

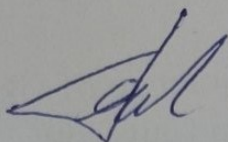
Ministry of Education and Science of Ukraine
Sumy National Agrarian University
Faculty of Food Technology
Department of Food Technology and Safety

Syllabus of the educational component

SC 9 Technology of special food products

Specialty	181 "Food Technology"
Educational program	Food technology
Level of higher education	First (bachelor's)

Developer:

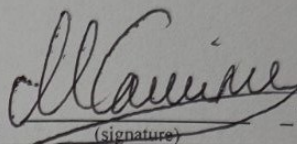


Anna HELIKH Ph.D., Assoc. Prof. of the Department of
Food Technologies and Safety
(surname, initials) (academic degree and title, position)

Reviewed and approved at the
meeting of the Department of
Food Technology and Safety
(name of department)

protocol dated 30.05.2025 № 19

Manager
departments

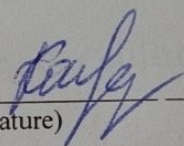


Maryna SAMILYK
(last name, initials)

Agreed:

Guarantor of the educational program

(signature)



Olena KOSHEL

(full name)

Acting Dean of the Faculty where
the educational program is implemented

(signature)

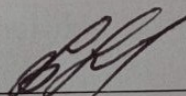


Nataliia BOLHOVA

(full name)

The review of the work program
was provided by Ph.D., Assoc. Prof.

(signature)



Vasyl Tyschenko

(full name)

Doctor of Philosophy, Associate Professor

(signature)

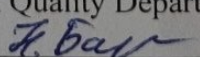


Nataliia BOLHOVA

(full name)

Methodologist of the Education Quality Department,
licensing and accreditation

(signature)



N. Baranik

(full name)

Registered in the electronic database: date: 26.06.2025

Information about reviewing the work program (syllabus):

[illegible]

1.	Name EC	SC 9 Technology of special food products		
2.	Faculty/department	Food Technology / Department of Food Technologies and Safety		
3.	Status EC	Selective		
4.	Program/Specialty (programs) that include ECfor (<i>filled in for mandatory EC</i>)	EP "Food Technologies", 181 Food Technologies		
5.	NRC level	6-th Bachelor's		
6.	Semester and duration of study	3-rdsemester, 15 weeks		
7.	Number of ECTS credits	5		
8.	Total hours and their distribution	Contact work (classes)		Independent work
		Lectures 30	Laboratory 60	60
9.	Language of instruction	English		
10.	Teacher/Educational Component Coordinator	Ph.D., associate professor Helikh A.O.		
11.1	Contact information	Anna Helikh, Associate Professor of the Department of Technologiesand Safety, 317a, e - mail: anna.helikh@snau.edu.ua		
11.	General description of the educational component	The discipline develops knowledge and skills in scientific fundamentals, modern production technologies, quality control and development of products for special dietary needs (e.g. dietary, functional). Students will learn to classify such products, justify the choice of raw materials, develop technologies and control quality, which will allow creating food products that meet the individual needs of consumers and promote health. .		
12.	Purpose of the educational component	formation of a system of theoretical knowledge and practical skills in students regarding scientific foundations, modern production technologies, quality control and development of special-purpose food products designed to meet the special dietary needs of different population groups.		
13.	Prerequisites for studying EC, connection with other educational components of EP	1. The educational component is the basis for the EP "Food Technologies": EC 33 Certification: performance and defense of qualification work.		
14.	Academic Integrity Policy	It is not allowed to copy the conclusions of the laboratory work protocols from each other, in such a case the laboratory work will be considered unprotected and will require re-revision. In case of re-revision, the work will not be evaluated for the maximum score.		
15.	Key words	Functional foods, nutraceuticals, food enrichment, novel food technologies, special dietary foods.		
16.	Course location on the Moodle platform	https://cdn.snau.edu.ua/moodle/course/view.php?ID=5650		

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

2. LEARNING OUTCOMES BY EDUCATIONAL COMPONENT AND THEIR RELATIONSHIP WITH PROGRAM LEARNING OUTCOMES

Learning outcomes in the discipline ¹	Program learning outcomes ²		How is RND assessed?
	PLO8	PLO29	
<u>DRN 1.</u> Understand the scientific basis, classification, composition, properties and specific requirements (including medical and biological) for food products for special purposes.	X		Oral defense of laboratory work Multiple-choice final test (modular assessment)
<u>DRN 2.</u> Apply knowledge of modern technologies and justify the choice of technological modes for the production of various groups of special-purpose food products (dietary, functional, for athletes, baby food, etc.).	X		Oral defense of laboratory work Multiple-choice final test (modular assessment)
<u>DRN 3.</u> Develop or adapt recipes and technological schemes for creating new types of specialty food products, as well as assess their quality and safety in accordance with current standards and consumer needs.		X	Oral defense of laboratory work Multiple-choice final test (modular assessment)

LIST OF COMPETENCES THAT WILL BE IMPROVED/ACQUIRED IN THE PROCESS OF NON-FORMAL EDUCATION

Course "Sustainable Food Security"

General: The presence of innovative perception in the culinary field. Specification in three types: 1. Perception of culinary innovations (new flavors, approaches, ingredients). 2. The ability to see the potential for innovation in traditional Thai recipes. 3. Ability to offer original culinary solutions based on Thai cuisine. Professional: Possession of a system of theoretical knowledge and practical skills in Thai cuisine; experience in applying knowledge to creatively solve culinary problems; awareness of one's own skills for innovative activities in the field of Thai cuisine.	Form for confirming learning results: A certificate of successful completion of training with the number of hours. The authenticity of the certificate can be verified by using the link on it.
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¹The list that is given in the work program under "to know, to be able to".

When defining the DNR in the work program, you can not highlight "know, be able to", but give a general list.

²indicate the PRN numbers as they are given in the OP.

MANDATORY! The PNRs listed in the appendix must match the "+" ones listed in the PNR and OK correspondence matrix of the educational program.

3. CONTENT OF THE EDUCATIONAL COMPONENT (COURSE PROGRAM)

Topic. List of issues to be addressed within the topic	Distribution within the overall time budget			Recommended reading ³
	Classroom work		Independent work	
	Lecture	Labs		
Module 1				
Lecture 1. Innovative food technology for redistributed manufacturing. Introduction. goal, scope and structure Plan: 1. Introduction 2. Goal, scope and structure.	2			[1,2,4,11,12,13]
Laboratory work 1. Comparison of different types of food additives when designing new types of vegetable and fruit drinks.		4		[1,2,4,6,10-14]
Independent work No. 1 Topic: Innovative food technology for redistributed manufacturing. Introduction. Goal, scope and structure			4	[1,2,4,11,12,13]
Lecture 2. RDM background. benefits and drivers for RDM implementations. Plan: 1. RDM Background 2. Benefits and drivers for RDM implementations	2			[1,2,4,6,7,9,10]
Laboratory work 2. Study of the process of color and aroma formation in the development of new recipes for canned fruit.		6		[1,2,4,11,12,13]
Independent work number 2 Topic: RDM background. benefits and drivers for RDM implementations.			6	[1,2,4,6,10-14]

³Specific source from the main or additionally recommended literature

Lecture 3.Process, product and system innovation. Plan: 1. Process, product and system innovation 2. Process innovation 3. Product innovation 4. System innovation 5. Common factors in future food innovations 5.1 Common factors influencing process and product innovation 5.2 Common factors influencing process and system innovation 5.3 Common factors influencing process, product and system innovations	2			[1,2,4,11,12,13]
Laboratory work 3. The influence of natural and artificial sweeteners on the formation of the taste of canned dietary products.		4		[1,2,4,6,7,9,10]
Independent work number 3 Topic:Process, Product and System Innovation.			4	[1,2,4,6,10-14]
Lecture 4.Food Technologies to Support RDM (Part 1) Plan: 1. Food technologies to support RDM 1.1 Re-distributed manufacturing assessment criteria 1.2 Physicochemical processing technology 1.2.1 Microwave technology 1.2.2 Ultrasound technology 1.2.3 High Pressure Processing technology 1.2.4 Cold Plasma technology 1.2.5 Innovative drying technology 1.2.6 Microfluidics technology	2			[1,2,4,6,10-14]
Laboratory work 4. The use of modern structure-forming agents in the production of fruit desserts with reduced energy value.		4		[1,2,4,11,12,13]
Independent work № 4 Topic: Redistributed manufacturing assessment criteria (Part 1)			4	[1,2,4,6,7,9,10]
Lecture 5.Food technologies to support RDM (Part 2) Plan: 1. Physical processing technology 1.1 Extrusion technology 1.2 Membrane emulsification technology 1.3 Additive Manufacturing technology 1.4 Nanotechnology 1.5 Modified Atmospheres technology 1.6 Robotics technology 2. Reflections on RDM assessment results	2			[1,2,4,6,7,9,10]

Laboratory work 5. Using complex mixtures of food additives in the design of new types of canned products.		4		[1,2,4,6,7,9,10]
Independent work No. 5 Topic: Redistributed manufacturing assessment criteria (Part 2)			4	[1,2,4,11,12,13]
Lecture 6. Research questions and challenges this support RDM. Plan: 1. Research questions and challenges this support RDM 1.1 Summary of research challenges in system, product and process innovation for RDM implementation 2. Concluding remarks	2			[1,2,4,6,10-14]
Laboratory work 6. Use of biologically active additives in the development of new types of canned products.		4		[1,2,4,6,7,9,14]
Independent work number 6 Topic: Summary of research challenges in system, product and process innovation for RDM implementation			4	[1,2,4,11,12,13]
Lecture 7.“FoodTech” solves food problems and creates new value. Plan: 1. Technological advances are accelerating food production industrialization 2. Aiming this eliminate food crises and food losses through food technology	2			[1,2,4,11,12,13]
Laboratory work 7. Development of a recipe and technology for a new type of functional drink using BAS.		4		[1,2,4,6,7,9,14]
Independent work number 7 Topic: Technology advances are accelerating food production industrialization			4	[1,2,4,11,12,13]
Total for module 1	14	30	30	
Module 2				
Lecture 8.Pulsed electric fields in the food industry: principles and applications. Plan: 1. Introduction:definition, historical context, relevance in non-thermal processing 2. Principles of PEF: mechanism of microbial inactivation (electroporation), tissue permeabilization 3. PEF System Components: pulse generators, treatment chambers (types,design). 4. Key Process Parameters. 5. Applications. 6. Advantages and Disadvantages.	2			[1,2,4,6,7,9,14]
Laboratory work 8. Study of the effect of pulsed electric field (PEF) on the quality and		2		[1,2,4,6,7,9,10]

microbiological safety of liquid food products.				
Independent work № 8 Topic: Pulsed electric fields (PEF) system components and key process parameters.			2	[1,2,4,11,12,13]
Lecture 9.Ohmic heating: technological aspects and prospects for use. Plan: 1. Introduction:definition, concept of volumetric heating. 2. Principles: joule's Law, electrical conductivity of foods, factors affecting heating rate. 3. Ohmic heating system design: electrodes (materials,configuration), power supply,insulation. 4. Applications: sterilization / pasteurization (especially liquids with particulates), blanching, thawing, extraction. 5. Advantages: rapid, uniform heating, potential quality benefits, reduced fouling 6. Disadvantages / Challenges. 7. Impact on food quality: nutrients, sensory properties. 8. Future prospects and research needs	2			[1,2,4,6,7,9,14]
Laboratory work 9. Study of the effectiveness of ohmic heating for pasteurization of food products with particles.		4		[1,2,4,11,12,13]
Independent work number 9 Topic: Ohmic heating applications and impact on food quality.			4	[1,2,4,6,7,9,14]
Lecture 10.Hurdle technology for ensuring microbiological stability of food products. Plan: 1. Introduction:concept, limitations of single preservation methods. 2. Principles: combining stress factors ("hurdles") to inhibit microbial growth. multi-target preservation. homeostasis disruption. metabolic exhaustion. 3. Types of hurdles:physical, chemical / physicochemical,microbial. examples of each. 4. Synergistic and additive effects between hurdles.examples. 5. Designing hurdle technology systems: identifying relevant hurdles, quantitative approaches, predictive microbiology. 6. Applications. 7. Advantages.	2			[1,2,4,11,12,13]
Laboratory work 10. Development and justification of a barrier system to ensure the stability of a model food product.		4		[1,2,4,6,7,9,14]
Independent work No. 10 Topic: Types of hurdles and their application in			4	[1,2,4,6,7,9,10]

different food categories.(<i>NEW TOPIC, created by AI</i>)				
Lecture 11.Sensory analysis of products made using innovative technologies. Plan: 1. Introduction: importance of sensory properties, specific challenges with novel technology. 2. Overview of sensory evaluation methods: analytical tests (discrimination, descriptive analysis), affective / hedonic tests. 3. Panel selection,training, and management. 4. Specific considerations for novel foods / technologies. 5. Case Studies. 6. Linking sensory data with instrumental measurements. 7. Best practices and limitations	2			[1,2,4,11,12,13]
Laboratory work 11. Conducting sensory analysis (descriptive test) of food products manufactured using innovative technologies.		4		[1,2,4,6,7,9,14]
Independent work No. 11 Topic: Sensory evaluation methods for novel food products.			4	[1,2,4,11,12,13]
Lecture 12.Consumer perception studies of novel food products and technology. Plan: 1. Introduction: defining consumer perception and acceptance, role in market viability 2. Factors influencing acceptance: food neophobia, perceived risks vs. benefits,trust, information &framing, psychological & socio-demographic factors. 3. Methodologies for studying perception: quantitative (surveys, choice experiments), qualitative (focusgroups,interviews), mixed & implicit methods. 4. Case Studies: gMOs, nanotechnology, cultivated meat, insect-based food. 5. Strategies for improving consumer acceptance	2			[1,2,4,6,7,9,10]
Laboratory work 12. Survey and analysis of consumer preferences for a new type of specialty food product.		4		[1,2,4,11,12,13]

Independent work No. 12 Topic: Factors influencing consumer acceptance of novel food technology and case studies.			4	[1,2,4,6,7,9,10]
Lecture 13.Biodegradable and edible packaging materials: development and application. Plan: 1. Introduction: environmental impact of conventional plastics, need for sustainable alternatives. 2. Definitions:biodegradable,compostable, edible packaging.bioplastics. 3. Types of biodegradable materials: polysaccharide-based, protein-based, lipid-based, biopolyesters . source and properties. 4. Edible movies and coatings: formulation principles, application methods,functionality. 5. Processing technology for bio-based packaging:extrusion,thermoforming,casting. 6. Properties and performance. 7. Applications in food packaging. 8. Advantages and challenges	2			[1,2,4,6,7,9,14]
Laboratory work 13. Production and evaluation of properties of edible films based on natural polymers.		4		[1,2,4,6,7,9,10]
Independent work № 13 Topic: Types and properties of biodegradable and edible packaging materials.			4	[1,2,4,11,12,13]
Lecture 14.Active and intelligent packaging: functions and examples of use. Plan: 1. Introduction: moving beyond passive containment; defining active vs. intelligent packaging. 2. Active packaging:definition,purpose, technologies (O2/ Ethylene / Moisture /CO2 control, antimicrobial / antioxidant release, flavor / odor control), formats. 3. Intelligent packaging:definition,purpose, technologies (indicators - tote,freshness; sensors - gas,bio; data carriers - RFID, NFC, QR). 4. Applications for specific food categories. 5. Benefits. 6. Regulatory considerations and consumer acceptance.	2			[1,2,4,6,7,9,10]
Laboratory work 14. Evaluation of the effectiveness of oxygen-absorbing sachets for extending the shelf life of food products.		4		[1,2,4,6,7,9,14]
Independent work № 14 Topic: Active packaging technology and their applications.			4	[1,2,4,6,7,9,10]
Lecture 15.Encapsulation technology for	2			[1,2,4,6,7,9,14]

delivery of biologically active substances in food products. Plan: 1. Introduction: definition, goals (protection, controlled release, masking, solubility / bioavailability). 2. Components: core material (bioactive), wall material (types, selection) criteria). 3. Encapsulation techniques: physical methods, chemical / physicochemical methods. 4. Characterization of micro / nano-capsules: size, morphology, efficiency, stability, release profile. 5. Target bioactive compounds. 6. Release mechanisms. 7. Applications in food products. 8. Challenges					
Laboratory work 15. Microencapsulation of oil by simple emulsification method and evaluation of emulsion stability.			4		[1,2,4,6,7,9,10]
Independent work No. 15 Topic: Encapsulation techniques and their applications for bioactive compounds.				4	[1,2,4,6,7,9,14]
Total for 2 Module		16	30	30	
Informal education					
Food Safety Course Course program: Topic 1. Introduction Topic 2: Potential production Topic 3: Production with limited resources using water	5	https://courses.agriacademy.org/courses/course-v1:EBRD+PLANT101+2022_T3/course/			
Total		30	60	60	

4. TEACHING AND LEARNING METHODS

DRN	Teaching methods (work that will be carried out by the teacher <u>during classroom lessons</u> , consultations)	Number of hours	Teaching methods (what types of learning activities should <u>the student perform independently</u>)	Number of hours
DRN 1. Understand the scientific basis, classification, composition, properties and specific requirements (including medical and biological) for food products for special purposes.	Problem lectures (Questions are raised regarding the material covered by the teacher, but the lecturer answers them himself, to focus students' attention on the main point) Presentations (demonstration of information on the topic of lectures)	10	Laboratory classes (performing tasks according to methodological instructions) Brainstorming while doing lab work Individual tasks (independent processing of the information proposed by the teacher)	20
DRN 2. Apply	Problem lectures (Questions are raised	10	Laboratory classes (performing tasks according to	20

knowledge of modern technologies and justify the choice of technological modes for the production of various groups of special-purpose food products (dietary, functional, for athletes, baby food, etc.).	regarding the material covered by the teacher, but the lecturer answers them himself, to focus students' attention on the main point) Presentations (demonstration of information on the topic of lectures)		methodological instructions) Brainstorming while doing lab work Individual tasks (independent processing of the information proposed by the teacher)	20
DRN 3. Develop or adapt recipes and technological schemes for creating new types of specialty food products, as well as assess their quality and safety in accordance with current standards and consumer needs.	Problem lectures (Questions are raised regarding the material covered by the teacher, but the lecturer answers them himself, to focus students' attention on the main point) Presentations (demonstration of information on the topic of lectures)	10	Laboratory classes (performing tasks according to methodological instructions) Brainstorming while doing lab work Individual tasks (independent processing of the information proposed by the teacher)	20

5. EVALUATION BY EDUCATIONAL COMPONENT

5.1.Diagnostic assessment (indicated as needed)

5.2.Summative assessment

5.2.1. To assess the expected learning outcomes, there are

No.	Summative assessment methods	Points / Weight in the overall score	Date of compilation
	Module 1 (50 points):		
1	Oral defense of laboratory works (7works, 3 point each)	21 points / 21%	within 5 days after class
2	Midterm testing (multiple choice test)	29 points / 29%	week 7
	Module 2 (50 points):		
3	Laboratory work defense (8works, 3 point each)	24 points / 24%	within 5 days after class
4	Midterm testing (multiple choice test)	26 points / 26%	week 15
5	Exam (multiple choice test)	30 test questions, each worth 1 point	By week 15
6	Completion of training on Prometheus	5 points / 5%	By week 15

5.2.2. Evaluation criteria

<i>Component</i>	<i>Good</i>	<i>Perfectly</i>
<i>Laboratory work defense (For one laboratory work)</i>	<i>2 points</i>	<i>3 point</i>
	<i>All task requirements met</i>	<i>Fulfilled all the requirements of the task, demonstrated creativity, thoughtfulness, proposed their own solution to the problem</i>
<i>Module 1 (50 points)</i>		
<i>Laboratory work protection</i>	<i>7 laboratory works, 3 point each (if completed – 21 points in total)</i>	
<i>Midterm testing (multiple choice test)</i>	<i>The test includes 29 questions, each of which is worth 1 point.</i>	
<i>Module 2 (50 points)</i>		
<i>Laboratory work protection</i>	<i>8 laboratory works, 3 point each (if completed – 24 points in total)</i>	
<i>Midterm testing (multiple choice test)</i>	<i>The test includes 26 questions, each of which is worth 1 point.</i>	
<i>Exam (multiple choice test)</i>	<i>30 test questions, each worth 1 point</i>	
<i>Completion of Prometheus training</i>	<i>Obtaining a certificate and identifying it with a trusted link (total 5 points)</i>	

5.3. Formative assessment:

To assess current progress in learning and understand areas for further improvement,

No.	Elements of formative assessment	Date
1	Oral survey after studying all topics, during laboratory classes	within 5 days after class
2	Feedback in the form of a discussion of the final testing	7, 15 weeks
3	Feedback in the form of a discussion of an individual assignment	up to 15 weeks
4	Feedback in the form of a discussion of exam testing	Up to 15 weeks

6. LEARNING RESOURCES (LITERATURE)

Educational and methodological literature

1. **Special food technologies.** A textbook in a foreign language for students of the educational institution "Food Technologies" of full-time and part-time forms of obtaining higher education "Bachelor" / compiled by A.O. Helikh - Sumy: SNAU, 2025. - 340 p.
2. **Special food technologies.** Lecture notes for students of education in a foreign language for the OPP "Food Technologies" full-time and part-time forms of obtaining education for the degree of higher education "Master" / compiled by A.O. Helikh - Sumy: SNAU, 2024. - 95 p.
3. **Special food technologies.** Methodological recommendations for performing laboratory work in a foreign language for students of the OPP "Food Technologies" of full-time and

part-time forms of obtaining education for the educational and scientific degree of higher education "Master" / compiled by A.O. Helikh - Sumy: SNAU, 2024. - 85 p.

4. **Special food technologies.** Methodological recommendations for independent work in a foreign language for students of the educational institution "Food Technologies" of full-time and part-time forms of obtaining higher education "Master" / compiled by A.O. Helikh - Sumy: SNAU, 2024. - 86 p.

Recommended reading

5. **Helikh A., & Filon, A. (2025).** Study of the amino acid profile of alternative proteins (Helix pomatia, Lissachatina fulica, Helix aspersa) and their potential application in a healthy diet: optimization of a modern brandade recipe. *Technology Audit and Production Reserves*, 2 (3(82)), 71–79. <https://doi.org/10.15587/2706-5448.2025.326896> (Scopus)

6. Liu, Y., **Helikh, A.O.**, Filon, A.M., Tang, X.-X., Duan, Z.-H., Ren, A.-Q. (2024). Beetroot Beta vulgaris L. var. conditiva Alef.) pretreated by freeze-thaw: influence of drying methods on the quality characteristics. *CYTA- Journal of Food*, 22(1), 1-12. <https://doi.org/10.1080/19476337.2023.2295421>

7. Gao, D., **Helikh, A.**, Duan, Z., & Xie, Q. (2023). Thermal, structural, and emulsifying properties of pumpkin seed protein isolate subjected this pH shifting treatment. *Journal of Food Measurement and Characterization*, 17(3), 2301-2312. <https://doi.org/10.1007/s11694-022-01776-6>

8. Liu, Y., **Helikh, A.**, Filon, A., & Duan, Z. (2023). Sausage technology for food sustainability: recipe, color, nutrition, structure. *Eastern-European Journal of Enterprise Technologies*, 4(11(124)), 47-58. <https://doi.org/10.15587/1729-4061.2023.286323>

9. **Helikh, A.**, Gao D., Zhenhua D. Development of pumpkin seed meal biscuits. *Eastern-European Journal of Enterprise Technologies*, 2022, 2/11, (116), p. 36-42 (Scopus)

10. **Helikh A.** Choice justification of dairy raw materials according to indicators of their structure for obtaining selenium-protein dietary supplements / Helikh A., Primenko V. // *Journal of chemistry and technologies*. – 2022/ – No. 30 (1). – R. 79-87. – modeaccess <http://chemistry.dnu.dp.ua/issue/view/15177> (Scopus)

11. **Helikh A. (2025).** Low-allergenic shortbread cookies enriched with cassava powder and alternative protein for military nutrition. *Biota. Human. Technology*. 2025. No. 1. P. 148-160. DOI: [10.58407/bht.1.25.9](https://doi.org/10.58407/bht.1.25.9)

12. **Helikh, A., Yunfen, P. (2025).** Modeling the technology of cooked minced meat products using alternative proteins. *Innovations and technologies in the field of services and food*, (1 (15)), 10-15. [https://doi.org/10.32782/2708-4949.1\(15\).2025.2](https://doi.org/10.32782/2708-4949.1(15).2025.2)

13. **Helikh, A. O. (2025).** Research on the quality indicators of sauces using alternative proteins for military food. *Tavria Scientific Bulletin. Series: Technical Sciences*, (1), 294-303. <https://doi.org/10.32782/tnv-tech.2025.1.29>

14. Food Chemistry. Yevlash V.V., Toryanyk O.I., Kovalenko V.O., Aksyonova O.F., Otroshko N.O., Kuznetsova T.O., Pavlotska L.F., Toryanyk D.O. World of Books. 2024.

15. Hubskeyi Y.I. Biological Chemistry. –Kyiv-Vinnytsia: NOVA KNYGA, 2022. –656 p.

16. Ecotrophology. Fundamentals of ecologically safe nutrition: a teaching manual / Scientific editor T.M. Ditman. – K.: Libra, 2023. – 304 p.

17. William Marshall, Marta Lapsley, Andrew Day, Kate Shipman. Clinical Chemistry. – Elsevier, 2023, - 432

18. Marintsova N.G. Biological chemistry: textbook / N.G. Marintsova, S.V. Polovkovich, V.P. Novikov. – Lviv: Lviv Polytechnic Publishing House, 2023. – 336 p.

15. Information resources

<https://cdn.snau.edu.ua/moodle/course/view.php?id=5650>

