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

Syllabus of the educational component

EC 22 Technology of Milk and Dairy Products

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

Sumy - 2026

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 (signature) Marina SAMILYK

Approved by:

Guarantor of the educational program "Food Technology" (signature) Olena KOSHEL (First Name LAST NAME)

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

Review of the work program provided by: (signature) PhD (Tech.), Associate Professor Oksana MELNYK

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Methodologist of the Department of Education Quality, Licensing and Accreditation (signature) (N. Baranik) (First Name LAST NAME)

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Information about reviewing 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 22 Technology of Milk and Dairy Products		
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	6th semester, 15 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	Milk and Dairy Technology ensures the formation of advanced theoretical and practical competencies in students regarding the processing of milk into high-quality dairy products. The discipline develops skills in managing technological processes; designing technological schemes for dairy production based on modern technologies (from raw materials to finished products); and constructing technological flows that reflect the organization of the production process, technological factors, and technological systems that transform raw materials into consumer-ready products. It also provides the ability to select scientifically grounded methods of technological influence on the quality of ready-to-consume dairy products and to understand the regularities of changes in product components under the impact of technological factors.		
13.	Purpose of the Educational Component	The aim of the discipline is to develop, systematize, and consolidate students’ theoretical knowledge and practical skills related to the composition, properties, and quality assessment of raw milk; general technological operations of milk processing; and technologies for the production of dairy products. The course ensures an understanding of the principles and essence of technological processes involved in the manufacture of dairy products, including products from whole milk, fermented dairy products, butter, hard and soft cheeses, dairy concentrates, and ice cream. It also focuses on applying the acquired competencies to improve existing technologies and to design innovative dairy products.		
14.	Prerequisites and relation to other ECs	The EC is based on: EC 8 Theoretical foundations of food production, EC 32 Teaching practice. The EC is a basis for: EC 25 Food enterprise design, EC 32 Pre-graduate practice, EC34 Qualification work		
15.	Academic Integrity Policy	Code of Academic Integrity: (https://snau.edu.ua/viddil-zabezpechennya-yakosti-osviti/zabezpechennya-yakosti-osviti/akademichna-dobrochesnist/)		
16.	Link to the Electronic Course	https://cdn.snau.edu.ua/moodle/course/view.php?id=6373		

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 22*							Assessment of ILO
	PLO 1	PLO 4	PLO 10	PLO 21	PLO 24	PLO 27	PRO 30	
ILO 1. Analyse and solve key problems and conceptual issues in the dairy sector related to the processing of raw milk and the production of high-quality dairy products.	+	+				+		Performance and defense of laboratory works; Lecture notes Moodle testing; Examination
ILO 2. Search for, evaluate, and compare the latest global and European trends in milk storage and processing, with particular emphasis on resource-efficient and sustainable technologies.		+						
ILO 3. Analyse scientific and technical information to address technological and engineering challenges within dairy-processing operations.	+							
ILO 4. Improve and develop competitive milk and dairy product technologies; ensure quality control of raw milk; perform quality assessment of finished products; prepare products for market distribution; and effectively present technological developments to professional and public audiences.			+	+				
ILO 5. Prepare and maintain technical documentation; perform technological calculations for raw materials and finished dairy products.					+			
ILO 6. Model technological processes for dairy production, including the selection of appropriate equipment and processing units, taking into account market needs and technological feasibility.					+		+	

** PLO1. Know and understand the basic concepts, theoretical and practical problems in the field of food technology.*
PLO4. Search and process scientific and technical information from various sources and apply it to solve specific technical and technological problems.
PLO10. Implement food quality and safety management systems.
PLO21. Be able to communicate the results of activities to a professional audience and the general public in order to convey ideas, problems, solutions and own experience in the field of food technology.
PLO24. Carry out technological, technical, and economic calculations within the framework of the development and
PLO27. Preserve and increase the achievements and values of society, lead a healthy lifestyle.
PRO30. To carry out modeling of technological processes of food enterprises and restaurant establishments in order to quickly adapt them to production conditions.

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		
Module 1				
Topic 1.				
Lecture 1. Obtaining High-Quality Milk 1. Features of dairy product production. 2. Types of raw milk materials for the dairy industry. 3. Conditions for obtaining high-quality milk. 4. Primary milk processing on farms.	**2**			[1], [2], [3], [4], [5], [6], [8]
Laboratory class 1. Familiarization with milk sampling rules. Determination of quality indicators of raw materials.		**2**		
Independent study: Bactericidal phase of milk. 1. Microelements, enzymes, vitamins in milk. 2. Defects of milk. 3. Foreign substances in milk and their characteristics. 4. Milk quality issues and ecology.			**6**	
Topic 2.				
Lecture 2. Primary Milk Processing 1. Transportation and storage. 2. Conditions for milk acceptance at enterprises. 3. Filtration, centrifugal purification of milk. 4. Basic principles of the separation process.	**2**			[1], [2], [3], [4], [5], [6], [7], [8], [10], [12], [13], [14], [15]
Laboratory class 2. Milk separation under laboratory conditions. Determination of fat mass fraction.		**2**		
Independent study: 1. Types of raw milk materials for the dairy industry. 2. Factors influencing the efficiency of separation. **3.** Types of equipment for milk fractionation.			**6**	
Topic 3.				
Lecture 3. Mechanical and Thermal Processing of Dairy Raw Materials 1. Methods and purpose of homogenization. 2. Purpose and essence of membrane methods of dairy raw material processing. 3. Essence of thermal processing of dairy raw materials. 4. Types of thermal processing used in the dairy industry.	**2**			[1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13] [14], [15]

Laboratory class 3. Familiarization with basic temperature regimes in dairy production. Conducting thermal treatment of milk.		**2**		
Independent study: 1. Formation of adsorption shells of fat globules. Changes in milk components during homogenization. 2. Equipment for crushing fat globules. 3. Application of ultrafiltration, electrodialysis, and reverse osmosis in dairy production. 4. Non-traditional methods of milk processing to reduce bacterial contamination. 5. Vacuum processing of dairy raw materials. 6. Cooling and freezing of milk and dairy products.			**6**	
Topic 4.				
Lecture 4. Material Balance in Dairy Production 1. Basic equations of material balance. 2. Standardization in dairy production. **3.** Standardization calculations using graphical methods.	**2**			[1], [2], [3], [4], [5], [6], [7], [8], [10], [12], [13], [14]
Laboratory class 4. Performing standardization calculations.		**2**		
Independent study: 1. Standardization of milk by fat mass fraction in mixtures and changes in SNF (solids-not-fat) content during standardization. **2.** Examples of calculations in the dairy industry.			**6**	
Topic 5.				
Lecture 5. Technology of Drinking Milk and Cream 1. Brief description of the industry producing whole milk products. 2. Technology of drinking milk production. 3. Technology of cream production and its types.	**2**			[1], [2], [3], [4], [5], [6], [8], [11]
Laboratory class 5. Modeling vector and apparatus-technological schemes of drinking milk production.		**2**		
Independent study: 1. Defects of drinking milk and cream, methods of elimination. 2. Modern methods of milk sterilization. 3. Packaging methods for drinking milk.			**6**	
Topic 6.				
Lecture 6. Technology of Fermented Milk Drinks and Sour Cream 1. Classification of fermented milk products. 2. Methods of producing fermented milk	**2**			[1], [2], [3], [4], [5], [6], [8], [9], [10], [11], [12], [13], [14]

products. 3. General technology of fermented milk products. 4. Technology of different types of fermented milk products. **5.** Technology of sour cream production.				
Laboratory class 6. Modeling vector and apparatus-technological schemes for kefir, curdled milk, baked milk, yogurt, sour cream. Practicing the technology.		**2**		
Independent study: 1. Main types of microorganisms in starter cultures for fermented milk products. 2. Dietary and therapeutic properties of fermented milk products. 3. Biochemical foundations of fermented milk product production. **4.** Defects of fermented milk drinks and methods of elimination.			**6**	
Topic 7.				
Lecture 7. Technology of Cottage Cheese and Curd Products 1. Methods of cottage cheese production. 2. Technology of cottage cheese production. 3. General technology of curd product production.	**2**			[1], [2], [3], [4], [5], [6], [8], [14]
Laboratory class 7. Studying the features of cottage cheese production by acid-rennet and acid methods, modeling technological schemes. Practicing the technology.		**2**		
Independent study: 1. Regulatory requirements for cottage cheese. 2. Requirements for equipment used in cottage cheese production. **3.** Specifics of producing different types of cottage cheese.			**6**	
Total for Module 1	**14**	**14**	**42**	
Module 2				
Topic 8.				
Lecture 8. General Technology of Cheese Production 1. Classification of cheeses 2. Requirements for raw materials used in cheese production 3. Main technological operations in the production of rennet cheeses 4. Biochemical processes during cheese ripening	**2**			[3], [4], [5], [6], [8], [9], [10], [11], [12], [13]
Laboratory class. 8. Determination of milk suitability for cheesemaking Laboratory		**4**		
Laboratory class. 9. Modelling vector technological schemes for rennet cheese				

production				
Independent study: 1. Specific features of the technological process of cheese production 2. Starter cultures and enzymes used in the cheese industry 3. Specific aspects of using colorants in cheesemaking.			**4**	
Topic 9.				
Lecture 9. Technologies of Cheeses with High and Low Second-Heating Temperatures 1. Technology of hard rennet cheeses with high second-heating temperature 2. Specific features of hard rennet cheeses with low second-heating temperature 3. Technology of cheeses produced with cheddaring of the curd	**2**			[1], [2], [3], [4], [5], [6], [8], [13]
Laboratory class 10. Technological calculations in cheese production.		**2**		
Laboratory class 11. Practicing the technology of hard cheeses with low second heating temperature		**2**		
Independent study: 1. Changes in curd components during ripening 2. Cheese defects and methods of their prevention **3.** Development of a technological regulation for cheese production			**4**	
Topic 10.				
Lecture 10. Technology of Soft and Brined Cheeses 1. Specific features of soft cheese technology 2. Classification of soft cheeses and technological characteristics of each group 3. General technology of fresh cheeses 4. Technology of brined cheeses	**2**			[4], [5], [6], [8], [9], [10], [11], [12], [13], [14], [15]
Laboratory class 12. Production of Adyghe cheese under laboratory conditions		**2**		
Laboratory class 13. Production of Brynza cheese under laboratory conditions		**2**		
Independent study: 1. Technological processes for producing selected types of brined cheeses 2. Use of whey in brined cheese production **3.** Influence of ripening microflora on the sensory and flavour characteristics of cheeses			**4**	
Topic 11.				
Lecture 11. General Technology of Processed Cheeses 1. Classification of processed cheeses 2. Characteristics of processed cheeses	**2**			[4], [5], [6], [8], [9], [10], [11], [12], [13], [14], [15]

3. Main technological processes in processed cheese production				
Laboratory class 14. Production of processed cheese under laboratory conditions		**2**		
Independent study: 1. Specific features of producing processed cheeses with fillers 2. Requirements for packaging materials for processed cheese 3. Defects of processed cheeses			**4**	
Topic 12.				
Lecture 12. General Principles of Butter Production 1. Classification of butter 2. General technological scheme of butter production by churning 3. Theoretical fundamentals of cream churning 4. General technological scheme of butter production by high-fat cream conversion	**2**			[1], [2], [3], [4], [5], [6], [8], [15]
Laboratory class 15. Modelling vector technological schemes for butter production		**2**		
Laboratory class 16. Production of sweet cream butter under laboratory conditions.		**2**		
Independent study: 1. Technology of butter with fillers 2. Moisture regulation in butter 3. Specific features of regulating fat content in butter 4. Technology of cultured butter produced by churning 5. Structural characteristics of butter produced by different methods			**4**	
Topic 13.				
Lecture 13. Technology of Condensed and Dry Milk Products 1. Essence of milk product preservation 2. Methods of preserving milk and dairy products 3. Requirements for raw materials used in milk concentrates	**2**			[1], [2], [3], [4], [5], [6], [8], [9]
Laboratory class 17. Modelling vector technological schemes for condensed milk products		**4**		
Laboratory class 18. Modelling vector technological schemes for dry milk products				
Independent study: 1. Defects of milk concentrates 2. Technology of sterilized unsweetened condensed milk 3. Specific features of product yield calculations 4. Specific features of instant dairy product technologies 5. Technology of skimmed milk powder			**4**	

Topic 14.				
Lecture 14. Ice Cream Technology 1. Assortment characteristics of ice cream 2. Raw materials for ice cream production 3. General technological scheme of ice cream production	**2**			[1], [2], [3], [4], [5], [6], [8], [10]
Laboratory class 19: Justification of technological parameters and schemes for ice cream production		**2**		
Laboratory class 20: Calculation of working formulations for ice cream under laboratory conditions		**2**		
Independent study: 1. Characteristics and quality of raw materials 2. Composition and properties of ice cream components 3. Packaging and hardening of ice cream 4. Structure of ice cream 5. Ice cream defects			**4**	
Topic 15.				
Lecture 15. Secondary Dairy Raw Materials 1. General information about secondary dairy raw materials 2. Principles of zero-waste dairy production 3. Directions of processing secondary dairy raw materials	2			[1], [2], [3], [4], [5], [6], [8], [15]
Laboratory class 21. Study of physicochemical parameters of skim milk, whey, and buttermilk		**2**		
Laboratory class 22. Modelling vector technological schemes for zero waste production		**2**		
Independent study: 1. Technology of skimmed milk powder 2. Specific features of buttermilk powder and whey powder production 3. Technology of milk replacers 4. Cheese-making butter 5. Milk sugar (lactose) 6. Assortment of whey protein concentrates 7. Production of albumin			**6**	
Total for Module 2	**16**	**30**	**34**	
Total for the semester	**30**	**44**	**76**	

4. TEACHING AND LEARNING METHODS

Learning Outcome (ILO)	**Teaching methods (activities conducted by the lecturer during classes and consultations)**	**Hours**	**Learning methods (types of learning activities performed independently by the student)**	**Hours**
ILO 1 **ILO 2** **ILO 3** **ILO 4** **ILO 5** **ILO 6**	Verbal (Didactic) Teaching Methods • lecture-presentation • narration • explanation • instruction (briefing) • educational dialogue (revision, control-based, reproductive) • academic discussion • illustrating • demonstration • independent observation Practical Teaching Methods • laboratory work • method of analysis • method of comparison • method of concretization Interactive Learning Strategies • group discussion • error analysis and correction • role-playing activities	74	- solving situational tasks in accordance with the topics of laboratory classes; - role-playing activities involving the modelling of practical situations to develop professional skills; - modelling technological schemes; - practising technological operations in the laboratory; - independent student work with educational and methodological literature, including reading, completing individual assignments, and preparing presentations. **Non-formal education**: Courses on the platform: https://osvita.diia.gov.ua/courses/cheesemonger	76

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
Module 1			
1.	Testing in the Moodle system	By the 8th week of the academic semester	**16 points / 16%**
2.	Oral defense of laboratory works		14 points / 14%
Total for Module 1			**30 points / 30%**
Module 2			
3.	Testing in the Moodle system	By the 15th week of the academic semester	25 points / 25%
4	Oral defense of laboratory works		15 points / 15%
Total for Module 2			**40 points / 40%**
Exam			
5.	Testing in the Moodle system	According to the schedule	**10 points / 10%**
6.	Expanded answers to the questions and the task		**20 points / 20%**
Together for the exam			**30 points / 30%**
Total per semester			**100 points / 100%**

5.1.2. Evaluation criteria

Компонент		Unsatisfactory	Satisfactory	Good	Excellent
Module 1 (0-30)	Testing in the Moodle system (Module 1)	**0-9**	**10-24**	**25-29**	**30**
		0-16 points			
		The test includes 16 questions., Each question is worth 1 point			
	Completion of laboratory works	0-14 points			
		Completion of 7 laboratory works Each lab is worth 2 points			
Module 2 (0-40)	Testing in the Moodle system (Module 2)	**0-15**	**15-29**	**30-39**	**40**
		0-25 points			
		The test includes 25 questions., Each question is worth 1 point			
	Completion of laboratory works	0-15 points			
		Completion of 15 laboratory works, Each lab is worth 1 points			
Exam (0-30)	**Exam :**	**<15 points**	**15-19 points**	**20-24 points**	**25-30 points**
	Testing in the Moodle system Test EXAM	0-10 points			
		The test includes 20 questions, Each question is worth 0,5 points			
	Expanded answers to the questions solutions to the task	0-20 points			
		The exam includes 2 questions and a task. Each question is worth 5 points, solutions to the task - 10 points			

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. Zakon Ukrainy “Pro moloko i molochni produkty” (Dokument 1870-IV, chynnyi, potochna redaktsiia — Redaktsiia vid 31.03.2023, pidstava – 2849-IX). (in Ukrainian)
2. DSTU 3662:2018 Moloko syrovyna korov’iacha. Tekhnichni umovy. (in Ukrainian)
3. Tekhnolohii moloka ta molochnykh produktiv [Technology of Milk and Dairy Products] : navchalnyi posibnyk / Ye.V. Demydova, S.O. Huba, Yu.V. Nazarenko – Sumy: SNAU, 2025 r. – 438 s. (in Ukrainian)
4. Huppertz T. Dairy Science and Technology. 3rd ed. Boca Raton : CRC Press, 2025. 702 p.
5. Le Floch-Fouéré C., Schuck P., Tanguy G., Lanotte L., Jeantet R. Drying in the Dairy Industry: From Established Technologies to Advanced Innovations. Boca Raton : CRC Press, 2024. 296 p.
6. Kober A. K. M. H. Milk and Dairy Foods: Nutrition, Processing and Healthy Aging. Boca Raton : CRC Press, 2024. 235 p.
7. Goyal M. R., Veena N., Mishra S. K. Analytical Methods for Milk and Milk Products. Vol. 1–3. Boca Raton : CRC Press, 2024.

Methodological support

8. Tekhnolohii moloka ta molochnykh produktiv [Technology of Milk and Dairy Products]. Kurs lektsii / uklad. S.O. Huba, Yu.V. Nazarenko, T.P. Synenko – Sumy: SNAU, 2025. – 173 s. Protokol No. 4 vid 25.02.2025 r. (in Ukrainian)
9. Tekhnolohii moloka ta molochnykh produktiv [Technology of Milk and Dairy Products]. Metodychni rekomendatsii do vykonannia laboratornykh robit / uklad. S.O. Huba, Yu.V. Nazarenko, T.P. Synenko – Sumy: SNAU, 2025. – 167 s. Protokol No. 4 vid "25" 02 2025 r. (in Ukrainian)
10. Tekhnolohii moloka ta molochnykh produktiv [Technology of Milk and Dairy Products]: Metodychni rekomendatsii do samostiinoi roboty / uklad. S.O. Huba, Yu.V. Nazarenko, T.P. Synenko – Sumy: SNAU, 2025. – 132 s. https://surl.li/bkskbo (in Ukrainian)

Additional literary sources

11. 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
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13. Ryzhkova, T. M., Samilyk, M. M., Bolgova, N. V., Huba, S. O., & Sokolenko, V. V. (2023). IMPROVEMENT OF THE TECHNOLOGY OF CURD MASSES USING VIBURNUM POWDER. Bulletin of Sumy National Agrarian University. The Series: Mechanization and Automation of Production Processes, (3 (49), 69-74. https://doi.org/10.32845/msnau.2022.3.10
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15. Demidova, Y. V., Samilyk, M. M., & Huba, S. O. (2025). RESEARCH OF THE INFLUENCE OF AN ELDERBERRY SUPPLEMENT ON THE STORAGE LIFE OF YOGURT. Bulletin of Sumy National Agrarian University. The Series: Mechanization and Automation of Production Processes, (4 (58), 21-27. https://doi.org/10.32782/msnau.2024.4.3
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18. Foods Editorial Board. (2023). Innovation in dairy processes and products. Foods, 12(4). https://www.mdpi.com/journal/foods
19. Huppertz, T. (2023). Advances in dairy processing technologies. International Dairy Journal, 142, 105–118.
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22. Patel, A. (2024). Precision fermentation in dairy ingredient production. Trends in Food Science & Technology, 142, 104–119.
23. Chen, L., Wang, Y., & Xu, M. (2022). Quality and safety challenges in modern dairy processing. Comprehensive Reviews in Food Science and Food Safety, 21(8), 7123–7145.
24. López, M., & Torres, A. (2023). Technological innovations in cheese manufacturing. Dairy Science & Technology, 103(2), 245–260.
25. Zhang, Y., Li, Q., & Huang, S. (2024). Application of AI and digital twins in dairy processing. Food Engineering Reviews, 16(1), 55–78.