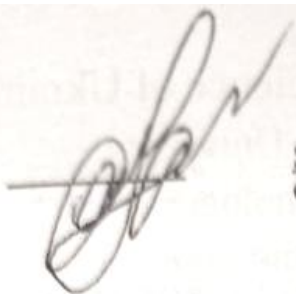


Ministry of Education and Science of Ukraine  
Sumy National Agrarian University  
Faculty of Food Technologies  
Department of Technology and Food Safety

Work Program of the Educational Component (Syllabus)  
**EC 12 FUNDAMENTALS OF PHYSIOLOGY AND FOOD HYGIENE**

Specialty	"Food Technology"
Educational Program Technology"	"Food Technology"
Higher Education Degree	First (Bachelor's)

Developer:



Svitlana HUBA  
(First Name LAST NAME)

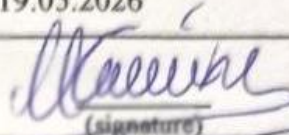
senior lecturer  
(academic degree, academic title, position)

Reviewed and approved at the meeting of the Department of Technology and Food Safety

Protocol No. 17 of 19.05.2026

Head of Department

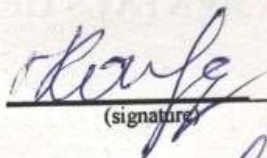
of



Marina SAMILYK  
(signature)

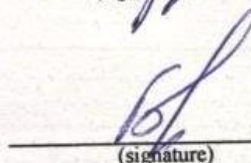
Approved by:

Guarantor of the educational program "Food Technology"




Olena KOSHEL  
(First Name LAST NAME)

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

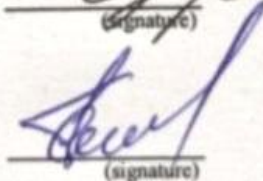


Nataliia BOLHOVA  
(First Name LAST NAME)

Review of the work program provided by:

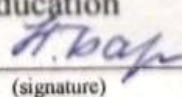


PhD (Tech.), Associate Professor  
Oksana MELNYK



PhD (Tech.), Associate Professor  
Anna HELIKH

Methodologist of the Department of Education Quality, Licensing and Accreditation



N. Baranik  
(First Name LAST NAME)

Registered in the electronic database: date: 12.06.2026

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Information on revisions of the work program (syllabus):

Academic year in which changes are made	The number of the annex to the work program with a description of the changes	Date and protocol number of the department meeting		
		Date and protocol number of the department meeting	Head of Department	Program Guarantor

## 1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	Name of the EC	EC 12 Fundamentals of Physiology and Food Hygiene		
2.	Faculty / Department	Department of Technology and Food Safety		
3.	Status of the EC	Mandatory		
4.	Program / Specialty for which the EC is a component	Educational and Professional Program “Food Technologies” / Specialty “Food Technologies”		
5.	Semester and duration of study	3rd semester, 18 weeks		
6.	NQF Level	Level 6		
7.	Number of ECTS credits	5		
8.	Total number of hours and their distribution	Contact work (classes)		Independent work
		Lectures	Laboratory classes	
		30	44	76
9.	Language of instruction	Ukrainian, English		
10.	Lecturer / Coordinator of the Educational Component	Senior Lecturer Svitlana Oleksandrivna HUBA		
11.	Contact information	Svitlana HUBA, Senior Lecturer of the Department of Technology and Food Safety, office 317m., E-mail: s.huba@snau.edu.ua		
12.	General description of the Educational Component	Study of the biological role of individual food components (proteins, fats, carbohydrates, vitamins, minerals) for human life; determination of the body's energy needs; study of general metabolism and energy exchange in the human body; mastering the principles of rational nutrition; determining directions for optimizing the assortment of food products of high biological value; development of hygienic recommendations for the composition and regimen of nutrition for different population groups depending on profession, sex, and age, aimed at enhancing immune protection, improving health and human performance.		
13.	Purpose of the Educational Component	Formation of a system of knowledge regarding the role of physiology and hygiene of nutrition in the vital processes of the human body, and the influence of food and its components on the functioning of major physiological systems.		
14.	Prerequisites and relation to other ECs	The EC is based on: EC 10 Food Microbiology, EC 15 Biochemistry. The EC is a basis for: EC 11 Food control methods, EC 31 Standardization, Certification, Quality and Food Safety Management.		
15.	Academic Integrity Policy	Code of Academic Integrity: ( <a href="https://snau.edu.ua/viddil-zabezpechennya-yakosti-osviti/zabezpechennya-yakosti-osviti/akademichna-dobrochesnist/">https://snau.edu.ua/viddil-zabezpechennya-yakosti-osviti/zabezpechennya-yakosti-osviti/akademichna-dobrochesnist/</a> )		
16.	Link to the Electronic Course	<a href="https://cdn.snau.edu.ua/moodle/course/view.php?id=6372">https://cdn.snau.edu.ua/moodle/course/view.php?id=6372</a>		

## 2. LEARNING OUTCOMES OF THE EDUCATIONAL COMPONENT AND THEIR ALIGNMENT WITH PROGRAM LEARNING OUTCOMES

Intended Learning Outcomes of the EC:	Program Learning Outcomes targeted by EC 12*				Assessment of ILO
	PLO5	PLO 6	PLO 8	PLO 24	
ILO1. Demonstrate knowledge and understanding of metabolic processes occurring with food components in the human body; understand the role of nutrients in human nutrition.	+				Performance and defense of laboratory works;  Lecture notes
ILO2. Analyze and determine the compliance of quality indicators of individual food products with physiological norms and sanitary-hygienic requirements.		+	+		Moodle testing;  Examination
ILO3. Select and calculate individual healthy nutrition rations using modern knowledge of the fundamentals of nutritional physiology and hygiene.		+		+	

\* PLO5. Know the scientific foundations of technological processes in food production and the laws of physicochemical, biochemical and microbiological transformations of the main components of food raw materials during technological processing.

PLO6. Know and understand the main factors influencing the course of the synthesis and metabolism of food components and the role of nutrients in human nutrition.

PLO8. Be able to develop or improve technologies for food products with increased nutritional value, taking into account global trends in the industry.

PLO24. Carry out technological, technical, and economic calculations within the framework of the development and

### 3. CONTENT OF THE EDUCATIONAL COMPONENT (COURSE PROGRAM)

Topic. List of issues covered within the topic	Distribution within the total time budget			Recommended literature
	Classroom work		Independent work	
	Lectures	Laboratory classes		
<b>Module 1</b>				
<b>Topic 1. Human nutrition as a medical-biological and socio-economic problem</b>				
<b>Lecture 1.</b> 1.Nutrition and population health. 2.Functions of food and factors determining them. 3.Biological effects of food.	2			[1-3,5,7,13-17]
<b>Laboratory class 1.</b> Familiarization with types of nutrition and assessment of compliance of individual actual nutrition with the criteria of rational nutrition.		4		
<b>Independent study:</b> Development of the science of nutrition.			4	
<b>Topic 2. Physiological and hygienic characteristics of proteins.</b>				
<b>Lecture 2.</b> 1. Physiological and hygienic significance of proteins and consequences of their excess or deficiency in diets. 2 Physiological and hygienic role of amino acids. 3. Protein digestion.	2			[1-3,12-17,20]
<b>Laboratory class 2.</b> Determination of physiological principles of protein standardization in diets and methods for assessing biological value indicators of proteins.		4		
<b>Independent study:</b> Physiological and hygienic measures to improve protein nutrition.			4	
<b>Topic 3. Physiological and hygienic characteristics of lipids.</b>				
<b>Lecture 3.</b> 1.Characteristics of dietary lipids. 2.Physiological and hygienic role of fats and fatty acids. 3.Consequences of excess or deficiency in the diet.	2			[1-3,12-17,20]
<b>Laboratory class 3.</b> Justification of physiological and hygienic norms of lipid intake and determination of nutritional and biological value indicators of fats.		4		
<b>Independent study:</b> Physiological and hygienic role of phospholipids and sterols.			4	
<b>Topic 4. Physiological and hygienic characteristics of carbohydrates.</b>				
<b>Lecture 4.</b> 1.Characteristics and functions of carbohydrates. 2.Physiological and hygienic role of available and unavailable carbohydrates.	2			[1-3,12-17,20]
<b>Laboratory class 4.</b> Physiological principles of carbohydrate intake standardization.		2		

Determination of recommended average carbohydrate norms in the daily diet.				
<b>Independent study:</b> Consequences of excess and deficiency of available and unavailable carbohydrates in the diet.			4	
<b>Topic 5. Physiological and hygienic characteristics of vitamins.</b>				
<b>Lecture 5.</b> 1. Physiological and hygienic significance and sources of vitamins. 2. Physiological need for vitamins. 3. Role of vitamins in physiological functions	2			[1-3,12-17,20]
<b>Laboratory class 5.</b> Determination of causes of vitamin deficiency and measures for preventing hypovitaminosis. Assessment of vitamin status.		2		
<b>Independent study:</b> Ways to ensure diets with deficient vitamins.			4	
<b>Topic 6. Physiological and hygienic characteristics of minerals.</b>				
<b>Lecture 6.</b> 1. Physiological and hygienic significance and absorption features of minerals. 2. Demineralizing factors.	2			[1-3,12-17,20]
<b>Laboratory class 6.</b> Determination of main dietary sources of minerals and physiological norms of their intake. Assessment of mineral status.		2		
<b>Independent study:</b> Participation of minerals in physiological functions. Role of water in the body and in food products.			4	
<b>Total for Module 1</b>	<b>12</b>	<b>18</b>	<b>24</b>	
<b>Module 2</b>				
<b>Topic 7. Digestive system and digestion processes</b>				
<b>Lecture 7</b> 1. General patterns of digestion processes. 2. Structure and functions of the digestive system. 3. Digestion in the oral cavity. 4. Digestion in the stomach and the influence of foods and technological factors on these processes. 5. Digestion in the small intestine. 6. Digestion in the large intestine.	2			[1-7,12-17,19,20]
<b>Laboratory class. 7.</b> Study of nutrient absorption features and determination of physiological bases of hunger and satiety.		4		
<b>Independent study:</b> Physiological bases of organoleptic evaluation of food quality. Physiological foundations and significance of cavity, membrane, and intracellular digestion. Role of the pancreas and liver in digestion.			8	
<b>Topic 8. Influence of nutrition on the functioning of major human body systems.</b>				
<b>Lecture 8</b> 1. Influence of food products and eating conditions on digestion processes. 2. Influence of dietary structure and type on neurohumoral processes.	2			[1-7,10,11,13-18]

3. Role of nutrition in cardiovascular system functioning.				
<b>Laboratory class 8.</b> Study of the significance of major nutrients in human vital activity. Assessment of nutritional status.		4		
<b>Independent study:</b> Physiological and hygienic foundations of cardiovascular system activity. Structural features of the nervous system. Nutrition rules under stress. Functions of endocrine glands, circulatory and excretory organs.			6	
<b>Topic 9.</b> Physiological and hygienic characteristics of major food groups				
<b>Lecture 9</b> 1.Protective properties of food products and factors ensuring them. 2.Negative effects of excessive intake of certain food substances.	2			[1-7,10,11,13-18,20,29]
<b>Laboratory class 9.</b> Justification of the significance of major nutrients in human vital activity according to dietary rations.		2		
<b>Independent study:</b> Physiological significance and hygienic assessment of foods of animal origin. Physiological significance and hygienic assessment of foods of plant origin.			8	
<b>Topic 10.</b> Physiological and hygienic foundations of rational and adequate nutrition.				
<b>Lecture 10</b> 1. Concept of rational nutrition. 2.Metabolism and energy exchange in the human body. 3.Energy expenditure and its components..	2			[1-7,10,11,13-18,20]
<b>Laboratory class 10.</b> Determination of energy expenditure and individual nutritional needs in energy and nutrients.		4		
<b>Independent study:</b> Physiological and hygienic requirements for the diet. Physiological and hygienic requirements for the eating regimen and conditions of food intake.			6	
<b>Topic 11.</b> Physiological and hygienic foundations of nutrition for different age and professional groups.				
<b>Lecture 11</b> 1.Nutrition norms for the population. 2.Physiological characteristics of children and adolescents and principles of their rational nutrition. 3.Physiological and hygienic foundations of rational nutrition for people engaged in mental work.	2			[1-7,10,11,13-18,20-22, 24-28]
<b>Lecture 12.</b> 1.Physiological and hygienic foundations of rational nutrition for workers of moderate and heavy physical labor. 2.Physiological and hygienic foundations of rational nutrition for the elderly. 3.Physiological and hygienic foundations of therapeutic and preventive nutrition.	2			

<b>Laboratory class 11.</b> Assessment of actual individual nutrition according to physiological needs and correction based on rational nutrition criteria.		4		
<b>Laboratory class 12.</b> Development of customized dietary rations.		4		
<b>Independent study:</b> Nutrition in environmentally unfavorable conditions. Nutrition of athletes and tourists.			8	
<b>Topic 12. Physiological and hygienic foundations of therapeutic nutrition.</b>				
<b>Lecture 13</b> 1. Physiological and hygienic principles of constructing therapeutic diets and eating regimens. 2. Causes, consequences, and physiological-hygienic principles of nutrition in obesity and diabetes mellitus.	2			[1-11,13-18,20,25,26,30]
<b>Lecture 14</b> 1. Causes, consequences, and physiological-hygienic principles of nutrition in digestive system diseases. 2. Causes, consequences, and physiological-hygienic principles of nutrition in liver, gallbladder, and pancreas diseases. 3. Causes, consequences, and physiological-hygienic principles of nutrition in kidney and cardiovascular diseases.	2			
<b>Laboratory class 13.</b> Development of therapeutic dietary rations.		4		
<b>Independent study:</b> Dietary nutrition in food service establishments. Restrictive diets.			8	
<b>Topic 13. Hygienic features of nutrition of specific population groups.</b>				
<b>Lecture 15</b> 1. Non-traditional (alternative) types of nutrition. 2. Vegetarianism. 3. Raw food diet. 4. Macrobiotic nutrition. 5. Yogic nutrition. 6. Separate nutrition.	2			[1-7,10,11,13-18]
<b>Independent study:</b> Alternative theories and concepts of nutrition. Ukrainian folk and traditional cuisine.			8	
<b>Total for Module 2</b>	<b>18</b>	<b>26</b>	<b>52</b>	
<b>Total for the semester</b>	<b>30</b>	<b>44</b>	<b>76</b>	

#### 4. TEACHING AND LEARNING METHODS

Learning Outcome (LO)	Teaching methods (activities conducted by the lecturer during classes and consultations)	Hours	Learning methods (types of learning activities performed independently by the student)	Hours
LO1. Demonstrate knowledge and understanding of metabolic processes occurring with food components in the human body; understand the role of nutrients in human nutrition.	Lectures with multimedia presentations; explanation and discussion of theoretical material;	30	<b>Practical laboratory training;</b> problem-based learning; case analysis; instructor-guided calculations  <b>Independent study</b> of lecture notes; preparation for laboratory classes; completion of individual tasks; work with scientific and educational literature.  Independent calculations; preparation of dietary plans; analysis of nutritional cases; preparation for assessment  <b>Non-formal education:</b> Courses on the Prometheus platform: <a href="https://prometheus.org.ua/prometheus-free/4-steps-to-healthy-nutrition/">https://prometheus.org.ua/prometheus-free/4-steps-to-healthy-nutrition/</a>	44
LO2. Analyze and determine the compliance of quality indicators of individual food products with physiological norms and sanitary-hygienic requirements.	<b>laboratory demonstrations;</b> guided laboratory work; consultations			76
LO3. Select and calculate individual healthy nutrition rations using modern knowledge of nutritional physiology and hygiene.				

#### 5. ASSESSMENT METHODS AND GRADING SYSTEM

##### 5.1. Summative assessment

5.1.1. For the assessment of expected learning outcomes, the following is provided:

№	Methods of summative assessment	Date of compilation	Points/Percentage in overall assessment
<b>Module 1</b>			
1.	Testing in the Moodle system	By the 8th week of the academic semester	<b>18 points / 18%</b>
2.	Oral defense of laboratory works		12 points / 12%
<b>Total for Module 1</b>			<b>30 points / 30%</b>
<b>Module 2</b>			
3.	Testing in the Moodle system	By the 15th week of the academic semester	26 points / 26%
4	Oral defense of laboratory works		14 points / 14%
<b>Total for Module 2</b>			<b>40 points / 40%</b>
<b>Exam</b>			
5.	Testing in the Moodle system	According to the schedule	<b>10 points / 10%</b>
6.	Expanded answers to the questions and the task		<b>20 points / 20%</b>
<b>Together for the exam</b>			<b>30 points / 30%</b>
<b>Total per semester</b>			<b>100 points / 100%</b>

### 5.1.2. Evaluation criteria

Компонент		Unsatisfactory	Satisfactory	Good	Excellent
Module 1 (0-30)	Testing in the Moodle system (Module 1)	<b>0-9</b>	<b>10-24</b>	<b>25-29</b>	<b>30</b>
		0-18 points <i>The test includes 18 questions., Each question is worth 1 point</i>			
	Completion of laboratory works	0-12 points <i>Completion of 6 laboratory works Each lab is worth 2 points</i>			
Module 2 (0-40)	Testing in the Moodle system (Module 2)	<b>0-15</b>	<b>15-29</b>	<b>30-39</b>	<b>40</b>
		0-26 points <i>The test includes 26 questions., Each question is worth 1 point</i>			
	Completion of laboratory works	0-14 points <i>Completion of 7 laboratory works, Each lab is worth 2 points</i>			
Exam (0-30)	<b>Exam :</b>	<b>&lt;15 points</b>	<b>15-19 points</b>	<b>20-24 points</b>	<b>25-30 points</b>
	Testing in the Moodle system Test EXAM	0-10 points <i>The test includes 20 questions, Each question is worth 0,5 points</i>			
	Expanded answers to the questions solutions to the task	0-20 points <i>The exam includes 2 questions and a task. Each question is worth 5 points, solutions to the task - 10 points</i>			

#### Formative assessment:

To assess current progress in learning and understand areas for further improvement, the following is provided:

№	Elements of formative assessment	Date
1	Test (multiple choice test)	By the 15th week
2	Feedback in the form of written protocols and oral defense of laboratory work	During the semester, after each laboratory work, for 2 days
3	Verbal feedback during laboratory work	Up to 14 weeks
4	Feedback in the form of a completed individual task on the topic of independent work	Up to 13 weeks
5	Discussion of exam results	According to the schedule

### LEARNING RESOURCES (LITERATURE)

1. Huba S.O., Bolhova N.V. Osnovy fiziologii ta hihieny kharchuvannia. Navchalnyi posibnyk dlia zdobuvachiv SVO «Bakalavr» dennoi ta zaochnoi formy navchannia, spetsialnosti G13 «Kharchovi tekhnologii» / S.O. Huba, N.V. Bolhova – Sumy: Sumskyi natsionalnyi ahrarnyi universytet, 2025. – 399 s (in Ukrainian)
1. Gropper S., Smith J. Advanced Nutrition and Human Metabolism. 8th ed. Cengage Learning, 2022. Pal, G. K. (2021). Textbook of Medical Physiology 4th Edition-E-Book. Elsevier Health Sciences.
- Bender, D.A., & Cunningham, S.M.C. (2021). Introduction to Nutrition and Metabolism (6th ed.). CRC Press. <https://doi.org/10.1201/9781003139157>
- Roche, H. M., Macdonald, I. A., Schols, A. M., & Lanham-New, S. A. (Eds.). (2024). *Nutrition and metabolism*. John Wiley & Sons.
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- Marriott, B. P., Birt, D. F., Stallings, V. A., & Yates, A. A. (Eds.). (2023). *Present knowledge in nutrition* (11th ed.). Academic Press.
- Berdanier, C. D., & Zempleni, J. (Eds.). (2022). *Advanced nutrition: Macronutrients, micronutrients, and metabolism*. CRC Press.

8. Whitney, E., & Rolfes, S. R. (2023). *Understanding nutrition* (17th ed.). Cengage Learning.
9. Mann, J., & Truswell, S. (Eds.). (2023). *Essentials of human nutrition* (6th ed.). Oxford University Press.
10. Gibney, M. J., Lanham-New, S. A., Cassidy, A., & Vorster, H. H. (2022). *Introduction to human nutrition* (4th ed.). Wiley-Blackwell.
11. Temple, N. J., Wilson, T., & Bray, G. A. (Eds.). (2022). *Nutrition guide for physicians and related healthcare professionals*. Springer.
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13. National Academies of Sciences, Engineering, and Medicine. (2021). *Dietary reference intakes: A risk assessment model for establishing upper intake levels for nutrients*. National Academies Press.
14. Alpers, D. H., Stenson, W. F., & Bier, D. M. (2022). *Manual of nutritional therapeutics* (9th ed.). Wolters Kluwer.

#### **Methodological support**

15. Основи фізіології та гігієни харчування. Конспект лекцій / уклад. С.О. Губа, Соколенко В.В., Н.В. Болгова - Суми: СНАУ, 2023. – 187с. протокол № 2 від 28.11.2023р
16. Основи фізіології та гігієни харчування. Методичні вказівки до самостійної роботи / уклад. С.О. Губа, Н.В. Болгова, В.В. Соколенко - Суми: СНАУ, 2023. – 112с. протокол № 2 від 28.11.2023р
17. Основи фізіології та гігієни харчування. Методичні рекомендації щодо виконання лабораторних робіт / уклад. С.О. Губа, Н.В. Болгова, В.В. Соколенко - Суми: СНАУ, 2024. – 150с. протокол № 4 від «26» березня 2024р

#### **Additional sources of literature**

18. Huba, S. O., Babenko, B. V., Bolhova, N. V., & Sokolenko, V. V. (2023). Research on the level of youth knowledge about the environmental impact on food safety. *Scientific Bulletin of Tavria State Agrotechnological University*, 13(1). <https://doi.org/10.31388/sbtsatu.v13i1.377>
19. Odintsov, S., Nazarenko, Y., Synenko, T., & Huba, S. (2024). Determining the influence of hemp seed protein on the quality indicators of cheese product and the content of nutrients in it. *Eastern-European Journal of Enterprise Technologies*, 2(11) (128), 6–12. <https://doi.org/10.15587/1729-4061.2024.300172>
20. Huba, S. O., Popova, A. O., Bolhova, N. V., Tyshchenko, V. I., & Huba, O. O. (2024). DEVELOPMENT OF THE TECHNOLOGY AND RECIPE OF A COFFEE BEVERAGE WITH INCREASED NUTRITIONAL VALUE. *Scientific Bulletin of Tavria State Agrotechnological University*, 14(1). <https://doi.org/10.32782/2220-8674-2024-24-1-19>
21. Huba, S. ., Bolhova, N. ., Demydova, Y., & Huba, O. (2025). Development of the recipe for protein cocktail with increased biological value. *Technical Sciences and Technologies*, (1) (39), 255–265. [https://doi.org/10.25140/2411-5363-2025-1\(39\)-255-265](https://doi.org/10.25140/2411-5363-2025-1(39)-255-265)
22. Demydova, Y. V., & Huba, S. (2025). The effect of elderberry powder and hazelnut on the quality, functional properties and nutritional value of muffins. *Bulletin of Sumy National Agrarian University. The Series: Mechanization and Automation of Production Processes*, (3), 37-43. <https://doi.org/10.32782/msnau.2025.3.5>
23. Tischenko, V. ., Huba, S., & Bozhko, N. (2026). Evaluation of technological properties and safety indicators of poultry products made using natural marinades. *Technology Audit and Production Reserves*, 1(3(87)), 51–58. <https://doi.org/10.15587/2706-5448.2026.353035>