

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
National Technical University of Ukraine
«Igor Sikorsky Kyiv Polytechnic Institute»**

APPROVED BY
Academic Council of Igor Sikorsky
Kyiv Polytechnic Institute
(Protocol No. 6
dated «07» September 2020)
Head of the Academic Council of
Igor Sikorsky Kyiv Polytechnic
Institute
Mykhailo ILCHENKO

Philology

EDUCATIONAL AND SCIENTIFIC PROGRAM
of the third (educational and scientific) level of higher education
In specialty 035 Philology
Field of knowledge 03 Humanities
Qualification: Doctor of Philosophy in Philology

Becomes effective by the Decree of
Rector of Igor Sikorsky Kyiv
Polytechnic Institute
as of date 17.09.2020 No. 1/282

PREAMBLE

DESIGNED by the project group:

Head of the project group:

Nina ISHCENKO, Doctor of Philological Sciences,
Professor, Professor of the Department of Theory, Practice and Translation of the English
Language

Members of the project group:

Natalya KOSMATSKA, Candidate of Philological Sciences, Associate Professor, Associate
Professor of the Department of Theory, Practice and Translation of the French Language

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Department of Theory, Practice and Translation of the English Language

Lidiya OLIYNYK, Candidate of Philological Sciences, Associate Professor of the Department of
Theory, Practice and Translation of the German Language

Heads of the departments:

Nina ISHCENKO, Doctor of Philological Sciences, Professor, Professor of the Department of
Theory, Practice and Translation of the English Language

Alla KALYTA, Doctor of Philological Sciences, Professor, Professor of the Department of
Theory, Practice and Translation of the French Language

Helena LYSENKO, Candidate of Philological Sciences, Associate Professor, Associate
Professor of the Department of Theory, Practice and Translation of the German Language

APPROVED BY:

*Scientific and Methodical Board of Igor Sikorsky Kyiv Polytechnic Institute
In specialty 035 Philology
Head of SMCU Nina ISHCENKO
(Protocol No. 5 dated 23.06.2020)*

*Scientific and Methodical Board of Igor Sikorsky Kyiv Polytechnic Institute
Head of Methodical Board Yurii YAKYMENKO
(Protocol No.1 dated 03.09.2020)*

PROFESSIONAL ASSESSMENT

The Program underwent changes following stakeholders' comments and suggestions based on the results of the public discussion, offered by:

- the research and teaching staff of the Department of Theory, Practice and Translation of the English Language, the Department of Theory, Practice and Translation of the German Language and the Department of Theory, Practice and Translation of the French Language, Faculty of Linguistics, Igor Sikorsky Kyiv Polytechnic Institute;

- the recipients of higher education enrolled in the scientific and educational program in specialty 035 Philology;

- the specialists of the Educational and Methodical department of Igor Sikorsky Kyiv Polytechnic Institute;

- specialists in the field of philology.

The Program was reviewed by the following stakeholders:

Mykhailo BONDAR, Head of the MYVIC SOLUTIONS International Translation Center;

Olga ILCHENKO, Doctor of Philological Sciences, Professor, Head of the Foreign Languages Department, Research and Educational Center of Foreign Languages, National Academy of Sciences of Ukraine;

Miguel-Angel CANDEL MORA, Doctor of Applied Linguistics, Professor, Professor of the Department of Applied Linguistics, Polytechnic University of Valencia, the Kingdom of Spain;

Oleksandr LAHODYNSKY, Doctor of Pedagogical Sciences, Professor, Head of the Foreign Languages Department, Military Diplomatic Academy named after Yevhenii Berezniak;

Ruslana SAVCHUK, Doctor of Philological Sciences, Professor of the Department of Spanish and French Philology, Kyiv National Linguistic University;

Jolita URBANAVICIENE, Doctor of Humanities, Senior Researcher at the Research Centre of the Standard Language, Institute of the Lithuanian Language, Vilnius, Lithuania.

Recipients of higher education involved in the development of the educational-and-scientific program:

Valeriia GAVRYLENKO, Postgraduate Student of the second year of study (group LA-v18f);

Yuliia ZAYCHENKO, Postgraduate Student of the fourth year of study (group LA-18f);

Iryna KRYVENETS, Postgraduate Student of the fourth year of study (group LF-18f).

The educational-and-scientific program was discussed after receiving all the suggestions from the postgraduate students seeking the degree of Doctor of Philosophy in Philology, graduates of Igor Sikorsky Kyiv Polytechnic Institute postgraduate studies in specialty 035 Philology, as well as representatives of the academic community and employers, and consequently approved by the Department of Theory, Practice and Translation of the English Language (Protocol No.14 dated 03.06.2020), the Department of Theory, Practice and Translation of the German Language (Protocol № 11 dated 09.06.2020) and the Department of Theory, Practice and Translation of the French Language (Protocol № 15 of 05.06.2020).

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1. DESCRIPTION OF THE EDUCATIONAL-AND-SCIENTIFIC PROGRAM
in specialty 035 “Philology”

1 – General information	
Full title of higher educational institution and institution/faculty	National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, Faculty of Linguistics
The degree of higher education and the title of the qualification	Degree of higher education – Doctor of Philosophy Qualification – Doctor of Philosophy in Philology
The official title of the educational program	Philology
Type of diploma and scope of the educational program	Doctor of Philosophy degree, unitary <u>Educational component</u> 40 credits, the term of study – 4 years <u>Scientific component</u> involves conducting the research and presenting its results in the form of a dissertation
Availability of accreditation	Original accreditation
Level in the national qualifications framework	The level of the national qualifications framework of Ukraine – 8 level QF-EHEA – third cycle EQF-LLL – 8 level
Prerequisites	Master’s degree
Teaching language(s)	Ukrainian / English / German / French
The duration of the educational program	Until the next accreditation
Internet address of the permanent placement of the educational program	http://osvita.kpi.ua/ section “Educational programs”, http://fl.kpi.ua , http://ktpam.kpi.ua , http://ktpnm.kpi.ua , http://ktpfm.kpi.ua
2 – The purpose of the educational program	
The purpose of the educational-and-scientific program is to train highly qualified and competitive professionals with the PhD degree in Philology, who are integrated into the European and world scientific and educational community and are capable of independent research, scientific-innovative, organizational-managerial, translation and pedagogical activities in the field of humanities in specialty 035 “Philology” in higher education institutions.	

3 – Characteristics of the educational program

<p>Subject area</p>	<p>The objects of a Doctor of Philosophy in Philology study and professional activities are the language(s) (in theoretical / practical, synchronic / diachronic, structural-and-functional, lingual pragmatic, communicative-and-cognitive, socio-cultural, psycholinguistic, stylistic and other aspects); literature, genre and style varieties of texts; written and oral communication aimed at providing information in various spheres of economy, science, technology, education, and culture by means of translating texts of various genres into foreign and state languages; intercultural and mass communication in oral and written forms.</p> <p>The objectives of the training are the formation of professional competencies necessary for innovative research activities in the field of philology.</p> <p>Theoretical content of the subject area includes the history of development as well as current state of scientific philological knowledge; theories, concepts and terminology of the philological direction under study.</p> <p>Methods, techniques, technologies and tools: critical analysis, evaluation and synthesis of new and complex ideas in the field of philological sciences; general scientific, philological, statistical methods of language, speech and text research, linguistic and information-and-communication tools, necessary and sufficient for professional and scientific innovative activities.</p>
<p>Orientation of the educational program</p>	<p>The scientifically oriented educational program involves the acquisition of theoretical knowledge, skills, abilities and other competencies sufficient to produce new ideas, solve complex problems within scientific innovative activities in the field of philology, mastering the methodology of scientific and pedagogical activities, and conducting their own research, whose results are of scientific novelty, theoretical and practical value.</p>
<p>The main focus of the educational program and specialization</p>	<p>The main focus of the program is to develop the ability to carry out innovative activities and conduct research in the field of linguistics, translation studies and related research fields, to implement the results of scientific research into research and teaching activities, taking into account national, European and global contexts, to use professionally oriented knowledge while teaching in higher education institutions.</p>

Specific features of the program	<p>Integration of professional training within a wide range of modern translation studies (with the emphasis on languages for specific purposes) and linguistic studies in cognitive-and-discursive, communicative pragmatic, sociolinguistic, contrastive and lingual energetic aspects with an access to education and other professional fields.</p> <p>Wide application of international academic mobility and dual scientific leadership with the involvement of foreign experts.</p>
4 – Eligibility of graduates for employment and further training	
Eligibility for employment	<p>Philologist, teacher at higher education institution, linguist, translator. The graduate can work in scientific, organizational, managerial and educational fields; teaching and other positions in higher education institutions; in research institutions, etc. The graduate may also work as an expert, consultant and advisor to professional issues in humanitarian education in public and private institutions, executive bodies and local governments, public organizations, etc.</p>
Further training	Continuation of education at the post-doctoral programs.
5 – Teaching and assessment	
Teaching and studying	<p>Training is conducted within the paradigm of problem-oriented approach.</p> <p>Forms of training include lectures, seminars and practical classes in small groups (up to 8 students), independent work with the possibility of consultation with the lecturer, individual classes with the use of information and communication technologies and blended learning (e-learning), online lectures).</p> <p>Information on the objectives, content and program learning outcomes, procedures and assessment criteria within individual educational components is available in the "Electronic Campus" system and on the websites of FL departments.</p> <p>The discussions of intermediary research results are carried out during all the years of study. The last two years of study (for PhD recipients seeking their degree outside postgraduate studies it is the last three years of study) are devoted to preparation for dissertation defense: finalisation a PhD candidate's scientific evidence in the form of a PhD thesis, summarizing how comprehensive the PhD thesis results are presented in scientific articles according to current requirements. Submitting the</p>

	documents for the PhD thesis preliminary expertise. Preparation for graduation certification (thesis defence).
Assessment	<p>Assessment of the recipients' program learning outcomes are carried out in accordance with the criteria of the Rating System of assessment, which provides continuous assessment and the end-of-semester examination in the form of presentations, written and oral exams, tests.</p> <p>The presentation of the report on pedagogical practice, reports at scientific and research seminars and conferences, participation in scientific projects and professional publications in journals indexed in scientometric databases are a part of the assessment. Certification of the student on the basis of the individual student's plan completion (twice a year) and the graduation report (public defense of the main provisions of the qualification work) are mandatory.</p>
6 – Program competencies	
Integral competency	The ability to solve complex problems in the field of linguistics, literature, translation in the process of professional and research-and-innovation activity, which involves deep rethinking of existing and the creation of new holistic knowledge and / or professional practice.
General competencies (GC)	
GC 1	Ability to abstract thinking, analysis and synthesis, generating new ideas.
GC 2	Ability to search, systematize and critically analyze information from various sources.
GC 3	Ability to plan and conduct comprehensive research including in interdisciplinary fields that are based on a systematic scientific worldview using modern information and communication technologies.
GC 4	Ability to communicate with the scientific community in Ukrainian and foreign (German or English) languages in order to present and discuss the results of scientific work in oral and written forms.
GC 5	Awareness of the need and compliance with scientific ethics.
GC 6	Ability to develop and manage research projects, make proposals for research funding, registration of intellectual property rights.
GC 7	Ability to participate in the work of national and international research teams.

Professional competencies (PC)	
PC 1	Acquiring of profound knowledge in the field of Philology, in particular learning the basic concepts, understanding of theoretical and practical problems, history of development and current state of scientific philological knowledge, mastering the terminology of the scientific field under study.
PC 2	Ability to collect data for philological research, systematize and interpret them including for the implementation of interdisciplinary philological research.
PC 3	Ability to analyze philological phenomena in terms of fundamental philological principles and knowledge, classical and modern research approaches as well as on the basis of appropriate general scientific methods.
PC 4	Ability to solve a wide range of problems in the field of Philology that are based on understanding of their nature, influential factors, development trends and usage of theoretical and experimental methods.
PC 5	Ability to perform linguo-creative activities in the field of science and innovation.
PC 6	Ability to comprehensively analyze linguocognitive and sociocultural processes, to model and predict trends in linguistic, extralinguistic and linguistic phenomena.
PC 7	Ability to conduct scientific research in the field of Linguistics with the help of system analysis.
PC 8	Ability to innovatively reinterpret and apply methods of other fields of knowledge to implement the tasks of interdisciplinary philological research.
PC 9	Ability to do the pre-translation text analysis in order to organize, plan and implement a sequence of logical operations to ensure the equivalence and adequacy of translation.
PC 10	Ability to use rationally and effectively innovative information technologies at different stages of research and translation activities.
PC 11	Ability to operate with conceptual, methodological and factual knowledge on theoretical, practical, methodological issues of intercultural communication.
PC 12	Ability to motivate tolerant intercultural interaction within the scope of scientific discussion and academic writing.
PC 13	Ability to conduct a fundamental analysis of specific linguistic or literary material using research approaches and methods.
PC 14	Ability to use communicative strategies of scientific discourse from the point of intentional, pragmatic and cognitive approaches for the effective implementation of goals in the research.
PC 15	Ability to develop logical and methodological foundations of science; create models of scientific doctrine.

PC 16	Ability to develop research strategies including self-monitoring and self-assessment strategies and self-improvement research strategies.
PC 17	Ability to improve pedagogical skills, methodological culture, methodological reflection, critical thinking throughout life.
PC 18	Ability to plan, organize professional, scientific-innovative, translation and teaching activities in particular in situations that require new strategic approaches.
Program outcomes of studying	
POS 1	Have advanced conceptual and methodological knowledge in philology and at the boundaries of subject areas, as well as to have the research skills sufficient to conduct scientific theoretical and applied research at the level of the latest world achievements, gain new knowledge and/or innovate.
POS 2	Freely present and discuss with specialists and non-specialists the results of own original research, scientific and applied problems of philology in state and foreign languages in oral and written forms: produce and competently design various genre texts in accordance with modern requirements (article, essay, presentation, conference speech , public popular science or scientific lecture, etc.); to reflect the results of research in scientific publications in leading domestic and foreign scientific journals in a qualified manner.
POS 3	Plan and perform theoretical and/or experimental research in philology and related interdisciplinary areas using professional tools, methods and approaches, critically analyze the results of their own research and the achievements of other scientists in the context of the whole complex of modern knowledge.
POS 4	Develop and implement research and innovation projects that provide an opportunity to rethink existing and create new holistic knowledge and/or professional practice and solve significant theoretical and applied problems of philology in compliance with academic ethics and social, economic, environmental, and legal aspects.
POS 5	Organize philological disciplines teaching in accordance with the objectives and principles of modern higher education, the requirements for its scientific, educational and methodological and regulatory support, use various forms of organization, diagnosis, monitoring and evaluation of the effectiveness of educational activities.
POS 6	Evaluate the results of cognitive scientific and professional activities and its regulation, build and implement effective strategies for research self-development and professional self-improvement.
POS 7	Apply modern methods and technologies, including information, for the successful and effective implementation of professional activities and

	quality assurance of research in a particular philological field.
POS 8	Develop a structural and semantic algorithm for research and tasks implementation.
POS 9	Use methodological tools of different knowledge areas to implement the tasks of innovative interdisciplinary research.
POS 10	Analyze, compare and classify different areas and schools in linguistics, literary criticism, translation studies.
POS 11	Carry out scientific analysis of language, linguistic, literary and translation material, interpret and structure it taking into account the classical and modern methodological principles as well as formulate generalizations on the basis of self-developed data.
POS 12	Use linguistic and communication tools to ensure innovative research.
POS 13	Possess the principles of organization and development of research and innovation projects, epistemological and axiological focus of modern science and society.
POS 14	Choose optimal research approaches and methods for the analysis of specific linguistic, literary or translation material.
POS 15	Abide by the rules of scientific ethics, legal and social norms in the process of professional and scientific-innovative activity.
POS 16	Follow the rules of academic honesty.
POS 17	Analyze complex phenomena of public life on the basis of a systematic scientific worldview, connect general philosophical problems with its solution arising in professional and scientific-innovative activities as well as apply empirical and theoretical methods of cognition.
POS 18	Examine linguocognitive processes to ensure the purpose of innovative scientific research.
POS 19	Practically apply automated translation systems and data processing methods, work with linguistic corpora, lexicographic and information retrieval systems.
POS 20	Present the results of work in the form of completed scientific and research developments (publications, reports, presentations, etc.).
POS 21	Use knowledge of translation studies, linguocognitive, pragmatic, sociocultural and psycholinguistic paradigms to optimize intercultural interaction.
POS 22	Take over the techniques of personal self-development and self-improvement and actualization of their potential and further self-realization.
POS 23	Put in communicative strategies of scientific discourse, translation and academic writing to ensure the continuous development of philological science, conducting research in close connection with the international scientific community.

8 – Resource provision of the program’s implementation

Staffing	In accordance with the staff requirements for ensuring the educational activities’ implementation at the relevant level of HE, approved by Decree of the Cabinet of Ministers of Ukraine No. 1187 dated December 30, 2015, (prevailing) updated by Decree No. 347, May 23, 2018.
Material-and-technical supplying	In accordance with the technological requirements for material-and-technical supplying of educational activities’ implementation at the relevant level of HE, approved by Decree of the Cabinet of Ministers of Ukraine No. 1187 dated December 30, 2015, (prevailing) updated by Decree No. 347, May 23, 2018.
Informational and methodological supplying	In accordance with the technological requirements for informational and methodological supplying of educational activities’ implementation at the relevant level of HE, approved by Decree of the Cabinet of Ministers of Ukraine No. 1187 dated December 30, 2015, (prevailing) updated by Decree No. 347, May 23, 2018. Use of The Scientific and Technical Library of Igor Sikorsky KPI. Use of literature provided by lecturers of the German Academic Exchange Service.

9 – Academic Mobility

National Credit Mobility	Possibility to conclude Credit Mobility agreements with other higher educational institutions of Ukraine, which prepare Doctors of Philosophy in the specialty 035 Philology.
International Credit Mobility	International Credit Mobility is carried out on the basis of bilateral agreements between the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" and foreign educational institutions-partners: <ul style="list-style-type: none">• Agreement on international academic mobility (Erasmus+) with the Faculty of Arts of the Catholic University of Leuven (Leuven, Belgium);• Agreement on international academic mobility (Erasmus+) with the University of Luxembourg (the Grand Duchy of Luxembourg);• Agreement on international academic mobility (Erasmus +) with Polytechnic University of Valencia (Valencia, the Kingdom of Spain);• Agreement on international academic mobility (Erasmus+)

	<p>with the university of Granada (Granada, the Kingdom of Spain);</p> <ul style="list-style-type: none"> • Agreement on international academic mobility (Erasmus+) with the University of Groningen (Groningen, the Netherlands); • Agreement on international academic mobility (Erasmus+) with Kütahya Dumlupinar University (Kütahya, Turkey); • Agreement on international academic mobility (Erasmus+) with the Friedrich Schiller University Jena (Jena, the Federal Republic of Germany); • Agreement on international academic mobility (Erasmus+) with the University of Lorraine (Nancy, the French Republic); • Cooperation agreement with the German Academic Exchange Service / DAAD (the Federal Republic of Germany).
<p>Training of foreign applicants acquiring higher education</p>	<p>It can be conducted in Ukrainian or English, provided that the level for the language of instruction is no less than B2.</p>

2. LIST OF COMPONENTS OF THE EDUCATIONAL PROGRAM

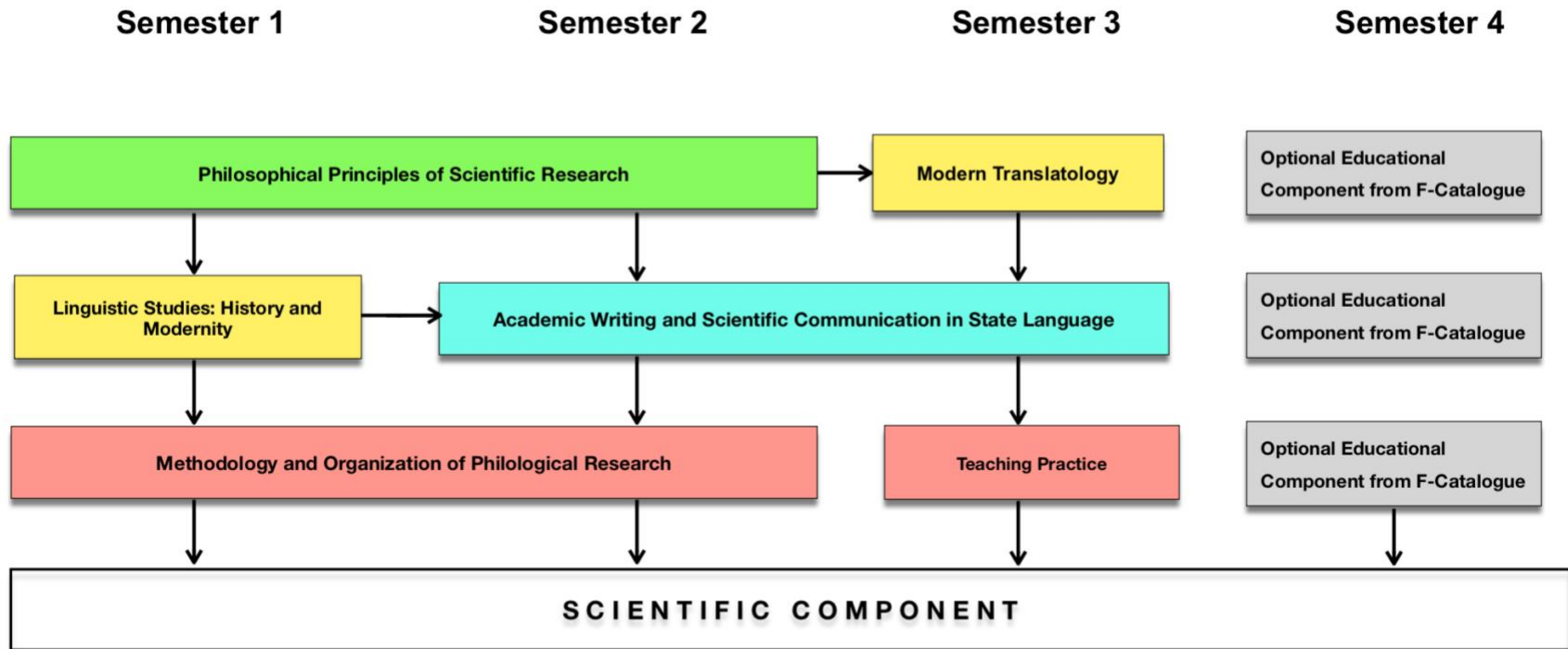
E/D code	Components of the educational program (disciplines, course projects (works), practices, qualification work)	Number of credits	Final assessment form
1	2	3	4
COMPULSORY EDUCATIONAL COMPONENTS			
Academic Disciplines Aimed at Achieving General Scientific (Philosophical) Competencies			
GC1	Philosophical Principles of Scientific Research	6	credit, exam
Academic Disciplines Aimed at Gaining Linguistic Competencies			
GC2	Academic Writing and Scientific Communication in Foreign Language	6	credit, exam
Academic Disciplines Aimed at Obtaining Profound Knowledge in Speciality			
PC1	Linguistic Studies: History and Modernity	5	credit, exam
PC2	Modern Translatology	5	exam
Academic Disciplines Aimed at Achieving Universal Competencies of a Researcher			
PC3	Methodology and Organization of Philological Research	4	credit
PC4	Teaching Practice	2	credit
OPTIONAL EDUCATIONAL COMPONENTS			
OC1	Educational Component from F-Catalogue	4	credit
OC2	Educational Component from F-Catalogue	4	credit
OC3	Educational Component from F-Catalogue	4	credit
Total scope of the compulsory components:		28	
Total scope of the optional components:		12	
TOTAL SCOPE OF THE EDUCATIONAL PROGRAM		40	

GC – General Compulsory

PC – Professional Compulsory

OC – Optional Component

3. STRUCTURAL-AND-LOGICAL SCHEME OF THE EDUCATIONAL PROGRAM



- Academic Disciplines Aimed at Achieving General Scientific (Philosophical) Competencies
- Academic Disciplines Aimed at Gaining Linguistic Competencies
- Academic Disciplines Aimed at Obtaining Profound Knowledge in Speciality
- Academic Disciplines Aimed at Achieving Universal Competencies of a Researcher
- Optional educational components

4. SCIENTIFIC COMPONENT OF THE EDUCATIONAL PROGRAM

Year of study	PhD candidate's scientific work scope	Form Of Control
1st year	To justify a candidate's scientific research topic and have it approved; decide on contents, set deadlines and scope of scientific efforts; choose and justify the methodology of a candidate's scientific research; review and analyse existent views and approaches which have been introduced in the modern state of the chosen scientific field. To prepare and submit to and have published at least 1 article on the research topic in academic professional publications (Ukrainian or foreign ones); take part in scientific and research conferences (seminars) including publication of abstracts.	Approval of a PhD's candidate individual plan of research by the Academic Council of an institute/faculty, making a progress report on a PhD's candidate individual plan of research twice a year.
2nd year	To conduct an individual scientific research under the supervision of an academic supervisor, i.e. to solve research tasks by applying the complex of theoretical and empirical methods. To prepare and submit to and have published at least 1 article on the research topic in scientific professional publications (Ukrainian or foreign ones); take part in scientific and research conferences (seminars) including publication of abstracts.	Making a progress report on a PhD's candidate individual plan of research twice a year.
3rd year	To analyse and summarise the obtained results of a PhD candidate's scientific research; justify scientific novelty of the results obtained, their theoretical and/or practical value. To prepare and submit to and have published at least 1 article on the research topic in scientific professional publications (Ukrainian or foreign ones); take part in scientific and research conferences (seminars) including publication of abstracts.	Making a progress report on a PhD's candidate individual plan of research twice a year.
4th year	To finalise a PhD candidate's scientific evidence in the form of a PhD thesis, summarise how comprehensive the PhD thesis results are presented in scientific article according to current	Making a progress report on a PhD's candidate individual plan of

	<p>requirements. To implement the results obtained and receive supporting documents. To submit the documents for the PhD thesis preliminary expertise. To prepare scientific speech for graduation certification (thesis defence).</p>	<p>research twice a year. To provide a report of novelty, theoretical and practical value of a PhD thesis results.</p>
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5. THE FORM OF GRADUATION CERTIFICATION FOR THE RECIPIENTS OF HIGHER EDUCATION

Graduation certification of a recipient of a PhD scientific degree in the field of Philology under the educational and scientific program “Philology” is conducted in the form of a qualifying paper (PhD thesis) public defence. The qualifying paper has to be checked for plagiarism; after the defence it is stored in the repository of the University Scientific and Technical Library to be accessed freely. The certification is conducted openly and publicly. The graduation certification is finalised with the issue of a document of a standard form on conferring a PhD scientific degree and qualification “PhD in Philology” under the educational and scientific program “Philology”.

**6. MATRIX OF CORRESPONDENCE OF PROGRAM COMPETENCES
TO EDUCATIONAL PROGRAM COMPONENTS**

	GC1	GC2	PC1	PC 2	PC 3	PC4	Scientific component
GC 1	+						+
GC 2		+		+	+		+
GC 3			+		+		+
GC 4							+
GC 5	+						+
GC 6					+		+
GC 7		+			+		+
PC 1			+		+		+
PC 2		+	+		+		+
PC 3			+				+
PC 4			+				+
PC 5		+			+		+
PC 6			+				+
PC 7	+				+		+
PC 8			+		+		+
PC 9				+			
PC 10				+	+		+
PC 11					+		+
PC 12					+		+
PC 13					+		+
PC 14		+	+		+		+
PC 15					+		+
PC 16	+						+
PC 17						+	
PC 18				+	+	+	

**7. MATRIX OF PROVIDING PROGRAM LEARNING OUTCOMES
WITH RELEVANT COMPONENTS OF THE EDUCATIONAL
PROGRAM**

	GC1	GC2	PC1	PC 2	PC 3	PC4	Scientific component
POS 1			+		+		+
POS 2		+			+		+
POS 3			+	+	+		+
POS 4	+				+		+
POS 5						+	
POS 6	+				+		+
POS 7				+	+		+
POS 8					+		+
POS 9			+		+		+
POS 10			+	+			+
POS 11			+	+	+		+
POS 12					+		+
POS 13					+		+
POS 14			+	+	+		+
POS 15	+	+					+
POS 16	+						+
POS 17	+					+	+
POS 18			+				+
POS 19				+	+		
POS 20		+		+	+		+
POS 21			+				
POS 22						+	
POS 23		+			+		+