of the CCW is determined by the average grade of the components (specified tasks) and is final.

The integral value of the assessment of the implementation of the CCW can be determined taking into account the weighting coefficients established by the department for each component of the description of the qualification level of the NQF.

### **6.3 Criteria**

The actual learning outcomes of the student are identified and measured relative those expected during the control activities using criteria that describe the student's actions to demonstrate the achievement of learning outcomes.

To assess the performance of control tasks during the current control of lectures and laboratory classes, the coefficient of mastery is used as a criterion, which automatically adapts the assessment indicator to the rating scale:

$$O_i = 100 a/m,$$

where  $a$  – is the number of correct answers or significant operations performed according to the solution standard;  $m$  – is the total number of questions or significant operations of the standard.

Individual tasks and comprehensive control work are assessed by experts using criteria that characterize the ratio of requirements for the level of competences and assessment indicators on a rating scale.

The content of the criteria is based on the competence characteristics defined by the NQF for the bachelor's level of higher education (presented below).

***General criteria for achieving learning outcomes  
for the 6<sup>th</sup> qualification level according to the NQF***

Description of qualification level	Requirements for knowledge, proficiency/skills, communication, autonomy and responsibility	Indicator evaluation
<b><i>Knowleges</i></b>		
Conceptual scientific and practical knowledge, critical understanding of theories, principles, methods and concepts in the field of professional activity and/or study	The answer is excellent - correct, reasonable, meaningful. Characterizes the presence of: - conceptual knowledge; - high degree of knowledge of the state of the art; - critical understanding of the basic theories, principles, methods and concepts in education and professional activity	95-100
	The answer contains minor errors or omissions	90-94
	The answer is correct, but has some inaccuracies	85-89
	The answer is correct, but has some inaccuracies and is insufficiently substantiated	80-84
	The answer is correct, but has some inaccuracies, insufficiently substantiated and meaningful	74-79
	The answer is fragmentary	70-73
	The answer shows the student's vague ideas about the object of study	65-69
	The level of knowledge is minimally satisfactory	60-64
	The level of knowledge is unsatisfactory	<60
<b><i>Proficiency/Skills</i></b>		
In-depth cognitive and practical skills, mastery and innovation at the level required to solve complex specialized tasks and practical problems in the field of	The answer characterizes the ability to: - identify problems; - formulate hypotheses; - solve problems; - choose appropriate methods and tools; - collect and interpret information logically and clearly; - use innovative approaches to solving problems	95-100

professional activity or training	The answer characterizes the ability to apply knowledge in practice with minor errors	<b>90-94</b>
	The answer characterizes the ability to apply knowledge in practice, but has some inaccuracies in the implementation of one requirement	<b>85-89</b>
	The answer characterizes the ability to apply knowledge in practice, but has some inaccuracies in the implementation of the two requirements	<b>80-84</b>
	The answer characterizes the ability to apply knowledge in practice, but has some inaccuracies in the implementation of the three requirements	<b>74-79</b>
	The answer characterizes the ability to apply knowledge in practice, but has some inaccuracies in the implementation of the four requirements	<b>70-73</b>
	The answer characterizes the ability to apply knowledge in practice when performing tasks on the model	<b>65-69</b>
	The answer characterizes the ability to apply knowledge in performing tasks on the model, but with inaccuracies	<b>60-64</b>
	The level of skills is unsatisfactory	<60
<b>Communication</b>		
<ul style="list-style-type: none"> <li>◆ reporting to specialists and nonspecialists information, ideas, problems, solutions, own experience and argumentation</li> <li>◆ data collection, interpretation and application</li> <li>◆ communication on professional issues, including in a foreign language, orally and in writing</li> </ul>	Fluency in industry issues. Clarity of the answer (report). Language: - correct; - clean; - clear; - accurate; - logical; - expressive; - concise. Communication strategy: - consistent and consistent development of thought; - the presence of logical own judgments; - appropriate reasoning and its compliance with the defended provisions; - correct structure of the answer (report); - correct answers to questions; - appropriate technique for answering questions; - ability to draw conclusions and formulate proposals;	95-100
	Sufficient knowledge of industry issues with minor flaws. Sufficient clarity of the answer (report) with minor flaws. Relevant communication strategy with minor flaws.	90-94
	Good knowledge of industry issues. Good clarity of the answer (report) and appropriate communication strategy (three requirements in total are not realized)	85-89
	Good knowledge of industry issues. Good clarity of the answer (report) and appropriate communication strategy (four requirements not implemented in total)	80-84
	Good knowledge of industry issues. Good	74-79

	clarity of the answer (report) and appropriate communication strategy (five requirements not implemented in total)	
	Satisfactory knowledge of industry issues. Satisfactory clarity of the answer (report) and appropriate communication strategy (a total of seven requirements have not been implemented)	70-73
	Partial knowledge of industry issues. Satisfactory clarity of the answer (report) and communication strategy with errors (a total of nine requirements are not implemented)	65-69
	Fragmentary knowledge of industry issues. Satisfactory clarity of the answer (report) and communication strategy with errors (a total of 10 requirements are not implemented)	60-64
	The level of communication is unsatisfactory	<60
<b><i>Відповідальність і автономія</i></b>		
<ul style="list-style-type: none"> <li>◆managing complex technical or professional activities or projects</li> <li>◆ability to take responsibility for making and making decisions in unpredictable work and / or learning contexts</li> <li>◆formation of judgments that take into account social, scientific and ethical aspects</li> <li>◆organization and management of professional development of individuals and groups</li> <li>◆ability to continue studies with a significant degree of autonomy</li> </ul>	Excellent command of personal management competencies focused on: 1) management of complex projects, which involves: - research nature of educational activities, marked by the ability to independently assess various life situations, phenomena, facts, identify and defend a personal position; - ability to work in a team; - control of own actions; 2) responsibility for decision-making in unpredictable conditions, including: - justification of own decisions by the provisions of the regulatory framework of the industry and state levels; - independence in the performance of tasks; - initiative in discussing problems; - responsibility for relationships; 3) responsibility for the professional development of individuals and/or groups of individuals, which involves - use of professionally oriented skills; - use of evidence with independent and correct argumentation; - mastery of all types of learning activities; 4) the ability to continue learning with a high level of autonomy, which includes - the degree of mastery of fundamental knowledge; - independence of evaluative judgments; - a high level of general learning skills; - - independent search and analysis of information sources	95-100
	Good mastery of personality management competencies (two requirements not met)	90-94
	Good mastery of personality management competencies (three requirements not met)	85-89
	Good mastery of personality management competencies (four requirements not met)	80-84

	Good mastery of personality management competencies (six requirements not met)	74-79
	Satisfactory mastery of personality management competencies (seven requirements not met)	70-73
	Satisfactory mastery of personality management competencies (eight requirements not met)	65-69
	The level of responsibility and autonomy is fragmentary	60-64
	The level of autonomy and responsibility is unsatisfactory	<60

## **7 TOOLS, EQUIPMENT AND SOFTWARE**

Technical teaching aids: multimedia equipment, departmental educational and control collections of rocks.

Remote platform MOODL.

## **8 RECOMMENDED SOURCES OF INFORMATION**

### **Basic**

1. Петрографія та літологія. Матеріали методичного забезпечення для виконання лабораторних робіт студентам напряму підготовки 103 Науки про Землю / Сливна О.В. – Д.: Національний технічний університет «ДП», 2018. – 33 с.

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