

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

Syllabus of the educational component

EC 8, EC 9 THEORETICAL FOUNDATIONS OF FOOD PRODUCTION

Implemented within the educational program
G– Engineering, Manufacturing and Construction
in specialty **G13 - Food Technology**
at the first (bachelor's) level of higher education

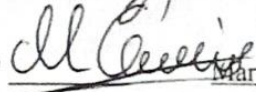
Developer: 

Tetiana NAUMENKO, Assistant of the Department of Food Technology

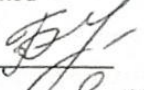
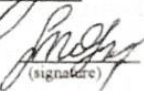
Reviewed, approved and approved on Meetings departments <u>food technology</u> (name of department)	protocol dated 02.06.2026 No. <u>21</u>
	Manager departments  (signature) <u>Oksana MELNYK</u> (last name, initials)

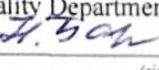
Agreed:

Guarantor of the educational program "Food Technologies"  Olena KOSHEL
(signature) (full name)

Guarantor of the educational program
"Craft technologies and gastronomic innovations"  Maryna SAMILIK
(signature) (full name)

Dean of the Faculty of Food Technology,
where the educational program is implemented  Nataliia BOLHOVA

Review of the work program provided by:  Serhii BOKOVETS (attached)
 Oksana MELNYK (attached)

Methodologist of the Education Quality Department,
licensing and accreditation  N. Baranik
(signature)

Registered in the electronic database: date: 30.06 2026.

Information about reviewing the work program (syllabus):

[illegible]

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	EC	EC Theoretical foundations of food production							
2.	Faculty/department	Faculty of Food Technology, Department of Food Technology							
3.	Status EC	Mandatory							
4.	Program/Specialty(s) that include OK for	EVP "Food Technologies" EVP " Craft Technologies and Gastronomic Innovations"							
5.	NQF level	Level 6							
7.	Semester and duration Study	Full-time HT, CTGI – 3th semester . Duration of study – 1 5 weeks Full-time HT Shortened programme. Duration of study – 1 5 weeks							
8.	Number of credits ECTS	5 credits							
9.	Total hours and their distribution	Contact work (classes)						Independent work Lectures	
		Lectures		Practical /seminar		Laboratory			
		Daily	Abroad	Daily	Abroad	Daily	Abroad	Daily	Abroad .
		30	-	-	-	44	-	76	-
10.	Language of instruction	Ukrainian, english							
11.	Teacher/Coordinator educational component	Tetiana Anatoliivna Naumenko							
11.1	Contact information	t.yarmosh.phd@snau.edu.ua							
12.	General description educational component	The educational component is designed to study the behavior of food constituents under the influence of technological factors during food production processes, the factors affecting changes in the properties of food systems, and the relationships between food quality indicators.							
13.	The purpose of education Component	The educational component aims to provide students with theoretical knowledge of the composition and properties of food products, the design of food processing operations, technological factors determining culinary readiness, the selection of scientifically justified methods of technological treatment of food systems, and the patterns of changes in food products and their constituents under the influence of technological factors.							
14.	Prerequisites for studying EC, connection with other educational components of the EVP	The educational component serves as a foundation for the further study of the following courses: gastronomic innovations, craft technologies of milk and dairy products, craft technologies of meat products and fish processing, food technologies, craft technologies of bread, bakery, pasta, confectionery products and food concentrates, and craft technologies of vegetable oils, canned vegetables and fruits.							
15.	Academic policy Virtue	The study of this educational component is based on the principles of academic integrity and compliance with the requirements of the Regulations on Academic Integrity of Sumy National Agrarian University. Students are required to complete all types of academic work independently and must not engage in plagiarism, self-plagiarism, fabrication, falsification, cheating, or any other forms of academic misconduct. Laboratory reports, individual assignments, and other written works containing signs of academic dishonesty or found to be identical to those of other students will not be accepted and must be revised and resubmitted for assessment. Violations of academic integrity during continuous or final assessment result in academic liability in accordance with the University's regulations. Depending on the nature of the violation, students may be required to repeat the relevant assignment or retake the final assessment (examination).							
16.	Link to the course in Moodle system	https://cdn.snau.edu.ua/moodle/enrol/index.php?id=5851							
17.	Key words	Food industry, proteins, fats, carbohydrates, technological process, functional properties, food systems, colour, extraction, food colourants.							

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

Learning outcomes for EC: After studying the educational component, the student is expected to be able to... »	Program learning outcomes, the achievement of which is aimed at the EC (indicate the number according to the numbering given in the profile of the OPP Food Technologies)				How is the DRE assessed?
	PLO 5	PLO 6	PLO 11	PLO 19	
DLO 1. Know the major changes that occur in food products during processing and the most effective methods for controlling these changes in the desired direction. Evaluate the properties of the main nutrients and food products.	+	+			<i>Preparation and defence of laboratory reports; module tests; preparation of conference abstracts and participation in scientific conferences.</i> <i>Exam</i>
DLO 2. Demonstrate knowledge of the scientific and theoretical foundations of classical and modern food processing technologies and processes, as well as the methods of their practical implementation.	+				
DLO 3. Demonstrate knowledge of the main food processing methods and their impact on the quality of finished food products.			+		
DLO 4. Analyse food processing operations in terms of the changes occurring during technological processing under the influence of various technological factors.	+			+	
DLO 5. Apply the principal methods for investigating physicochemical, chemical, biochemical, and microbiological processes; interpret and integrate the obtained results into professional practice; and present the results of scientific research and industrial studies in the form of scientific papers and conference proceedings.		+	+	+	

Learning outcomes for EC: After studying the educational component, the student is expected to be able to... »	Program learning outcomes, the achievement of which is aimed at the EC (indicate the number according to the numbering given in the profile of the OPP Food Technologies)					How is the DRE assessed?
	PLO 1	PLO 5	PLO 6	PLO 18	PLO 19	
DLO 1. Know the major changes that occur in food products during processing and the most effective methods for controlling these changes in the desired direction. Evaluate the properties of the main nutrients and food products.	+	+				Preparation and defence of laboratory reports; module tests; preparation of conference abstracts and participation in scientific conferences. Exam
DLO 2. Demonstrate knowledge of the scientific and theoretical foundations of classical and modern food processing technologies and processes, as well as the methods of their practical implementation.	+					
DLO 3. Demonstrate knowledge of the main food processing methods and their impact on the quality of finished food products.			+			
DLO 4. Analyse food processing operations in terms of the changes occurring during technological processing under the influence of various technological factors.	+			+		
DLO 5. Apply the principal methods for investigating physicochemical, chemical, biochemical, and microbiological processes; interpret and integrate the obtained results into professional practice; and present the results of scientific research and industrial studies in the form of scientific papers and conference proceedings.		+	+	+	+	

3. CONTENT EDUCATIONAL COMPONENT (PROGRAM ACADEMIC DISCIPLINE)

Topic. List of issues to be addressed within the topic	Distribution within the overall time budget			Recommended reading
	Classroom work		Independent work	
	Lectures	Lab .		
Module 1				
LC 1. Introduction. Purpose, objectives, and basic concepts of the course 1. Prospects for the development and key objectives of the food industry in Ukraine. 2. Purpose, object, subject, and objectives of the course. 3. Classification of food constituents and food products. Laboratory Work 1. General characteristics and interrelationships of food production industries. IW 1. Fundamental technological concepts and	2 -	4	6	[1-14]

definitions.				
LC 2. Proteins and Changes in Their Properties under the Influence of Food Processing 1. General characteristics of proteins, classification, and levels of structural organization. 2. Functional properties of proteins. 3. Properties of proteins of different origins and their changes under the influence of technological factors. IW 2. 1. Protein modification. 2. Types and purposes of protein modification. Laboratory Work 2. Effect of heat treatment on colloidal systems.	2 -	4	5	[1-14]
LC 3. Food Products as Sources of Protein 1. Proteins of traditional food products. 2. Novel protein foods. 3. Functional and technological properties of protein products obtained from plant raw materials. 4. Promising protein sources. IW 3. 1. Functional and technological properties of protein products obtained from plant raw materials. 2. Alternative and promising protein sources. Laboratory Work 3. Effect of technological factors on the hydration properties of proteins.	2 -	4	5	[1-14]
LC 4. Fats and Changes in Their Properties under the Influence of Food Processing 1. General characteristics and classification of fats. 2. Functional and technological properties of fats. 3. Changes in fats during storage and under the influence of technological factors. 4. Study of the properties of fats and oils and investigation of the effects of technological factors on changes in their quality indicators. IW 4. 1. Fat modification. 2. Types and purposes of fat modification. Laboratory Work 4. Determination of the properties of lipids.	2	4	5	[1-14]
LC 5. Food Products as Sources of Fats 1. Characteristics of animal- and plant-based fats and fat products. 2. Enzymatic oxidation of lipids in milk and dairy products, meat, fish, and vegetables. 3. Effects of heat treatment on the properties, nutritional value, and biological value of fats. 4. Types of fat spoilage. IW 5. 1. Methods for fat stabilization. 2. Assessment of the degree of lipid oxidation and oxidative stability of fats.	2	-	5	[1-14]

LC 6. Changes in Mono- and Oligosaccharides during Food Processing 1. General characteristics of carbohydrates: classification, structure, and physiological significance. 2. Functional and technological properties of mono- and oligosaccharides. IW 6. 1. Study of the properties of carbohydrates and their changes under the influence of technological processing. 2. Transformations of mono- and oligosaccharides during food processing. Laboratory Work 5. Determination of the properties of carbohydrates.	2	4	5	[1-14]
Module 2				
Lc 7. The role of polysaccharides in food processing 1. Characteristics of polysaccharides in food products. 2. Functional and technological properties of starch and its role in food processing. 3. Dietary fibre: structure, properties, and role in food processing. IW 7. 1. Application of modified starches in the food industry. Laboratory Work 6. Investigation of the effects of technological factors on starch gelatinization.	2	4	5	[1-14]
Lc 8. Water and its role in food processing 1. Water as a solvent and extraction medium. 2. Structure and properties of water. 3. Water activity. IW 8. 1. Classification and characteristics of the forms of moisture binding. 2. Water in food products. Laboratory Work 7. Determination of the moisture content of food products.	2	4	5	[1-14]
LC 9. Vitamins and Minerals in Food Processing 1. Vitamins: general characteristics and classification. 2. Water-soluble and fat-soluble vitamins, vitamin-like compounds, and provitamins. 3. Technological factors affecting vitamin degradation. 4. Minerals: general characteristics and classification. 5. Nutritional, physiological, and technological significance of minerals. IW 9. 1. Properties of minerals. 2. Study of the effects of technological factors on the properties of hydrocolloids of various origins and the gels based on them. 3. Application of vitamins and minerals in food	2	-	5	[1-14]

technologies.				
LC 10. Enzymes in the Food Industry 1. General characteristics, classification, and properties of enzymes. 2. Structure and mechanism of enzyme action. 3. Factors affecting enzyme activity. IW 10. 1. Characteristics of enzymes used in the food industry.	2	-	5	[1-14]
LC 11. Food Products as Disperse Systems 1. Classification of disperse systems in food products. 2. Liquid food products. 3. Gels. 4. Emulsions. 5. Foams. IW 11. 1. Study of the effects of technological factors on the formation of the consistency of food products. 2. Powders. 3. Suspensions. Laboratory Work 8. Effects of technological factors on the foaming capacity and foam stability.	2	4	5	[1-14]
LC 12. Structural and mechanical properties of food systems 1. Basic concepts of rheology. 2. Effects of technological factors on the structural and mechanical properties of food products. IW 12. 1. Methods and instruments for determining the structural and mechanical properties of food products. Laboratory Work 9. Study of the properties of food additives used to regulate the texture of food products.	2	4	5	[1-14]
LC 13. Fermentative microorganisms and fermentation 1. Microorganisms used in the food industry: classification and general characteristics. 2. Yeasts. IW 13. 1. Microorganisms responsible for lactic acid fermentation. 2. Acetic acid fermentation and the microorganisms responsible for it. Laboratory Work 10. Sensory and physicochemical evaluation of yeast quality.	2	4	5	[1-14]
LC 14. Colour, Taste, and Aroma of Food Products 1. Colour formation during food production. 2. Characteristics of food colourants. 3. Taste and aroma of food products. IW 14. 1. Compounds affecting the taste of food products. 2. Characteristics of aroma compounds in food products. Laboratory Work 11. Study of the properties of	2	4	5	[1-14]

natural food colourants.				
LC 15. Theoretical foundations of preventing the spoilage of raw materials and food products during storage 1. Raw materials as storage objects. 2. Mass losses and quality losses of raw materials. 3. Physicochemical processes. 4. Biochemical processes. 5. Theoretical foundations of the circular economy in food production: scientific approaches to resource conservation and waste minimization. IW 15. 1. Biological processes. 2. Internal and external factors affecting the storage of raw materials. 3. Biosis, anabiosis, and abiosis.	2	-	5	[1-14]
Всего	30	44	76	

4. TEACHING AND LEARNING METHODS

DLO	Teaching methods (work that will be carried out by the teacher <u>during classroom lessons</u> , consultations)	Number of hours (day / night)	Teaching methods (what types of learning activities should <u>the student perform?</u> <u>independently</u>)	Number of hours (days / weeks)
DLO 1	Lecture class (lectures, guided discussions, and presentation of visual materials).	74	Review of lecture materials and preparation of structured lecture notes.	76
DLO 2	Laboratory class (demonstration of diagrams and figures, and laboratory experiments).		Presentation of laboratory results and preparation of laboratory reports.	
DLO 3	Lecture class (lecture presentation, guided discussion, and demonstration of visual materials).		Review of lecture materials and preparation of structured lecture notes.	
DLO 4	Lecture class (delivery of lecture material, guided discussion, and demonstration of visual materials).		Review of lecture materials and preparation of structured lecture notes.	
DLO 5	Laboratory class (demonstration of technological flow diagrams and laboratory experiments).		Presentation of the results of laboratory work and preparation of laboratory reports.	

5. EVALUATION BY EDUCATIONAL COMPONENT

5.1. Diagnostic assessment (indicated as appropriate)

5.2. Summative assessment

5.2.1 For the assessment of expected learning outcomes, there are

No.	Summative methods evaluation	Points	Date drafting
Module 1 (35 points):			
1.	Intermediate testing (multiple choice test)	20 points	after each laboratory occupation
2.	Completion and defence of laboratory work (5 laboratory works). One laboratory work – 3 points.	15 points	after study topics 1-6

Модуль 2 (35 балів)			
3.	Intermediate testing (multiple choice test) choice)	17 points	after study topics 7-15
4.	Completion and defence of laboratory work (6 laboratory works). One laboratory work – 3 points.	18 points	after each laboratory occupation
5.	<i>Preparation and publication of a conference abstract, and participation in a scientific conference (optional).</i>	15 points	By the end of Week 14.
6.	Exam	30 points	According to the schedule.

5.1.2 Критерії оцінювання

Component ¹	Unsatisfactorily	Satisfactorily	Good	Perfectly ²
Defence of a laboratory work (per laboratory work).	0 балів <i>The student completed the laboratory work but did not defend it.</i>	1 бал <i>Most requirements have been met, but some components are missing.</i>	2 балів <i>All task requirements have been met.</i>	3 бали <i>All task requirements have been met. Critical thinking has been demonstrated, and an original solution to the problem has been proposed.</i>
Testing (multiple-choice test)	<i>The test consists of 18/20 multiple-choice questions, each worth 1 point.</i>			
Participation in an international or national scientific conference (additional credit).	<i>A student who participates in an international or national scientific conference and provides a certificate of participation is awarded 5 additional points</i>			
Preparation of a conference abstract (additional credit activity).	<i>Preparation of a conference abstract is awarded 10 additional points.</i>			

5.2. Formative assessment

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

№	Елементи формативного оцінювання	Date
Autumn semester		
1.	<i>Midterm assessment (knowledge assessment after completing Topics 1–7).</i>	<i>Week 7</i>
2.	<i>Midterm assessment (knowledge assessment after completing Topics 8–14).</i>	<i>Week 14</i>
3.	<i>Oral questioning during each laboratory class, laboratory work defence, and consultations on conference abstract preparation.</i>	<i>Throughout Weeks 1–14</i>
4.	<i>Instructor feedback during preparation for the test.</i>	<i>Week 8</i>
5.	<i>Instructor feedback during the review of examination questions.</i>	<i>Week 14</i>

Autumn Semester. Form of final assessment: Examination. The final grade for the course (maximum 100 points per semester) is determined as the sum of the points earned by the student throughout the semester. A student is not eligible to take the final examination if they have missed and failed to make up more than 20% of the classes, have not completed the required midterm assessments, have failed to complete the mandatory coursework (laboratory work and specified individual assignments) передбачених by the course syllabus, or have obtained an unsatisfactory semester rating (0–41 points).

¹ Specify the summative assessment component

² Indicate the distribution of points and the criteria that determine the level of assessment

1. LEARNING RESOURCES (LITERATURE)

6.1. Main sources

1. Naumenko, T. A. Theoretical Foundations of Food Production : methodological guidelines for lecture classes for students of the Educational Programme "Food Technologies", full-time and part-time Bachelor's degree programmes / T. A. Naumenko. Sumy : Sumy National Agrarian University, 2025. – p.

2. Theoretical Foundations of Food Production : methodological guidelines for laboratory classes for students of the Educational Programme "Food Technologies", full-time and part-time Bachelor's degree programmes / comp. by D. O. Bidiuk, F. V. Pertsevyi, T. A. Yarmosh. Sumy : Sumy National Agrarian University, 2025. 97 p.

3. Theoretical Foundations of Food Production : methodological guidelines for independent study for students of the Educational Programme "Food Technologies", full-time and part-time Bachelor's degree programmes / comp. by T. A. Naumenko. Sumy : Sumy National Agrarian University, 2025. – p.

4. Blishch, R. O. *Theoretical Foundations of Food Technologies* : textbook / R. O. Blishch. Lviv : Levada, 2025. 139 p.

5. Zubar, N. M. *Theoretical Foundations of Food Production* : textbook / N. M. Zubar. Kyiv : Kondor Publishing House, 2025. 304 p.

6. . Melnyk, O., Yarmosh, T. Development of jelly marmalade using vegetable raw materials. *Bulletin of Sumy National Agrarian University. Series: Mechanization and Automation of Production Processes*. 2023. No. 2. P. 44–49. DOI: [10.32782/msnau.2023.2.7](https://doi.org/10.32782/msnau.2023.2.7)

7. . Yarmosh T., Pertsevyi F. Effect of technological factors on the yield of colouring compounds from black elderberry pomace. *Taurian Scientific Bulletin. Series: Technical Sciences*. 2024. No. 3. P. 151–163. DOI: [10.32782/tnv-tech.2024.3.16](https://doi.org/10.32782/tnv-tech.2024.3.16)

8. Yarmosh T. A., Pertsevyi F. V. Study of the efficiency of glycerol for extracting colouring compounds from black elderberry. *Scientific Bulletin of Tavria State Agrotechnological University*. 2024. Vol. 14, No. 1. DOI: <https://doi.org/10.32782/2220-8674-2024-24-1-16>

9. Yarmosh T. A., Pertsevyi F. V., Marenkova T. I. Study of the efficiency of sorbitol and xylitol for extracting colouring compounds from black elderberry. *Scientific Bulletin of Tavria State Agrotechnological University*. 2024. Vol. 14, No. 1. DOI: <https://doi.org/10.32782/2220-8674-2024-24-1-21>

10. Yarmosh T. A., Pertsevyi F. V. Technology for obtaining an anthocyanin colourant from black elderberry pomace. *Taurian Scientific Bulletin. Series: Technical Sciences*. 2025. No. 1. P. 497–507. DOI: <https://doi.org/10.32782/tnv-tech.2025.1.51>

11. Yarmosh T., Pertsevoi F., Marenkova T. Investigating polyols to improve the efficiency of extracting anthocyanins from elderberry (*Sambucus nigra* L.) pomace. *Eastern-European Journal of Enterprise Technologies*. 2025. Vol. 3, No. 11 (135). P. 61–70. DOI: <https://doi.org/10.15587/1729-4061.2025.330457>

12. Yarmosh T. A., Melnyk O. Yu. Technology for obtaining an anthocyanin colourant from blackberry pomace. *Bulletin of Sumy National Agrarian University. Series: Mechanization and Automation of Production Processes*. 2025. No. 2. P. 81–86. DOI: <https://doi.org/10.32782/msnau.2025.2.13>

13. Naumenko T. A., Pertsevyi F. V. Effect of a blackberry extract colourant on the quality characteristics of soft ice cream. *Commodity Science. Technologies. Engineering*. 2025. Vol. 56, No. 4. P. 32–45. DOI: [https://doi.org/10.31617/2.2025\(56\)03](https://doi.org/10.31617/2.2025(56)03)

14. Naumenko T. A., Melnyk O. Yu. Study of the biological effects of natural colourants compared with synthetic colourants using phytotesting. *Taurian Scientific Bulletin. Series: Technical Sciences*. 2025. Vol. 2, No. 5. P. 141–148. DOI: <https://doi.org/10.32782/tnv-tech.2025.5.2.14>

5.1 Додаткові джерела

15. Fellows P. J. **Food Processing Technology: Principles and Practice**. 5th ed. Cambridge, MA : Woodhead Publishing, Elsevier, 2022. 804 p.

16. Brown A. C. *Understanding Food: Principles and Preparation*. 7th ed. Boston, MA : Cengage Learning, 2023. 704 p.

17. Martindale W., Duong L. N. K., Jagtap S., Swainson M. *Food Industry 4.0: Unlocking Advancement Opportunities in the Food Manufacturing Sector*. Wallingford : CABI, 2024. 168 p.

Review of the Work Program (Syllabus)

Parameter by which the work program (syllabus) of the educational component is evaluated by the guarantor or member group syllabus	Yes	No	Comment
Learning outcomes for the educational component (DOL) correspond to the NQF			
The learning outcomes for the educational component (DRL) correspond to the stipulated PRL (for mandatory OK)			
Learning outcomes for the educational component make it possible to measure and assess the level of their achievement			

Member of the project group of EVP G13 “Food Technologies”, associate professor,
 Melnyk.Yu. _____
 (name) (full name) (signature)

The parameter by which the work program (syllabus) of the educational component is evaluated by the teacher of the relevant department	Yes	No	Comment
General information about the educational component is sufficient			
Learning outcomes for the educational component (DOL) correspond to the NQF			
Learning outcomes by educational component (LE) provide an opportunity to measure and assess the level of their achievement			
Learning outcomes (LOs) relate to student competencies, not to the content of the discipline (contain knowledge, skills, abilities, and not to the topics of the discipline curriculum)			
The content of the OK is formed in accordance with the structural and logical scheme			
Learning activity (teaching and learning methods) enables students to achieve expected learning outcomes (ELOs)			
The educational component involves learning through research that is appropriate and sufficient for the appropriate level of higher education.			
The assessment strategy within the educational component is in line with the University/Faculty policy			
The provided assessment methods allow assessing the degree of achievement of learning outcomes by educational component.			
The student workload is adequate to the volume of the educational component.			
The recommended learning resources are sufficient to achieve the learning outcomes (LOs)			
The literature is relevant			

Reviewer (department lecturer) food technology, associate professor,
 Bokovets S. _____
 (name) (full name) (signature)