

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
LVIV POLYTECHNIC NATIONAL UNIVERSITY**



«APPROVED»

Rector of Lviv Polytechnic National
University

/Y. Bobalo/

2021

EDUCATIONAL AND SCIENTIFIC PROGRAM

**Of third (educational and scientific) level of higher education
in specialty 132 " Materials science"
fields of knowledge 13 " Mechanical engineering"
Qualification: Doctor of Philosophy in "Materials Science"**

Considered and approved by
University Academic Council
(Protocol No. 74
from « 25 » 05 2021)

AGREEMENT LETTER
Of educational and scientific program

High Education level
Knowledge field
Speciality
Qualification

Third (educational and scientific)
13: Mechanical engineering
132 « Materials Science »
Philosophy Doctor of Materials Science

DEVELOPED AND APPROVED

By scientific and methodical commission of «
«Materials Science »

Protocol No. 1
25.01.2021

Head of SMC of speciality
[Signature] Z.Duriagina

APPROVED

Vice-rector of scientific work of Lviv Polytechnic
National University

[Signature] I. Demydov
« 15 » 04 2021

Head of the Educational and Methodological
Department of the University

[Signature] V. Sviridov
« 12 » 05 2021

RECOMMEND

By scientific and methodical council
of university

Protocol No. 56
« 13 » 05 2021

Head of SMC of university
[Signature] A. Zagorodniy

Director of Institute of Mechanical Engineering
and Transport

[Signature] O. Lanets
« 25 » 01 2021

PREFACE

It was developed by the working group for ensuring educational and scientific program quality, according to which studying of applicants at the third (educational and scientific) level of higher education in the specialty 132 « Materials Science » is carried out as part of:

Head of working group

(guarantor):

Z.Duriagina - Doctor of Sciences, professor, Head of the Department of Materials Science and Materials Engineering

Members:

L. Bohun.. - Ph.D, associate professor, associate professor of the Department of Materials Science and Materials Engineering

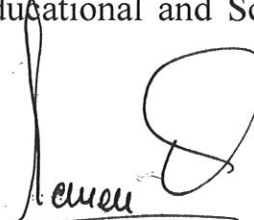
E.Pleshakov - Ph.D., associate professor, associate professor of the Department of Materials Science and Materials Engineering

V. Sribnyi - Ph.D., general director of the state enterprise "Argentum"

The project of the educational and scientific program was discussed and approved at the session of the Academic Council of the Educational and Scientific Institute of Mechanical Engineering and Transport

Protocol No. _____ of « _____ » _____ 2021

Chairman of the Scientific Council of IMET
Doctor of Sciences, professor



(signature)

O. Lanets

Approved and brought into force

By order of the Rector of Lviv Polytechnic National University

from « 4 » 06 2021 No. 325-4-10.

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I. EDUCATIONAL COMPONENT OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

1. Profile of the Doctor of Philosophy program from the field of knowledge 13 Mechanical engineering specialty 132 Materials Science

1. General information	
Full name of the higher education institution and structural unit	Lviv Polytechnic National University
The full title of the qualification in the original language	Доктор філософії з галузі <i>Механічна інженерія за спеціальністю Матеріалознавство</i> Doctor of Philosophy in field <i>Mechanical engineering</i> by Specialty of <i>Materials Science</i>
The official name of the educational and scientific program	Матеріалознавство Materials Science
Type of diploma and scope of the educational program	Diploma of Doctor of Philosophy, single, 43 ECTS credits of the educational and scientific program educational component, the time of the educational and scientific program educational component is 1.5 years
Cycle/level	8th level of Ukraine NQF, third cycle of FQ-EHEA, 8th level of EQF-LLL
Prerequisites	Master level of higher education
Language(s) of teaching	Ukrainian
Basic concepts and their definitions	The educational and scientific program uses the main concepts and their definitions in accordance with the Law of Ukraine "On Higher Education" dated 07/01/2014 No. 1556-VII as amended, the Law of Ukraine "On Scientific and Scientific and Technical Activities" dated 11/26/2015 No. 848-VIII with changes and additions, Order of higher education applicants for the degree of doctor of philosophy and doctor of sciences in higher educational institutions (scientific institutions), approved by Resolution of the Cabinet of Ministers No. 261 dated 03/23/2016
2. The purpose of the educational and scientific program	
	To deepen theoretical knowledge and practical skills and abilities in the field of Mechanical Engineering with a specialization in Materials Science, to develop philosophical and linguistic competences, to form universal skills of a researcher, sufficient for conducting and successfully completing scientific research and further professional and scientific activities
3. Characteristics educational and scientific programs	
Subject area (field of knowledge, specialty)	Field of knowledge 13 Mechanical engineering, specialty 132 Materials science
Orientation of the educational and scientific program	The educational and scientific program is based on the fundamental postulates of materials science and the results of modern scientific research. It is aimed at the development of the theoretical-methodological and applied base of materials science, modeling and parametric optimization of material properties, which deepens the professional scientific outlook and provides the basis for solving fundamental and applied tasks of materials science.
Features of the program	The educational and scientific program provides linguistic competence and universal skills of the researcher, as well as in-depth knowledge in the chosen specialty. It covers a wide range of modern innovative vectors of materials

	science development, which forms a theoretical and applied basis for conducting scientific research.
4. Suitability graduates educational and scientific programs to employment and further education	
Suitability for employment	Jobs in public and private higher education institutions, scientific and research institutions as teachers and researchers, in enterprises and organizations of various types of activities and forms of ownership in managerial positions
Further education	Improving qualifications at leading universities, scientific research centers of Ukraine and abroad, completing the scientific program of the fourth (scientific) level of higher education and obtaining the degree of Doctor of Science.
5. Teaching and assessment	
Teaching and learning	A combination of lecture, laboratory and practical classes, a pedagogical workshop with independent scientific work, consulting with a scientific supervisor and the scientific-pedagogical community, working out publications, conducting experimental research.
Assessment	Exams, credits, current control
6. Software competencies	
Integral competence (INT)	The ability to master the methodology of scientific and pedagogical activity, produce innovative scientific ideas and conduct original scientific research, solve scientific and applied problems to optimize the selection of existing materials and technologies and create new ones for the needs of industrial production.
General competences (CG)	<ol style="list-style-type: none"> 1. Knowledge of the theoretical and applied principles of materials science, the current state and trends of its development. 2. Mastering philosophical general scientific competences aimed at forming a systematic scientific outlook, professional ethics and a general cultural outlook; application of modern information technologies in scientific activities (work with NMBD, automatic formation of links to sources, etc.)Acquisition of universal skills of a researcher, in particular, organization and conduct of training sessions, use of modern information technologies (working with virtual education environment (VEE), Microsoft Teams, Zoom, etc.). 3. The ability to demonstrate oratory and rhetorical skills when presenting the results of scientific research, conduct a professional scientific conversation and debate with the wider scientific community and the public in Ukrainian, create scientific texts in written form, organize and conduct training sessions, use progressive information and communication tools 4. Acquisition of linguistic competences sufficient to present and discuss the results of one's scientific work in oral and written form, as well as to fully understand foreign language scientific texts on materials science, use of modern information technologies for the presentation of scientific results. 5. Acquisition of universal skills of a researcher, in particular, oral and written presentation of the results of one's own research in Ukrainian, management of scientific projects and/or drafting of proposals for financing scientific research, registration of intellectual property rights, application of modern information technologies. 6. Acquisition of universal skills of a researcher, in particular, organization and conduct of training sessions, use of modern information technologies (working with VEE, Microsoft Teams, Zoom, etc.).

	<p>7. The ability to initiate and conduct original scientific research, identify relevant scientific problems, search for and critically analyze information, produce innovative constructive ideas, and apply non-standard approaches to solving complex and atypical tasks.</p> <p>8. The ability to conduct scientific research, analyze their results and form scientific texts in the form of publications, disseminate scientific data among interested professionals, promote the circulation of scientific knowledge.</p>
<p>Professional competences (PC)</p>	<ol style="list-style-type: none"> 1. Acquiring in-depth knowledge of materials science, in particular mastering the main concepts, understanding theoretical and practical problems, the history of development and the current state of scientific knowledge in the field of materials science, mastering the terminology of the researched scientific direction. 2. Mastering the methods of studying the structure and physical and mechanical properties of materials. 3. In-depth understanding of the nature of friction and wear mechanisms in relation to the structure and properties of materials. 4. In-depth understanding of thermodynamics and kinetics of phase transformations, diffusion processes. 5. Understanding the mechanisms of the influence of operational factors on the degradation of materials and mastering the methods of assessing the damage of products. 6. Mastering the methods of calculating the residual resource of products, forecasting the functional properties of materials and improving the performance of products. 7. Deep understanding of physical and chemical processes that cause corrosion of materials and knowledge of methods of protection against it. 8. Mastering empirical and experimental methods of determining the level of surface energy at external and internal interphase interfaces, visualization of nanostructuring phenomena in the surface layers of materials, mastering methods of surface engineering. 9. Mastering modern methods of optimizing properties and creating products using automated design systems (CAD-CAM-CAE). 10. Understanding the principles of creating metallic, non-metallic, powder and composite materials, manufacturing technologies and ensuring the required properties
<p>7. Program learning outcomes</p>	
<p>Knowledge (KN)</p>	<ol style="list-style-type: none"> 1. In-depth knowledge of thermodynamics and physical kinetics of phase transformations, types of phase equilibrium diagrams, theories of diffusion in metals and alloys, theoretical foundations of diffusion and non-diffusion transformations in solids. 2. Knowledge of scientifically based criteria for the performance of materials and products, physical phenomena that lead to the degradation of materials, operating conditions that cause a decrease in the performance of products. 3. Knowledge of physical and chemical adsorption processes, patterns of surface diffusion processes. 4. Knowledge of modern theories of friction, wear and lubrication and the main groups of wear-resistant materials. 5. Knowledge of the principles of using specialized software for the rational selection of materials and manufacturing technologies, forecasting and optimization of their properties, taking into account economic indicators

	<p>and competitiveness of production.</p> <p>6. Knowledge of the main trends and trends in the creation of new materials of various nature, the basics of modern methods of production of structural, instrumental and functional materials.</p> <p>7. Knowledge of modern methods of determining the chemical composition, structure and properties of materials.</p> <p>8. Knowledge and understanding of the methodology of scientific knowledge, psychological and pedagogical aspects of professional and scientific activity, own scientific outlook and moral and cultural values.</p> <p>9. Knowledge of the English language, necessary for oral and written presentation of the results of scientific research, conducting professional scientific dialogue, full understanding of English-language scientific texts in the field of materials science.</p>
Skill (SK)	<p>1. The ability to control phase transformations to create materials with given structures and properties</p> <p>2. The ability to choose software products and create calculation models for prognostic modeling of damage to materials and products, and to work out metallurgical, technological, operational measures to increase the performance and durability of products. Develop a system for maintaining the working condition of the fleet of motor vehicles.</p> <p>3. The ability to develop a regulatory mechanism for "designing" the appropriate surface structure or type of grain boundaries, interphase surfaces to obtain the necessary functional properties.</p> <p>4. The ability to predict the behavior of products in operating conditions, to establish the cause of their failure, to make the optimal choice of material for effective use in engineering practice.</p> <p>5. The ability to apply modern methods of analysis to establish the structure, phase composition and properties of materials.</p> <p>6. The ability to develop optimal production technologies with minimal financial costs while complying with the conditions of sustainable development.</p> <p>7. The ability to apply modern resource-saving technologies for the production and processing of materials, to predict the physical and mechanical properties of different classes of materials, to use the achievements of modern materials science in the creation of new materials.</p> <p>8. The ability to apply knowledge about the regularities of the interrelationship of composition, structure, external action with mechanical, physical and chemical properties when solving theoretical and applied problems of materials science.</p> <p>9. The ability to participate in scientific conversations and discussions in Ukrainian or English at an appropriate professional level, to present the results of scientific research in oral and written form, to organize and conduct training sessions</p>
Communication (COM)	<p>1. The ability to communicate in business scientific and professional language, to use different speech styles, communication methods and techniques, to demonstrate a wide scientific and professional vocabulary.</p> <p>2. The ability to use modern information and communication tools and technologies to ensure effective scientific and professional communications.</p>
Autonomy and responsibility (A&R)	<p>1. The ability to independently conduct scientific research and make decisions.</p> <p>2. The ability to formulate one's own author's conclusions, proposals and</p>

	recommendations. 3. The ability to realize and be personally responsible for the obtained research results.
8. Resource support for the implementation of the educational program	
Specific characteristics of staffing	100% of scientific and pedagogical workers involved in teaching a cycle of disciplines that provide special (professional) competencies of a graduate student have scientific degrees and academic titles.
Specific characteristics of material and technical support	Use of modern software: Flashforge Creator Pro 3D Printer, «CES EduPack», «PTC», «Novacast»AutoCAD, Microsoft Teams, Zoom (Video Communications)
Specific characteristics of informational and methodological support	The use of the virtual learning environment of the Lviv Polytechnic National University and author's developments of research and teaching staff
9. Academic mobility	
National credit mobility	On the basis of bilateral contracts between Lviv Polytechnic National University and universities of Ukraine
International credit mobility	Within the framework of the EU Erasmus+ program on a bilateral basis contract between Lviv Polytechnic National University and educational institutions of partner countries
Education of foreign graduate students	It is possible after studying the Ukrainian language course

2. Distribution of the educational component content of the educational and scientific program by component groups and educational cycles

No a/o	Educational cycles	The amount of study load of a graduate student (credits / %)		
		Mandatory components of the educational component	Elective components of the educational component	In total for the entire teaching term
1	Cycle of disciplines that form general scientific competences and universal skills of the researcher	21/49	3/7	24/56
2	Cycle of disciplines forming professional competences	10/23	6/14	16/37
3	Cycle of subjects of free choice of a graduate student	–	3/7	3/7
Total for the entire period of study		31/72	12/28	43/100

3. List of parts of the educational component of the educational and scientific program

Code e/d	Parts of the educational component	Number of credits	Form summary control	Competences
1	2	3	4	5
Mandatory components of the educational component				
<i>A cycle of disciplines that form general scientific competences and universal skills of the researcher</i>				
MD1.1	Philosophy and methodology of science	3	Exam	Mastering philosophical general scientific competences aimed at forming a systematic scientific outlook, professional ethics and a general cultural outlook; the use of modern information technologies in scientific activities (work with the NMBD, automatic formation of links to sources, etc.)
MD1.2	A foreign language for academic purposes, part 1	4	Kredyt	Acquisition of linguistic competences sufficient to present and discuss the results of one's scientific work in oral and written form, as well as to fully understand foreign language scientific texts from the relevant specialty, use of modern information technologies for the presentation of scientific results.
MD1.3	A foreign language for academic purposes, part 2	4	Exam	
MD1.4	Professional pedagogy	3	Kredyt	Acquisition of universal skills of a researcher, in particular, organization and conduct of training sessions, use of modern information technologies

				(working with VNS, Microsoft Teams, Zoom, etc.).
MD1.5	Academic entrepreneurship	4	Kredyt	Acquisition of universal researcher skills, in particular, oral and written presentation of the results of one's own research in Ukrainian, management of scientific projects and/or preparation of proposals for financing scientific research, registration of intellectual property rights, application of modern information technologies.
MD1.6	Pedagogical practice	3	Kredyt	Acquisition of universal skills of a researcher, in particular, the organization and conduct of training sessions, the use of modern information technologies (working with VNS, Microsoft Teams, Zoom, etc.).
Total per cycle:		21		
<i>Cycle of disciplines that form professional competences*</i>				
MD2.1	Analytical and numerical methods of research in the field of mechanical engineering	4	Exam	Acquiring in-depth knowledge of materials science, in particular mastering the main concepts, understanding theoretical and practical problems, the history of development and the current state of scientific knowledge in the field of mechanical engineering and materials science, mastering the terminology of the researched scientific direction.
MD2.2	Research seminar in the field of mechanical engineering	3	Kredyt	
MD2.3	Research methods in materials science	3	kredyt	
Total per cycle:		10		
Elective components of the educational component				
<i>Cycle of disciplines that form general scientific competences and universal skills of the researcher*</i>				
SD1.1	Business Foreign Language	3	Kredyt	Acquisition of language competences sufficient to present and discuss the results of one's scientific work in oral and written form, as well as to fully understand foreign language scientific texts on materials science.
SD1.2	Psychology of creativity and invention	3	kredyt	The ability to initiate and conduct original scientific research, identify relevant scientific problems, search for and critically analyze information, produce innovative constructive ideas, and apply non-standard kredyt approaches to solving complex and atypical tasks.
SD1.3	Modern inventions in research activities.	3	Kredyt	

SD1.4	Management of scientific projects	3	Kredyt	The ability to initiate, substantiate and manage actual scientific projects of an innovative nature, independently conduct scientific research, interact in a team and demonstrate leadership abilities in the implementation of scientific projects.
SD1.5	Technology of registration of grant applications and patent rights	3	kredyt	Drafting proposals for financing scientific research, registration of intellectual property rights, application of modern information technologies.
SD1.6	Rhetoric	3	kredyt	The ability to demonstrate oratory and rhetorical skills when presenting the results of scientific research, to conduct a professional scientific conversation and debate with the wider scientific community and the public in Ukrainian, to form scientific texts in written form, to organize and conduct training sessions, to use progressive information and communication tools.
SD1.7	Methodology of preparation of scientific publications	3	Kredyt	The ability to conduct scientific research, analyze their results and form scientific texts in the form of publications, disseminate scientific data among interested professionals, promote the circulation of scientific knowledge.
SD1.8	Open scientific practices	3	kredyt	
Total per cycle:		3		
<i>Cycle of disciplines forming professional competences**</i>				
SD2.1	Physico-chemical processes of anti-corrosion protection	3	Exam	Deep understanding of the physical and chemical processes that cause corrosion of materials and knowledge of methods of protection against it.
SD2.2	Tribology and wear-resistant materials	3	Exam	Deep understanding of the nature of friction and wear mechanisms in relation to the structure and properties of materials.
SD2.3	Physico-chemical foundations of surface phenomena	3	Exam	Mastering empirical and experimental methods of determining the level of surface energy at external and internal interphase interfaces, visualization of nanostructuring phenomena in the surface layers of materials, mastering surface engineering methods.

SD2.4	Modeling of products and optimization of their properties	3	Exam	Mastering modern methods of optimizing properties and creating products using automated design systems (CAD-CAM-CAE).
SD2.5	Theory of phase transformations	3	Exam	Deep understanding of thermodynamics and kinetics of phase transformations, diffusion processes.
SD2.6	Predictive modeling of material degradation	3	Exam	Understanding the mechanisms of the influence of operational factors on the degradation of materials and mastering the methods of assessing the damage of products.
SD2.7	Principles of creating alloys	3	Exam	Understanding the principles of creating metallic, non-metallic, powder and composite materials, manufacturing technologies and ensuring the required properties.
SD2.8	Scientific bases of improving the performance of products	3	Exam	Mastering the methods of assessing damage and calculating the residual resource of products, forecasting the functional properties of materials and increasing the performance of products.
Total per cycle:		6		
<i>Disciplines of the graduate student's free choice***</i>				
SD3.1	Discipline of the graduate student's free choice	3	Kredyt	
Total per cycle:		3		
Total:		43		

Note: * – pedagogical practicum can take place in the II or III year of study;

** – a graduate student can choose disciplines from clause 1.2; clause 2.2, clause 3 (selective and free-choice), while the share of these subjects must be at least 25% of the total number of ECTS credits.

4. Matrix of correspondence of program competences educational components

	• MD1.1	• MD1.2	• MD1.3	• MD1.4	• MD1.5	• MD1.6	• MD2.1	• MD2.2	• MD2.3	• SD1.1.	• SD1.2	• SD1.3	• SD1.4	• SD1.5	• SD1.6	• SD1.7	• SD1.8	• SD2.1	• SD2.2	• SD2.3	• SD2.4	• SD2.5	• SD2.6	• SD2.7	• SD2.8
INT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
GC1								•										•	•	•	•	•	•	•	•
GC 2	•							•																	
GC 3				•		•										•									
GC 4		•	•							•					•	•									
GC 5					•		•				•		•	•	•										
GC 6						•		•																	
GC 7											•	•													
GC 8												•		•		•	•								
PC1																		•	•	•	•	•	•	•	•
PC 2								•	•																
PC 3																			•						
PC 4																						•			
PC 5																							•		
PC 6							•																		•
PC 7																		•							
PC 8							•													•					
PC 9																					•				
PC 10																								•	

Description: MDi is a mandatory discipline, SDi is a selective discipline, i is the number of the discipline in the list of components of the educational component, INT is integral competence, GCj is general competence, PCj is professional (special) competence, j is the competence number in the list of competencies of the educational component

5. Matrix of provision of program learning outcomes relevant components of the educational component

	MD1.1	MD1.2	MD1.3	MD1.4	MD1.5	MD1.6	MD2.1	MD2.2	MD2.3	SD1.1	SD1.2	SD1.3	SD1.4	SD1.5	SD1.6	SD1.7	SD1.8	SD2.1	SD2.2	SD2.3	SD2.4	SD2.5	SD2.6	SD2.6	SD2.8
KN1																				•		•			
KN2													•	•				•	•				•		•
KN3																		•		•					
KN4																			•						
KN5												•										•		•	
KN6												•	•					•		•	•			•	
KN7								•	•									•	•						
KN8	•			•	•	•					•	•					•								
KN9		•	•							•				•	•	•									
PR1																•						•		•	•
PR2							•															•			
PR3																		•	•	•					
PR4												•								•			•		
PR5							•	•	•																
PR6														•								•			•
PR7																									
PR8											•	•	•						•			•	•		
PR9		•	•	•									•	•	•	•	•								
COM1										•	•			•	•										
COM2												•	•	•		•	•					•			
AiR1					•			•				•	•												
AiR2					•							•	•	•	•	•									
AiR3								•					•				•								

Description: MDn – mandatory discipline, SDn – selective discipline, n – number of the discipline in the list of components of the educational component, KNm – program results (knowledge), PRm – program results (skills), m – number of the program result in the list of program results of the educational component

II. The scientific component of the educational and scientific program

The scientific component of the educational-scientific program involves the postgraduate student conducting his own scientific research under the guidance of one or two academic supervisors and the preparation of his results in the form of a dissertation.

The dissertation for obtaining the degree of Doctor of Philosophy is an independent comprehensive study that offers a solution to an actual scientific and applied task in the specialty 132 Materials Science, the results of which are characterized by scientific novelty and practical value and are published in relevant publications.

The scientific component of the educational-scientific program is drawn up in the form of an individual plan of scientific work of a postgraduate student and is an integral part of the postgraduate study plan.

An integral part of the scientific component of the postgraduate educational and scientific program is the preparation and publication of scientific articles, speeches at scientific conferences, scientific professional seminars, round tables, and symposia.

Subjects of scientific research in specialty 132 " Materials Science "

1. Modeling of the atomic-crystalline structure of materials to optimize their functional properties.
2. Synthesis of new materials with improved physicochemical and operational properties.
3. Formation of functional gradient layers with properties of new materials.
4. Establishing correlations between structure parameters, physical and mechanical characteristics, and material damage in the initial state and after operational degradation.
5. Development of methods and technologies for diagnosing the technical condition of materials and products.

III. Academic integrity

All participants in the educational process must comply with the norms of the "Regulations on academic integrity at the Lviv Polytechnic National University". Ensuring academic integrity at the University is based on the principles of the rule of law, democracy, legality, justice, scientific integrity, partnership and mutual respect, openness and transparency. Observance of academic integrity by scientific and pedagogical workers and students of higher education involves:

- compliance with the norms of the Constitution of Ukraine and current legislation of Ukraine;
- democratic relations between representatives of the academic communities;
- objective assessment of knowledge;
- avoiding actions based on private interest and conflict of interests;
- use of proven sources of information in educational or research activities;
- avoiding falsification or fabrication of information, scientific results with their subsequent use in the dissertation work.

- exclusion of manifestations of bribery for obtaining advantages in educational or research activities;
- responsibility for violation of academic integrity;
- to ensure impeccable honesty and transparency at all stages of scientific research, to prevent plagiarism;
- observe the culture of behavior and communication.

IV. Certification of graduate students

Attestation of applicants for higher education with the degree of doctor of philosophy is carried out by a specialized scientific council, permanently active or formed for a one-time defense, on the basis of a public defense of scientific achievements in the form of a dissertation. The volume of the main text of the dissertation of higher education holders of the degree of Doctor of Philosophy in the specialty 132 Materials Science should be 4.5 - 6.5 author's pages.

A mandatory condition for admission to the defense is the successful completion of the graduate student's individual study plan.

Candidates of higher education for the degree of Doctor of Philosophy defend their dissertations, as a rule, in a permanent specialized academic council for the relevant specialty, which functions in the higher educational institution where the graduate student was trained. The academic council of a higher educational institution has the right to submit documents to the National Agency for Quality Assurance of Higher Education for the accreditation of a specialized academic council formed for a one-time defense, or to apply to another higher educational institution where a permanent specialized academic council in the relevant specialty operates.

Note: this educational and scientific program has not yet passed accreditation.

Structural and logical scheme of the educational and scientific program of the Doctor of Philosophy in the specialty 132 "Materials Science"

