

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY
Faculty of food technologies
Department of food technology and safety

Syllabus of the educational component

EC 10 FOOD MICROBIOLOGY
(compulsory / optional)

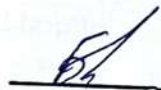
Specialization	G 13 ' Food Technology '
Educational program	Food Technology
Level of higher education	First (Bachelor's)

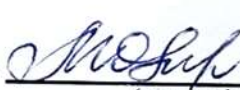
Developers:  Demidova E.V., Doctor of Philosophy, Associate Professor of the
Department of Food Technology and Safety
(last name, initials) (academic degree and title, position)

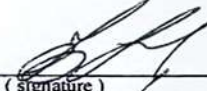
Reviewed, approved and ratified at the department meeting <u>technologies and food safety</u> (name of department)	protocol 17 of 19.05,2026
	Manager departments <u></u> <u>Marina SAMILYK</u> (signature) (last name, initials)

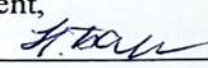
Agreed:

Guarantor of the educational program "Food Technologies"  Olena KOSHEL

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

Review of the work program provided by :  Oksana MELNYK
(signature)

 V. TISCHENKO
(signature)

Methodologist of the Education Quality Department,
licensing and accreditation  Nadia Baranik
(signature) (Maria KOVALIOVA)
(First name LAST name)

Registered in electronic database : date: 18.06. 2026
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Information on reviewing the work program (syllabus):

Educational the year in which are introduced changes	Number of the appendix to the work program with a description of the changes	Changes reviewed and approved		
		Date and number minutes of the meeting departments	Head of the Department	Guarantor educational programs

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

Name EC	EC 10 Food Microbiology	
Status EC	Mandatory	
Program/Specialty, which includes EC	G 13 « Food technologies » OPP « Food technologies »	
Name of structural unit	Faculty of Food Technology/Department of Food Technology and Safety	
NRC level	Level 6	
Semester and duration of study	2nd semester	
Number of ECTS credits	5	
Total hours and their distribution 150	Contact work (classes)	
	Lectures – 30	Laboratory – 44
Independent work – 76		
Language of instruction	Ukrainian, English	
Limitation	missing	
General description of the educational component	The educational component is aimed at forming in higher education students a system of knowledge about the morphology, physiology and biochemical activity of microorganisms, their role in technological processes of food production, as well as their impact on the quality and safety of food products. Food industry enterprises process raw materials of animal and plant origin, which are a favorable environment for the development of microorganisms. At the same time, microorganisms are widely used in the production of certain types of food products, therefore, knowledge of the laws of microbiological processes is a necessary component of the professional training of food industry specialists.	
Purpose of the educational component	The purpose of the educational component is to form in students theoretical knowledge and practical skills regarding the patterns of development of microorganisms in food raw materials and products, the essence of microbiological processes in various branches of food production, as well as mastering microbiological control methods to ensure quality, safety and establish rational storage and sale periods for food products.	
Prerequisites for studying EC, connection with other educational components of OP	There are no prerequisites. EC is based on the study of EC 14 "Chemistry", and is the basis for the study of EC 13 "Fundamentals of Physiology and Food Hygiene", EC 19 "Technology of Grain, Bread, Pasta, Confectionery and Food Concentrates ", EC 31 "Standardization, Certification, Quality and Safety Management of Food Products", EC 23 "Technology of Milk and Dairy Products", EC 21 "Technology of Water, Non-Alcoholic, Low-Alcohol and Alcoholic Beverages", EC 24 "Technology of Meat, Meat Products and Fish"	
Academic Integrity Policy	Provided according to the Code of Academic Conduct integrity (http://surl.li/khyd)	
Keywords EC	food microbiology, microorganisms, bacteria, yeast, molds, microbiological processes, fermentation, food raw materials, food products, microbiological control, sanitation, production hygiene, food safety, food spoilage, pathogenic microorganisms, starter cultures, sterilization, pasteurization, shelf life, food product quality.	
Teacher information	Demydova Yevheniia Vyacheslavivna, Associate Professor of the Department of Food Technology and Safety, room 317m, +380507372890, E– mail : yevheniia.demydova@snau.edu.ua , consultations 14.30-15.45 every Monday	

Link to the course in Moodle	https://cdn.snau.edu.ua/moodle/course/view.php?id=4631
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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 the DRE assessed?
	PLO 5	PLO 6	PLO 19	
DRE 1. Explain the patterns of microbiological processes in food raw materials and products during technological processing and storage.	+			Modular testing according to the schedule and evaluation criteria. Oral survey in class. Performing and defending laboratory work. Assessment of practical laboratory skills. Exam taking
DRE 2. Determine the impact of microorganisms on the quality, safety, and shelf life of food products, as well as assess the compliance of microbiological indicators with regulatory requirements.		+		
DRE 3. Conduct microbiological studies of food raw materials, semi-finished products and finished products using modern analysis methods individually and/or as part of a group.		+	+	

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

PLO19. Increase work efficiency by combining independent and team work.

¹The list that is given in the work program under "to know, to be able to".

When defining the DRL 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*	Self-employed*	
	Luke	Lb.	
Module 1			
<i>Lecture 1: Introduction. Technically important microflora of food products.</i> 1. Content, meaning and objectives of the discipline. Basic concepts. 2. The main groups of microorganisms found in raw materials and food products and the microbiological processes caused by them. 3. General characteristics of technically useful microflora (lactic acid microorganisms, yeast, acetic and propionic acid microorganisms) and their importance in the production of food products. 4. Representatives, general characteristics and biological properties of microorganisms that cause food spoilage (rotting microorganisms, mold fungi).	4	2	[1], [2], [3], [4], [6], [7]
LB No. 1: Organization of work in a microbiological laboratory when researching food products.		2	
LB No. 2: Preparation and microscopy of preparations. Gram staining of bacteria		2	
LB No. 3: Morphological and cultural characteristics of bacteria. Cultivation of microorganisms. Nutrient media for cultivating microorganisms.		2	
Self-study questions 1. Study of qualitative and quantitative microflora of food products. 2. A brief history of the development of the discipline. 3. Connection with other disciplines.			6
<i>Lecture 2 The most important biochemical processes caused by microorganisms</i> 1. Classification of biochemical processes caused by microorganisms. 2. Fermentation processes, their types.	2		[1], [3], [6].
LB No. 4: Morphological and cultural characteristics of yeast. Quantitative accounting of microorganisms.		2	
LB No. 5: Morphological and cultural characteristics of mycelial fungi		2	
Self-study questions 1. Industrial use of microorganisms			6
<i>Lecture 3. Foodborne diseases</i> 1. General characteristics of sanitary indicator microorganisms. Their importance for the food industry.	2		[1], [2], [3], [4], [6], [7].

³ Specific source from the main or additionally recommended literature

2. General characteristics of pathogenic microorganisms as causative agents of foodborne infections (salmonella, E. coli, clostridia).				
3. General characteristics, taxonomy, biological properties of foodborne pathogens (staphylococci, botulism pathogen).				
4. Ways of entry of pathogens of toxicosis and toxicoinfections into food products. Methods of preventing the entry of these microorganisms into raw materials and food products.				
LB No. 6: Methods of working with microorganisms. Microbiological methods for studying the sensitivity of microorganisms to antimicrobial drugs.		2		[1], [2], [3], [4], [6], [7].
LB No. 7: Study of the morphological structure and properties of foodborne pathogens transmitted to raw materials and food products.		2		
LB No. 8: Study of the morphological structure and properties of foodborne pathogens transmitted to raw materials and food products.		2		
Self-study questions 1. The influence of environmental factors on the vital activity of organisms 2. Alimentary diseases			6	
Lecture 4: Microbiology of drinking water 1. Microbiota of natural waters 2. Drinking water microbiota 3. Wastewater microbiota	2		-	[5]
LB No. 9: Sanitary and bacteriological control of drinking water		2		
Self-study questions 1. Water pollution and self-purification			6	
Total for module 1	10	18	24	
Module 2				
Lecture 5. Microbiology of milk and dairy products 1. Sources of primary milk microflora and characteristics of microbiological processes in raw milk. 2. Defects of raw milk caused by microorganisms. Standard requirements for the microbiological composition of milk. 3. Sources of primary microflora of fermented milk products. Conditions for the development of microorganisms in the process of production of fermented milk products. 4. Characteristics of microbiological processes in the manufacture of fermented milk products. 5. Defects of fermented milk products caused by microorganisms. 6. Microbiological control of the production of fermented milk products.	4			[1], [2], [3], [4], [5], [7].
LB No. 10: Microbiological examination of raw milk		2		
LB No. 11: Determination of microbiological indicators of various types of fermented milk products according to the requirements of regulatory documents.		2		
Self-study questions 1. Microflora of cheeses, butter, ice cream, canned milk. Microbiological control of production.			8	

2. Schemes and methods of microbiological research of dairy products.				
3. Study of microbiological indicators of dairy products according to the requirements of regulatory documents				
Lecture 6. Microbiology of meat and meat products and egg products 1. Sources of primary microflora of meat. Characteristics of microbiological processes in raw meat. Changes in the microflora of meat during refrigerated storage, salting and drying. Standard requirements for the microbiological composition of meat. 2. Sources of microflora in minced sausage. Characteristics and changes in microbiological processes in minced meat during the production of cooked, semi-smoked and smoked sausages. The influence of residual microflora on the quality of the finished product during its storage. 3. Sources of microflora and conditions for the development of microorganisms in semi-finished meat products and canned food. Residual microflora of semi-finished meat products and canned food and its impact on the quality of products during storage. 4. Sanitary and microbiological control of meat and meat product production conditions. Sanitary and microbiological control of technological processes and finished meat products.	4			[1], [2], [3], [4], [5], [7].
LB No. 12: Microbiological control of raw meat.		2		[1], [2],
LB No. 13: Microbiological control of sausage products		2		[3], [4],
Self-study questions 1. Microflora of canned meat. 2. Microbiology of eggs and egg products			8	[5], [7].
Lecture 7. Microbiology of fish, fish products and commercial invertebrates 1. Sources of microbiological contamination of fish. 2. Microflora of frozen fish 3. Microflora preserved 4. Microflora of salted, pickled, dried and smoked fish	2			[1], [4], [5], [7].
LB No. 14: Fish microbiota research		2		
study questions 1. Caviar microflora 2. Microflora of industrial invertebrates			6	
Lecture 8. Microbiology of cereals, flour, pasta and bread 1. Sources of microflora of flour products. Main microorganisms of flour. 2. Microorganisms used in bread production. Harmful microorganisms in bread baking . 3. Microbiology of bakery production. Sources and composition of microflora. Microbiological spoilage of products. 4. Microbiology of pasta and cereals.	2			[1], [2], [3], [4], [5], [7]
LB No. 15: Microbiological analysis of grain and flour.		2		[1], [2],
LB No. 16: Microbiological control of semi-finished bakery products		2		[3], [4],
LB No. 17: Microbiological control of groups .		2		[5], [7]
Self-study questions			8	

1. The effect of moisture and temperature of grain mass on microorganisms 2. The role of microorganisms in grain self-heating 3. Phytopathogenic microorganisms of grain crops				
Lecture class 9. Microbiology of confectionery, confectionary and alcoholic beverages 1. Microflora of sugar and honey. 2. Microflora of confectionery products 3. Microflora of wine. 4. Microflora of beer. 5. Microflora of bread kvass 6. Microflora of soft drinks 7. Microflora of spices and table salt.	4			[1], [2], [3], [4], [5], [7].
LB 18: Microbiological control of pure yeast culture propagation. Beer microbiology		2		
Self-study questions 1. "Wild" yeasts are pests of winemaking 2. Morphological and physiological properties of mold fungi – pests of vineyards and winemaking 3. Methods of inhibiting the development of microorganisms.			8	
Lecture 10. Microbiology of fruits, vegetables and berries. 1. Microorganisms of fruits, vegetables and berries. Microbiological processes during the storage of fruits, vegetables and berries and their spoilage. 2. Microbiology of canned vegetables.	2			[1], [2], [3], [4], [5], [7]
LB No. 19: Microbiological control of plant raw materials		2		
LB No. 20: Microbiological control of canned vegetables		2		
Self-study questions 1. Microbiological control of production during aseptic canning 2. Microbiological control of food concentrates, dried fruits and vegetables.			8	
Lecture 11. Sanitary and hygienic requirements for the technological process of food production. 1. Sanitary and hygienic requirements for the transportation and storage of food products. 2. Sanitary and hygienic requirements for heat treatment of food products. 3. Sanitary and hygienic requirements for the sale of food products.	2			[1], [2], [3], [4], [5], [6], [7].
LB No. 21: Sanitary and microbiological analysis of objects in contact with raw materials and work surfaces in the production of food products.		2		
LB No. 22: Sanitary and hygienic control of raw materials and finished products of major food industries. Determination of the effectiveness of disinfection of production processes in the food industry		2		
Self-study questions 1. Sanitary and hygienic measures at food enterprises and restaurant establishments 2. Sanitary control of food production facilities			6	

Total for Module 2	20	26	52	
Total per semester	30	44	76	

* full-time/part-time form of study

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
DRE1. Explain the patterns of microbiological processes in food raw materials and products during technological processing and storage.	Using lecture-visualizations, educational discussion, oral questioning, showing an experiment or example with explanation and commentary.	74	Solving situational tasks according to the topic of laboratory work, conducting experiments in groups (making fixed smears, making dilutions, sowing the sample under study, microscopy, etc.), independent work of the applicant with educational and methodological literature: reading, solving individual tasks according to the provided topics.	76
DRE2. Determine the impact of microorganisms on the quality, safety, and shelf life of food products, as well as assess the compliance of microbiological indicators with regulatory requirements.				
DRE3. Conduct microbiological studies of food raw materials, semi-finished products and finished products using modern analysis methods individually and/or as part of a group.				

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	Date of compilation	Points/Weight in Overall Score
Module 1			
1	Testing in the Moodle system	By the 8th week of the academic semester	21 points / 21%
2.	Oral defense of laboratory work		9 points / 9%
Total for module 1			30 points / 30%
Module 2			
3.	Testing in the Moodle system	By the 15th week of the academic semester	27 points / 27%
4	Oral defense of laboratory work		13 points / 13%
Total for module 2			40 points / 40%
Exam			
5.	Detailed answers to questions	According to the schedule	30 points / 30%
Total per semester			100 points / 100%

5.2.2. Evaluation criteria (EC)

Component		Unsatisfactorily	Satisfactorily	Good	Perfectly
For Module 1		0-10	11-24	25-29	30
Test	KO	0-7	7-19	19-21	21
	Testing in the Moodle system	<i>The test includes 21 questions, each of which is worth 1 point.</i>			
Performing the	KO	0-3	4-5	6-8	9
	Completion of 9 laboratory works (maximum 1 b each)	<i>Less than 30% of laboratory work reports have been submitted, the applicant is not familiar with the material</i>	<i>At least 60% of laboratory work has been completed, the applicant has a poor understanding of the material</i>	<i>At least 80% of laboratory work has been completed, the applicant is familiar with the material and can explain the progress of the work and the results.</i>	<i>100% of laboratory work protocols have been submitted, the applicant can explain the progress and results of the work in a reasoned and well-founded manner</i>
For Module 2		0-15	15-29	30-39	40
Test	KO	0-10	10-20	20-27	27
	Testing in the Moodle system	<i>The test includes 27 questions, each of which is worth 1 point.</i>			
Performing the forehead	KO	0-5	5-9	10-12	13
	Completion of 13 laboratory works (maximum 1 b each)	<i>Less than 30% of laboratory work reports have been submitted, the applicant is not familiar with the material</i>	<i>At least 60% of laboratory work has been completed, the applicant has a poor understanding of the material</i>	<i>At least 80% of laboratory work has been completed, the applicant is familiar with the material and can explain the progress of the work and the results.</i>	<i>100% of laboratory work protocols have been submitted, the applicant can explain the progress and results of the work in a reasoned and well-founded manner</i>

Exam:	<15 points	15-19 points	20-24 points	25-30 points
Detailed answers to questions. The exam includes 3 questions. Each question is worth 5 points.	<i>The applicant answered <30% of the questions, the answers are not accurate, the essence of the question is not revealed</i>	<i>The applicant answered no >60% of the questions correctly, the answer is correct, in sufficient volume</i>	<i>The applicant answered no more than >75% of the questions correctly, the answer was sufficiently detailed.</i>	<i>The applicant answered no > 90% of the questions correctly, the answer reveals the essence of the questions, and there is justification.</i>

Formative assessment:

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

No.	Elements of formative assessment	Date
1.	Oral interview (conversation) after studying each topic, during laboratory classes	According to the educational process schedule
2.	Feedback in the form of testing discussion	
3.	Intermediate testing	
4.	Feedback in the form of preparation of presentation/laboratory reports	
5.	Discussion of exam results	According to the exam session schedule

EVALUATION BY EDUCATIONAL COMPONENT (RATING SCALE ECTS)

On a scale ECTS	On a 100-point scale	On a national scale	Definition*
AND	90-100	perfectly	excellent – excellent performance with a small number of inaccuracies
B	82-89	good	very good – above average with a few minor errors
C	75-81		good – overall, the work was done correctly with a small number of errors
D	69-74	satisfactorily	satisfactory – not bad, but with a significant number of shortcomings
E	60-68		sufficient – performance meets minimum criteria
FX	35-59	unsatisfactory with the possibility of reassembly	unsatisfactory – needs work before getting a positive rating
F	0-34	unsatisfactory with mandatory retake	unsatisfactory – serious further work with re-study of the course is necessary

Basic literature

1. Food microbiology . Educational guide for applicants education in the specialty G 13 " Food technology » full-time and part-time forms of study education degree higher education "Bachelor" / compiled by A.O. Gelikh , S.O. Guba, V.V. Sokolenko - Sumy : SNAU, 2025. - 384 p.
2. Food microbiology: workbook for 1st year students of specialty 181 food technologies, / compiled by V.V. Sokolenko, S.O. Guba - Sumy: SNAU, 2023. – 147p.
3. Food microbiology: methodological recommendations for independent work / compiled by V.V. Sokolenko, S.O. Guba - Sumy: SNAU, 2022. - 140 p. Protocol No. 1 dated "22" November 2022.
4. Food microbiology: course of lectures / compiled by V.V. Sokolenko, - Sumy: SNAU, 2022. - 125 p. Protocol No. 1 of "22" November 2022.
5. Food microbiology: methodological recommendations for performing laboratory work / compiled by V.V. Sokolenko, S.O. Guba - Sumy: SNAU, 2022. - 147p. Protocol No. 2 dated "07" December 2022.

Auxiliary

1. Adams , MR, McClure , PJ, & Moss , MO (2024). Food microbiology . Royal society of chemistry .
2. Matthews , KR, Kniel , KE, & Critzer , FJ (2025). Food microbiology : an introduction . John Wiley & Sons .
3. Pylypenko, L. M., Kylymenchuk , O. O., Yegorova, A. V., & Trufkati , L. V. (2024). Microbiology of the industry. Technological expertise and food safety.
4. Kukhtyn , M. D., & Malimon , Z. V. (2024). Microflora of frozen fish imported into Ukraine.
5. Kukhtin , M. D., & Salata , V. Z. (2023). Microbiological and biochemical processes in beef meat during refrigerated storage: monograph.
6. Pylypenko, L. M., Kylymenchuk , O. O., Yegorova, A. V., & Trufkati , L. V. (2024). Microbiology of the industry. Technological expertise and food safety.
7. **Demidova , E ., & Samilyk , M.** (2023). Development of a powder food supplement based on sea buckthorn fruits. NV LNU Veterinary Medicine and Biotechnology. Series: Food Technologies, 25(100), 88-93. <https://doi.org/10.32718/nvlvet-f10014> (domestic professional publication of category "B")
8. **Demidova, E.V.,** Samilyk , M.M., Guba, S.O. (2025). Research on the influence of elderberry powder food additive on the shelf life of yogurts. Bulletin of Sumy National Agrarian University. Series: Mechanization and automation of production processes. 4 (58), 21-27. <https://doi.org/10.32782/msnau.2024.4.3> (domestic professional publication of category "B")
9. **Demydova, E. V. ,** Synenko , T. P., & Gorbatyuk, O. V. (2025). Technological aspects of the production of kraft ciders using non-traditional raw materials. *Tavria Scientific Bulletin. Series: Technical Sciences* , (6), 329–344. <https://doi.org/10.32782/tnv-tech.2025.6.32>

Information resources

1. <https://www.sciencedirect.com/journal/food-microbiology/issues>
2. <https://www.sciencedirect.com/journal/international-journal-of-food-microbiology>

