MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
LVIV POLYTECHNIC NATIONAL UNIVERSITY

Approved
by the Rector
of Lviv Polytechnic National University
_____Yu. Ya. Bobalo
2022/02/28

EDUCATIONAL AND SCIENTIFIC PROGRAM

for the third (educational and scientific) level of higher education

in the specialty 181 *Food Technologies*

in the field of knowledge 18 *Production and Technologies*

Qualification of Doctor of Philosophy in the specialty *Food Technologies*

Approved
by the Academic Council
of Lviv Polytechnic National University
Protocol No 81 dated 2022/02/28

Lviv 2022

The Program has been elaborated by a working group in the specialty 181 *Food Technologies*, represented by:

the head of the working group (guarantor):

Kosiv Ruslana Bohdanivna	Ph.D., Associate Professor, Associate Professor of the Department of Technology of Organic Products

Members:

Palyanytsia Lyubov Yaroslavivna	the head of the Scientific and Methodical Commission of the specialty, Ph.D., Associate Professor, Associate Professor of the Department of Technology of Organic Products;
Shevchuk Liliya Ivanivna	Ph.D., Prof., Professor of the Department of Technology of Organic Products;
Blishch Roksolana Oleksandrivna	Ph.D., Associate Professor, Associate Professor of the Department of Technology of Organic Products;
Berezovska Nataliya Ivanivna	Ph.D., Associate Professor, Associate Professor of the Department of Technology of Organic Products;
Lekh Halyna Bohdanivna	chief technology officer of Trading and Production Company "The First Private Brewery "For People as for Yourself!" LLP;
Polyuzhyn Lyubov Ihorivna	a third-year postgraduate student of the specialty 181 *Food Technologies*;
Prystai Romanna Rostyslavivna	A student of the CTFW (Chemical Technologies of Fermentation Products and Winemaking) group

The guarantor _____ Ph.D., Associate Professor Kosiv R.B.

The Program is approved and entered into force by the Order of the Rector of Lviv Polytechnic National University dated 2022/05/04 No. 205-1-03.

LETTER OF AGREEMENT
concerning educational and scientific program

Level of higher education	the third (educational and scientific)
Field of knowledge	18 *Production and Technologies*
Specialty	181 *Food Technologies*
Qualification	Doctor of Philosophy

APPROVED
by the Scientific and Methodological Commission of the specialty 181 *Food Technologies*
Protocol No. 2
dated 2022/02/08

The head of the Scientific and Methodical Commission of the specialty
_____ Palyanytsia L.Y.
dated 2022/02/08

The Director of the Institute of Chemistry and Chemical Technologies
_____ Skorokhoda V.Y.
dated 2022/02/15

AGREED
by the Head of the Educational and Methodical Department

_____ Sviridov V.M.
dated 2022/02/17

Vice-rector for Research

_____ Demydov I.V.
dated 2022/02/16

Vice-rector for Research and Teaching Work
_____ Davydchak O.R.
dated 2022/02/17

RECOMMENDED
by the Scientific and Methodological Council of the University
Protocol No. 61
dated 2022/02/21
The head of SMC
_____ Zahorodniy A.H.

I. EDUCATIONAL COMPONENT OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

1. Profile of the Doctor of Philosophy Program in the specialty 181 *Food Technologies*

1 – General information	
1	**2**
Full name of the institution of higher education	**Lviv Polytechnic National University**
The full title of the qualification in native language	**Доктор філософії з Харчових технологій** Doctor of Philosophy in Food Technologies
The official name of the educational and scientific program	Харчові технології. Food Technologies
Type of diploma and scope of the educational program	Diploma of Doctor of Philosophy, single, 43 ECTS credits of the educational component of the educational and scientific program, the term of the educational component of the educational and scientific program is 2 years
Cycle/level	NQF of Ukraine – 8th level, FQ-EHEA – third cycle, EQF-LLL – 8th level
Prerequisites	The level of higher education – Master's degree
Language(s) of teaching	Ukrainian language
Basic concepts and their definitions	Main concepts and their definitions were used in the educational and scientific program 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 amendments and additions, the Procedure for training applicants for the degree of Doctor of Philosophy and Doctor of Science in higher educational institutions (scientific institutions), approved by Resolution of the Cabinet of Ministers dated 03/23/2016 No. 261 with amendments and additions, the Procedure for conducting of the experiment on awarding the degree of Doctor of Philosophy, approved by the Resolution of the Cabinet of Ministers of Ukraine dated 03/06/2019 No. 167, Methodological recommendations for the development of higher education standards, approved by the Order of the Ministry of Education and Science of Ukraine dated 06/01/2017 No. 600 with changes and additions, Regulations on the accreditation of educational programs (according to which students of higher education undergo training) approved by the Order of the Ministry of Education and Science of Ukraine dated July 11, 2019 No. 977
2 – The purpose of the educational and scientific program	
	To deepen theoretical knowledge and practical abilities and skills in the field of production and technology in the specialty *Food Technologies*, to develop philosophical and linguistic competences,

	to form universal skills of a researcher, sufficient for conducting and successful completion of scientific study and further professional and scientific activities
3 - Characteristics of the educational program	
Subject area (field of knowledge, specialty)	Field of knowledge 18 *Production and Technologies*, specialty 181 *Food technologies*
1	**2**
Orientation of the educational and scientific program	Theoretical and methodological, scientific and applied foundations of *Food Technologies*; principles of optimizing technological processes to ensure a high level of quality and safety of food products, environmental safety and resource conservation of production; patterns of innovative development of the theory and practice of food technologies; methodological principles of scientific, scientific and technical as well as research and teaching work
Features of the program	The educational and scientific program covers a wide range of modern innovative vectors of the development of the theory and practice of *Food Technologies*, in particular, the technologies of fermentation products and winemaking, which forms an updated theoretical and applied base for conducting scientific studies.
4 – Suitability of graduates of the educational program for employment and further education	
Employment suitability	Positions of research and research and teaching workers in scientific institutions and institutions of higher education, engineering, expert, analytical, etc. positions in research, design and construction institutions and divisions of food industry enterprises
Further education	Obtaining the scientific degree of Doctor of Science and additional qualifications in the adult education system
5 – Teaching and assessment	
Teaching and learning	A combination of lectures and practical classes, teaching workshops, consulting with a scientific supervisor, research and teaching community with independent scientific and educational work
Assessment	Exams, credit tests, continuous assessment
6 – Program competences	
Integral competence (IC)	The ability to produce new ideas, to solve complex problems of professional and/or research-innovative activity in the field of food production, to apply the methodology of research and teaching activity, as well as to conduct personal research, the results of which have scientific novelty, theoretical and practical significance
General competences (GC)	**GC1**. The ability to abstract thinking, analysis and synthesis. **GC2**. The ability to work within an international context. **GC3**. The ability to solve complex problems in food technologies based on a systematic scientific and general cultural outlook in compliance with the principles of professional ethics and academic integrity.
Special (professional, subject) competences (SC)	**SC1.** The ability to perform original research, to achieve scientific results that form new knowledge in the field of food technologies and/or related interdisciplinary areas. **SC2.** The ability to initiate, develop and implement complex innovative projects in the field of food production and related

Table Continued

	interdisciplinary projects, to show leadership during their implementation. **SC3.** The ability to apply modern methodologies, methods and tools of experimental and theoretical research, digital technologies, computer modeling methods, databases and other electronic resources, specialized software in scientific and educational activities in the field of food technologies.
1	**2**
	SC4. The ability to critically analyze and evaluate the current state and trends in the development of food technologies. **SC5.** The ability to identify, set and solve problems of a research nature, evaluate and ensure the quality of work performed in the food industry. **SC6.** The ability to conduct research and teaching activities in institutions of higher education.
7 – Program learning outcomes (LO)	
LO1. To freely present and discuss the results of research, scientific and applied problems in the field of food technologies in national and foreign languages with specialists and non-specialists, to competently reflect the results of research in scientific publications in compliance with the principles of professional ethics and academic integrity. **LO2**. To formulate and test hypotheses; to use appropriate evidence to substantiate conclusions, in particular, the results of theoretical analysis, experimental studies and mathematical and/or computer modeling, available literature data. **LO3**. To use modern tools and technologies for searching, processing and analyzing information on food technology issues, in particular, statistical methods for analyzing data of a large volume and/or complex structure, specialized databases and information systems. **LO4**. To plan, organize and perform experimental and/or theoretical research in the field of food technologies using modern tools and equipment, information technologies and software. **LO5**. To have advanced conceptual and methodological knowledge, demonstrate research skills in the field of food technologies and at the edge of subject areas, sufficient for conducting scientific and applied research with the aim of obtaining new knowledge and/or implementing innovations at the level of modern world achievements of science and technology. **LO6**. To develop and implement scientific and/or innovative engineering projects that provide an opportunity to solve significant scientific and applied problems in the field of food production, taking into account social, economic, environmental and legal aspects. **LO7**. To critically analyze the results of personal research in the field of food technologies and the results of other researchers within the context of the entire complex of significant knowledge regarding the investigated problem, ensure the protection of intellectual property. **LO8**. To develop and teach special disciplines of food technologies in institutions of higher education, provide educational and methodological support for the educational process.	
8 – Resource support for the implementation of the educational program	
Specific characteristics of personnel support	100% of research and teaching workers involved in teaching a cycle of disciplines that provide special (professional) competencies of a postgraduate student, have scientific degrees and academic titles, are recognized professionals with experience in research, management or innovative work in their field.
Specific characteristics of material and technical support	Use of modern equipment from leading companies, including Agilent Technologies, IKA-WERK, Axis, ProMinent, Sestos.
Specific characteristics of informational and methodological support	The usage of the Virtual Learning Environment of Lviv Polytechnic National University and author's designs of research and teaching workers.

Table Continued

1	2
9 – Academic mobility regulated by CMU Resolution No. 579 *On Approval of the Regulation on the Procedure for Realizing the Right to Academic Mobility* dated August 12, 2015)	
National credit mobility	On the basis of bilateral agreements between Lviv Polytechnic National University and universities of Ukraine
International credit mobility	On the basis of bilateral agreements between Lviv Polytechnic National University and educational institutions of partner countries
Education of foreign students of higher education	Possible

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

No	**Training cycle**	**The volume of the educational load of the higher education applicant (credits / %)**		
		Required components of the educational component	**Optional components of the educational component**	**Total for the entire period of study**
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 postgraduate student	-	3 / 7	3 / 7
Total for the entire period of study		31 / 72	12 / 28	43 / 100

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

Code of s/d	Components of the educational component	Number of credits	Final control form	Competences provided for by Resolution 261 dated 03/23/2016 (as amended from 04/03/2019)
1	2	3	4	5
1. **Required components of the educational component**				
1.1. *Cycle of disciplines that form general scientific competences and universal skills of the researcher*				
RC1.1.	Philosophy and Methodology of Science	3	exam	Mastering general scientific (philosophical) 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 Scientometric Database, automatic formation of links to literary sources)
RC1.2.	Foreign Language for Academic Purposes, Part 1	4	credit test	Acquisition of linguistic competences sufficient to present and discuss the results of personal scientific work in a foreign language in oral and written forms, as well as to fully understand foreign scientific texts in the relevant specialty, use of modern information technologies (presentation of scientific results).
RC1.3.	Foreign Language for Academic Purposes, Part 2	4	exam	
RC1.4.	Professional Teaching	3	credit test	Obtaining universal skills of a researcher, in particular, organizing and performing teaching process (classes), using modern information technologies (work within VLE (VNS), Microsoft Teams, Zoom, etc.)
RC1.5.	Academic Entrepreneurship	4	credit test	Acquiring universal researcher skills, in particular oral and written presentation of the results of personal research in Ukrainian, management of scientific projects and/or performing proposals for financing scientific research, registration of intellectual property rights, application of modern information technologies.
RC1.6.	Teaching Practice	3	credit test	Obtaining universal skills of a researcher, in particular, organizing and performing teaching process (classes), using modern information technologies (work within VLE (VNS), Microsoft Teams, Zoom, etc.)
Total per cycle:		**21**		
1	2	3	4	5
1.1.Cycle of disciplines forming professional competences				
RC1.1.	Scientific Bases of Modeling and	4	exam	Gaining profound knowledge of the specialty in which the postgraduate

	Optimization of Processes in Food Technologies			student conducts research, in particular, mastering the main concepts, grasping theoretical and practical issues, the history of development and the current state of scientific knowledge in the chosen specialty, becoming proficient in terminology of the studied area in the amount of ECTS credits in accordance with the standard of higher education
RC1.2.	Innovative Aspects of Food Technology Development	3	credit test	
RC1.3.	Research Methods in Food Technologies	3	credit test	
Total per cycle:		**10**		
2. **Optional components of the educational component****				
2.1. Cycle of disciplines that form general scientific competences and universal skills of the researcher				
OP1.1	Business Foreign Language	3	credit test	Obtaining universal researcher skills, in particular, oral and written presentation of the results of personal research in Ukrainian, management of scientific projects and/or performing proposals for financing scientific research, registration of intellectual property rights, application of modern information technologies. Acquisition of linguistic competences sufficient to present and discuss the results of personal scientific work in a foreign language in oral and written forms, as well as to fully understand foreign language scientific texts in the relevant specialty, use of modern information technologies (presentation of scientific results). Mastering general scientific (philosophical) 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 Scientometric Database, automatic formation of links to literary sources) Obtaining universal skills of a researcher, in particular, organizing and performing teaching process (classes), using modern information technologies (work within VLE (VNS), Microsoft Teams, Zoom, etc.)
OP1.2	Psychology of Creativity and Invention	3	credit test	
OP1.3	Management of Scientific Projects	3	credit test	
OP1.4	Technology of Grant Applications and Registration of Patent Rights	3	credit test	
OP1.5	Rhetoric	3	credit test	
OP1.6	Modern Inventions in Research Activities	3	credit test	

	OP1.7	Open Research Practices	3	credit test	
	OP1.8	Academic Integrity and Quality of Education	3	credit test	
	OP1.9	Methodology of Preparing Scientific Publications	3	credit test	
	OP1.10	Quality of Higher Education (Formation of Internal Quality Assurance Systems)	3	credit test	
	Total per cycle:		**3**		

1	2	3	4	5
*2.2. Cycle of disciplines forming professional competences**				
OP2.1	Kinetics of enzymatic reactions	3	exam	Gaining profound knowledge of the specialty in which the postgraduate student conducts research, in particular, mastering the main concepts, grasping theoretical and practical issues, the history of development and the current state of scientific knowledge in the chosen specialty, becoming proficient in terminology of the studied area
OP2.2	Microorganisms in Technologies of Fermentation Products	3	exam	
OP2.3	Water Preparation and Water Purification in Technologies of Fermentation Products	3	exam	
OP2.4	Assessment of the Quality of Biological Preparations and Biological Products	3	exam	
OP2.5	Molecular Biotechnology and Bioengineering	3	exam	
OP2.6	Biotechnology and Plant Bioengineering	3	exam	
OP2.7	The Technology of Obtaining Hydrogels Based on Natural and Synthetic Polymers for Use in the Food and Cosmetic Industry	3	exam	
OP2.8	The Technology of Obtaining Emulsifiers and Stabilizers and their Use in the Food and Cosmetic Industry	3	exam	
OP2.9	Prospective Water Conditioning Technologies	3	exam	
OP2.10	Fundamental Principles of Ecological Biotechnology	3	exam	
Total per cycle:		**6 (3+3)**		

*3. Disciplines of the postgraduate student's free choice***				
OP3.1	Discipline of the postgraduate student's free choice **	3	credit test	Obtaining skills of critical analysis, evaluation and synthesis of new and complex ideas
Total per cycle:		**3**		
In Total		**43**		

Footnote: * - a postgraduate student chooses two disciplines;
** - a postgraduate student can choose disciplines taught at Lviv Polytechnic National University or other national (foreign) higher education institutions (scientific institutions) at all levels.

4. The matrix of correspondence of program competencies to educational components

	RQ1.1.	RQ1.2.	RQ1.3.	RQ1.4.	RQ1.5.	RQ1.6.	RQ2.1.	RQ2.2.	RQ2.3.	OP1.1.	OP1.2.	OP1.3.	OP1.4.	OP1.5	OP1.6.	OP1.7	OP1.8	OP1.9.	OP1.10	OP2.1.	OP2.2.	OP2.3.	OP2.4.	OP2.5.	OP2.6.	OP2.7.	OP2.8.	OP2.9.	OP2.10.	OP3.1
INT	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
GC1	•										•				•															
GC2		•	•							•																				
GC3	•			•		•	•	•	•			•	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
SC1							•	•	•											•	•	•	•	•	•	•	•	•	•	
SC2						•						•			•															
SC3				•	•		•		•									•												•
SC4								•												•	•	•	•	•	•	•	•	•	•	
SC5					•	•		•			•		•		•	•				•	•	•	•	•	•	•	•	•	•	
SC6				•										•			•		•											

Conventional designations: RQi – mandatory discipline (required educational component), OPi – optional discipline, i – discipline number in the list of components of the educational component, INT – integral competence, GCj – general competence, SCj – special (professional, subject) competence, j – competence number in the list of competencies of the educational component.

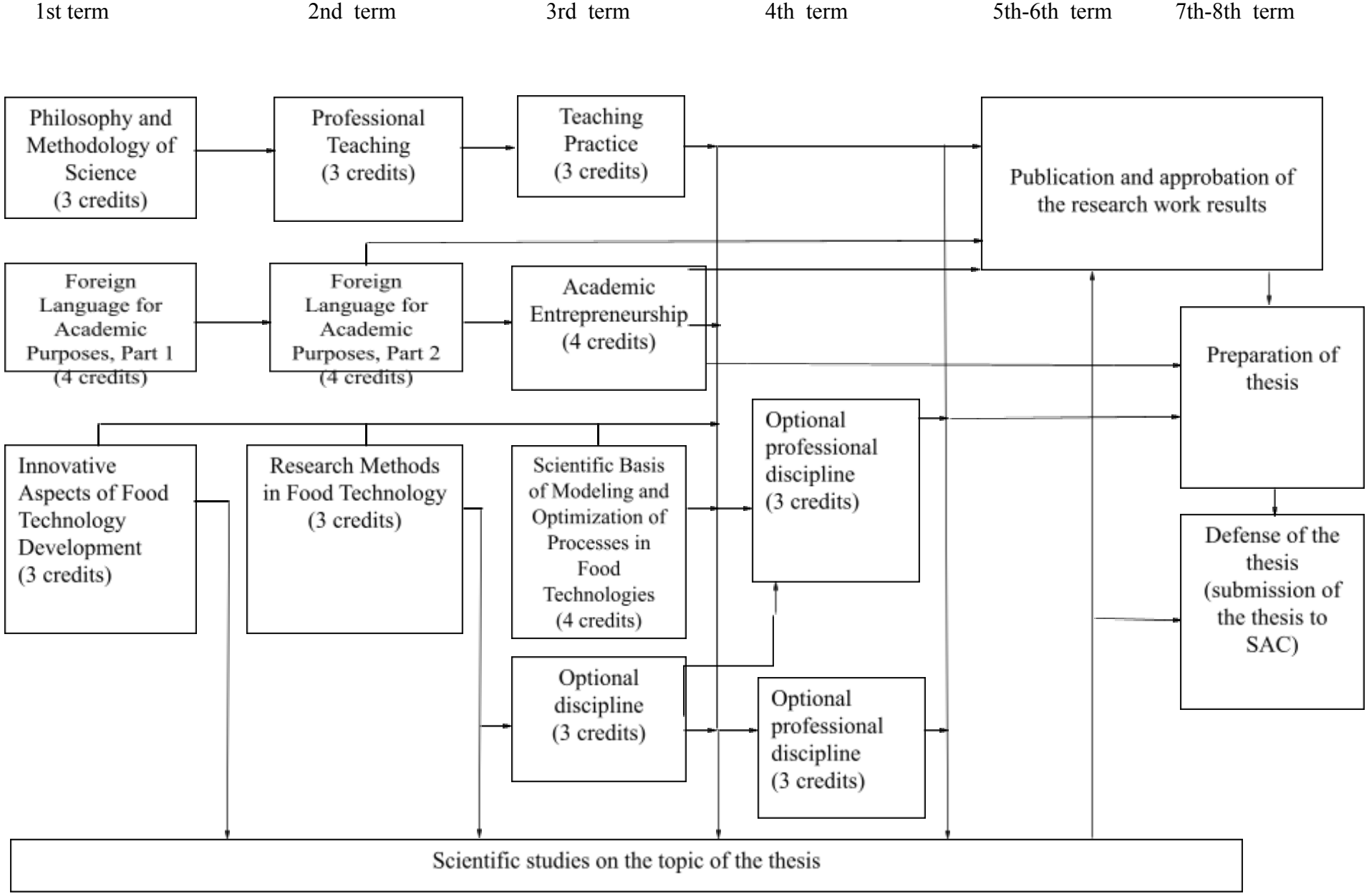
5. The matrix of providing program learning outcomes with the relevant components of the educational component

	RQ1.1.	RQ1.2.	RQ1.3.	RQ1.4.	RQ1.5.	RQ1.6.	RQ2.1.	RQ2.2.	RQ2.3.	OP1.1.	OP1.2	OP1.3.	OP1.4.	OP1.5	OP1.6.	OP1.7	OP1.8.	OP1.9	OP1.10	OP2.1.	OP2.2.	OP2.3.	OP2.4.	OP2.5.	OP2.6.	OP2.7.	OP2.8.	OP2.9.	OP2.10.	OP3.1
LO1	•	•	•	•						•				•		•	•	•												
LO2					•		•	•										•		•	•	•	•	•	•	•	•	•	•	
LO3	•			•				•								•		•												
LO4					•		•		•																					
LO5					•		•	•	•		•									•	•	•	•	•	•	•	•	•	•	•
LO6					•	•						•	•		•															
LO7								•					•		•	•		•												
LO8				•										•			•		•											

Conventional designations: RQi – mandatory discipline (required educational component), OPi – optional discipline, i – discipline number in the list of components of the educational component, LOm – program learning outcomes (knowledge, skills), m – number of the program outcome in the list of program outcomes of the educational component.

Structural and logical scheme of the educational and scientific program of the Doctor of Philosophy in the specialty

181 Food Technologies



II. SCIENTIFIC COMPONENT OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

A year of training	The content of the postgraduate student's research work	Type of assessment
1st year	The process of choice and justification of the topic of personal research, determination of the content, deadlines and scope of scientific work; choice and justification of the methodology of conducting personal scientific study, providing a review and analysis of existing views and approaches developed in modern science in the chosen direction. existing views and approaches developed in modern science in the chosen direction. Preparation and publication of at least 1 article in the specialized scientific publications (national or foreign) on the topic of research; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Approval of the postgraduate student's individual plan of work by the academic council of the institute, reporting on the progress of the postgraduate student's individual plan twice a year at the Department's scientific seminar.
2nd year	Under the guidance of a scientific supervisor, conducting personal scientific study, which involves solving research tasks by applying a complex of theoretical and empirical methods. Preparation and publication of at least 1 article in the specialized scientific publications (national or foreign) on the topic of research; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Reporting on the progress of the postgraduate student's individual plan twice a year at the Department's scientific seminar.

3rd year	Analysis and generalization of the obtained results of personal scientific study; substantiation of the scientific novelty of the obtained results, their theoretical and/or practical significance. Preparation and publication of at least 1 article in the specialized scientific publications (national or foreign) on the topic of research; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Reporting on the progress of the postgraduate student's individual plan twice a year at the Department's scientific seminar.
4th year	Introducing the scientific achievements of the postgraduate student in the form of a thesis, summarizing the completeness of the coverage of the results of the thesis in scientific articles in accordance with current requirements. Implementation of the obtained results and obtaining supporting documents. Submission of the documents for the preliminary examination of the thesis. Preparation of a scientific report for graduation certification (thesis defense).	Providing a conclusion on the scientific novelty, theoretical and practical significance of the results of the thesis. Presentation of the results of the completed thesis at the extended Department's scientific seminar. Submission of the thesis to a Specialized Academic Council.

The scientific component of the educational and scientific program involves conducting personal scientific research by a postgraduate student under the guidance of one or two academic supervisors and the preparation of the results in the form of a thesis.

The thesis for obtaining the degree of Doctor of Philosophy is an independent comprehensive study that offers a solution to a complex problem in the field of food technologies, in particular, technologies of fermentation products and winemaking, the results of which are characterized by scientific novelty and practical value and are published in relevant publications.

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

Preparation and publication of scientific articles, speeches at scientific conferences, participation in scientific seminars, round tables, and symposia are an integral part of the scientific component of the educational and scientific program of the postgraduate studies.

Research topics:

1. Creation of new and improvement of existing technologies of fermentation products.
2. Development of new methods of research of fermentation products, analysis of raw materials, semi-products and auxiliary materials of fermentation production.
3. Study of the composition and properties of raw materials, semi-products and auxiliary materials for the production of fermentation products during their long-term storage. Development of new and improvement of existing storage methods.
4. Intensification and optimization of technological processes of raw materials processing in order to increase the output and/or improve the quality of target products, reduce their cost due to resource and energy saving, in particular, the use of physical and chemical methods of influence.
5. Development of methods of use and processing of production waste in order to obtain new food products, sorbents, additives, biologically active substances, biofuel, biogas and fertilizers for the agricultural sector.
6. Development of scientific and practical foundations of technologies of fermentation products from non-traditional types of raw materials.
7. Improvement and optimization of technologies for microbial synthesis of biomass and biologically active substances, rational use of waste and secondary products of these industries, ensuring microbiological purity of finished products.
8. Intensification and optimization of technological processes of obtaining products of improved quality of the preventive direction, in particular, by introducing new strains of microorganisms and chemicals.
9. Providing aseptic conditions at the production stages of fermentation products.
10. Creation of technologies of fermentation products with a closed cycle of water, liquid and gaseous products.

III. CERTIFICATION OF POSTGRADUATE STUDENTS

Certification of holders of the educational degree of Doctor of Philosophy is obtained in the form of a public defense of the thesis.

The thesis for the degree of Doctor of Philosophy is an independent comprehensive study that offers a solution to a complex problem in the field of food technologies or at its edge with other specialties, which involves a profound reinterpretation of existing and the creation of new knowledge and/or professional practice.

The thesis should not contain academic plagiarism, falsification, fabrication.

The thesis must be published on the official website of the institution of higher education (scientific institution).