

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

Working Program (Syllabus) of the Educational Component

OK24. Technological Equipment for Meat and Dairy Processing Enterprises

Specialty	181 "Food Technologies"
Educational Program	Food Technologies
Higher Education Level	First (Bachelor's)

Sumy -2026

Developer: Vasyl TISHCHENKO, Ph.D. in Agricultural Sciences, Associate Professor of the Department of Food Technologies and Safety

Reviewed and approved at the meeting of the Department of Food Technologies and Safety	Protocol No. 17 dated May 19, 2026.
	Head of the Department Maryna SAMILYK (підпис) (прізвище, ініціали)

Agreed: Educational Program Guarantor:

Doctor of Philosophy, Associate Professor _____ Olena KOSHEL

Dean of the Faculty where the educational program is implemented:

_____ Nataliia BOLGOVA

Review of the working program provided by:

Candidate of Technical Sciences, Assoc. Prof. _____ Anna HELIKH

Candidate of Technical Sciences, Assoc. Prof. _____ Maryna SAVCHENKO

Methodologist of the Department of Educational Quality, Licensing, and Accreditation:
_____ (_____) (signature) (Full Name)

Registered in the electronic database: Date: _____ 2026

SNAU, 2026 year

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1	Name of the Educational Component (EC)	OK24. Technological Equipment for Meat and Dairy Processing Enterprises					
2	Faculty/Department	Food Technologies / Food Technologies and Safety					
3	EC Status	Mandatory					
4	Program/Specialty (programs) of which the EC is a part (to be completed for mandatory ECs)	"Food Technologies" / 181 "Food Technologies"					
5	NQF Level	First (Bachelor's) level of higher education					
6	Semester and duration of study	3rd year, 6th semester; 2nd year, (15 weeks)					
7	Number of ECTS credits	5 credits					
8	Total hours and their distribution	Contact hours (full-time study)			Contact hours (part-time study)/		
		Lectures	Laboratory sessions	Independent work	Lectures	Laboratory sessions	Independent work
		30	44	76	8	16	126
9	Language of instruction	English					
10	Instructor/Coordinator of the educational component	Vasyl Ivanovych Tyshchenko, Associate Professor, Candidate of Agricultural Sciences					
11	Contact information	tischenko_1958@ukr.net					
12	General description of the educational component	The syllabus for the course OK 24, "Technological Equipment for Meat and Dairy Processing Enterprises," is designed for students majoring in 181 "Food Technologies." Studying this educational component fosters professional knowledge of food industry engineering fundamentals and provides a systematic overview of equipment design and the processes occurring within it. It also covers development trends, operational and maintenance procedures, methods for efficient utilization and energy conservation, and techniques for selecting and calculating both primary and auxiliary equipment.					
13	Objective of the educational component	Developing in future specialists deep theoretical knowledge and practical skills regarding the mechanization of milk and meat processing in food production; the fundamentals of mechanical and thermal product processing; and promising trends in the development of mechanical, commercial-technological, and thermal equipment, as well as their selection, layout, operation, maintenance, and repair.					
14	Prerequisites for studying the	1. The educational component is based on knowledge from the following disciplines: OK8 "Theoretical Foundations of Food					

	educational component; connection with other educational components of the educational program.	Production," OK11 "Automation of Production Processes in Food Enterprises and Public Catering Facilities," and OK15 "Processes and Equipment in Food Production." 2. The educational component serves as a foundation for the study of the following disciplines: OK25 "Design of Food Enterprises," OK31 "Organization of Enterprises in the Sector," and OK33 "Execution and Defense of the Qualification Work."
15	Academic Integrity Policy	Compliance is ensured in accordance with the Code of Academic Integrity and the requirements set forth in the "Regulation on Academic Integrity of Sumy National Agrarian University." (https://snau.edu.ua/viddil-zabezpechennya-yakosti-osviti/zabezpechennya-yakosti-osviti/akademichna-dobrochesnist)
16	Electronic resourceLink to the course materials on the Moodle platform	https://cdn.snau.edu.ua/moodle/course/view.php?id=1436
17	Keywords	Technological processes, equipment, operating rules and modes; compiling equipment and process flow diagrams for food production.

2. LEARNING OUTCOMES OF THE EDUCATIONAL COMPONENT AND THEIR LINK TO PROGRAMME LEARNING OUTCOMES

Learning outcomes for the educational component: Upon completion of the educational component, the student is expected to be able to...	Program learning outcomes that the educational component aims to achieve				How RND is assessed
	PRN 5	PRN 13	PRN 16	PRN 28	
DNR 1 Demonstrate knowledge of the fundamentals of dairy and meat product manufacturing processes, as well as the key structural-mechanical and biochemical transformations of raw material components during processing.	+				Preparation of lecture notes and laboratory work materials; Completion of modular tests; Completion of independent work; Oral defense of laboratory assignments; Final multiple-choice test (modular assessment)
DNR 2Analyze and select modern equipment for the technical re-equipment of enterprises (production workshops); understand its operating principles, operating modes, and usage guidelines; and develop process flow diagrams for food production.		+			
DNR 3. Ensure the maintenance and efficient use of equipment, and implement technical and organizational measures to ensure safe working conditions.			+		
DNR 4. Professionally model technological processes for milk and				+	

meat processing enterprises—with the aim of improving equipment utilization efficiency and extending service life—and perform key calculations.					

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

Topic. List of issues to be addressed within the topic.	Allocation within the total time budget			Recommended reading
	Classroom work		SRS	
	Lecture	Laboratory session		
Module 1				
Topic 1. Introduction. General characteristics of dairy processing equipment. Lecture 1. Introduction. General characteristics of dairy processing equipment. 1. Objectives and structure of the course; relationship with other disciplines. 2. Analysis of the current state of the dairy processing industry in Ukraine.	2		2	[1], [2], [3], [4], [8], [9], [11], [12], [13] [15]
Laboratory Session No. 1 1. Basic requirements for machines and equipment in processing lines. 2. Study of the operational and design parameters and operating principles of the main equipment.		4/2		
Topics for independent study 1. Study of technological and design parameters and the operating principles of auxiliary equipment. 2. Implementation of innovative processing technologies and its impact on the economic performance of enterprises.			6/12	
Topic 2. Processing equipment for the initial treatment of collected milk. Lecture 2. Processing equipment for the initial treatment of collected milk. 1. Equipment for milk transportation and storage. 2. Insulated tanker trucks, refrigerated trucks, and vehicles with isothermal bodies. 3. Milk pipelines and fittings: design, basic calculations, operating rules, and technical specifications.	2			1], [3], [4], [5], [6], [9], [10]

Laboratory Session 2. Processing equipment for the initial treatment of raw milk. 1. Selection of milk pipeline diameters. 2. Pumps for milk and dairy products: centrifugal milk pumps – design, operating principle, key calculations, and operating guidelines. 3. Selection and calculation of centrifugal pumps. 4. Positive-displacement milk pumps – design, operating principle, key calculations, operating guidelines, and pump selection and calculation. 5. Rotary pumps and pumps with reciprocating working elements – design, operating principle, key calculations, and operating guidelines.		4		
Topics for independent study 1. Milk metering equipment: design, operating principle, operating instructions, and technical specifications. 2. Milk clarification equipment and pressure-driven membrane processing equipment for the dairy industry: design, operating principle, key calculations, operating instructions, and technical specifications. 3. Milk cooling equipment: design, operating principle, key calculations, and operating instructions. 4. Milk storage equipment: design, operating principle, key calculations, operating instructions, and technical specifications.			8/12	
Topic 3. Equipment for the mechanical and thermal processing of milk and dairy products. Lecture 3. Equipment for the mechanical and thermal processing of milk and dairy products. 1. Filters, filter presses, and membrane filtration units. 2. Settling vats, separators, centrifuges, homogenizers, and agitators. 3. Equipment for heating, cooling, and thermo-vacuum processing.	2/2			[1], [2], [3], [4], [8], [9], [11], [12], [13] [15]
Laboratory Session No. 3. Equipment for the mechanical and thermal processing of milk and dairy products. 1. Equipment for the thermal processing of milk. Functional diagrams of processing lines and their specifications. 2. Equipment for the production of pasteurized milk, cream, fermented milk beverages, and sour cream. 3. Tank and thermostat methods for producing fermented milk products. 4. Pasteurizers and pasteurization-cooling units. The principle of energy recuperation.		4/2		
Topics for independent study 1. Equipment for starter culture preparation.			8/10	

2. Equipment for dosing, filling, and packaging.				
Topic 4. Equipment for cheese and butter production. Lecture 4. Equipment for cheese and butter production. 1. Functional diagrams of processing lines: purpose, types, characteristics, design, operating principles, and process controls. 2. Cheese salting apparatus and units: design, operating principles, kinematic and schematic diagrams, operating procedures, technical specifications, and key calculations. 3. Equipment for producing butter from high-fat cream.	4/2			[1], [2], [3], [4], [8], [9], [11], [12], [13] [15]
Laboratory Session No. 4. Equipment for cheese and butter production. 1. Equipment for cheese curd production. 2. Equipment for hard cheese processing. 3. Equipment for cottage cheese production. 4. Functional diagrams of processing lines, their specifications, key calculations, operating instructions, and technical characteristics.		4/2		
Topics for independent study 1. High-fat cream separators, standardization vats, metering pumps, and tubular and plate butter-making machines: construction, operating principles, kinematic and schematic diagrams, operating procedures, technical specifications, and key calculations. 2. Equipment for dosing, filling, and packaging cheese and butter.			8/7	
Topic 5. Equipment for the production of dried dairy products, canned dairy products, casein, and ice cream. Lecture 5. Equipment for the production of dried dairy products, canned dairy products, casein, and ice cream. 1. Equipment for drying milk and dairy products. 2. Evaporation equipment. 3. Functional diagrams of processing lines.	4			[1], [2], [3], [4], [8], [9], [11], [12], [13] [15]
Laboratory Session 5. Equipment for the production of dry dairy products, canned dairy products, casein, and ice cream. 1. Auxiliary equipment for drying systems: design, operating principle, kinematic diagram, operating procedures, technical specifications, and basic calculations.		4/2		

2. Calculation and selection of drying systems.				
Topics for independent study 1. Continuous production lines for brick-style ice cream. 2. Production lines for cup ice cream: line composition, equipment design, operating principles, and operating procedures. 3. Batch and continuous ice cream freezers: design, operating principles, process flow diagram, operating procedures, technical specifications, and key calculations.			8/12	
Topic 6. General characteristics of processing equipment in the meat processing industry. Lecture 6. General characteristics of processing equipment in the meat processing industry. 1. General information on machines, mechanisms, devices, and apparatuses used in meat processing plants. 2. Classification of processing equipment and key requirements for it. 3. Transport equipment for meat processing plants. Overhead transport equipment.	2			[1] [2], [4], [5], [8], [9], [10], [12], [14] [15],
Laboratory Session 6. General characteristics of processing equipment in the meat industry. 1. Selection and calculation of processing equipment and parameters for non-conveyor and conveyor overhead track systems at facilities.		4		
Topics for independent study 1. Floor-based transport equipment. 2. Pressure-based transport equipment. 3. Safety rules for the operation of raw material transport equipment.			8/14	
Total for the module	14 /4	22/8	37/61	
Module 2				
Topic 7. Equipment for livestock slaughter and primary carcass processing. Lecture 7. Equipment for livestock slaughter and primary carcass processing. 1. Equipment for livestock slaughter and primary carcass processing for facilities of various capacities.	2 /1			[1], [3], [4], [5], [6], [9], [11], [12],
Laboratory Session 7. Equipment for livestock slaughter and primary carcass processing. 1. Equipment for stunning, slaughtering, bleeding, and blood collection. Selection and calculation. 2. Equipment for animal hide removal. Equipment for de-hiding cattle, small ruminants, and pigs. Selection		6		[1] 1], [2],

and calculation. 3. Equipment for washing, de-bristling, and fleshing hides. Equipment for carcass splitting. Selection and calculation.				[4], [5], [6], [7], [9], [10], [12], [14] [15],
Topics for independent study. 1. Equipment for the slaughter and primary processing of waterfowl and land-based poultry carcasses. Selection and calculation. 2. Equipment for the slaughter and primary processing of rabbit carcasses. Selection and calculation.			7/15	
Topic 8. Equipment for meat mixture preparation and sausage casing filling. Lecture 8. Equipment for meat mixture preparation and sausage casing filling. 1. Meat cutting machines. Factors affecting the quality of meat comminution. 2. Classification, purpose, design, and operating principles of meat comminution machines. Design, operating principles, and operating procedures. 3. Classification of sausage stuffers. Operating principles and design of sausage stuffers.	4/1			[2], [4], [5], [6], [7], [11], [12], [14] [15],
Laboratory Session 8. Equipment for preparing minced meat and filling sausage casings. 1. Calculation of the throughput of sausage stuffers with various extrusion mechanisms. 2. Selection and throughput calculation of raw material comminution equipment (meat grinders, meat cutters, bowl choppers, etc.).		6		
Topics for independent study 1. Molding machines and automatic molding units. 2. Production lines for molding meat products.			7/15	
Topic 9. Equipment for the heat treatment of meat products and semi-finished meat products. Lecture 8. Equipment for the heat treatment of meat products and semi-finished meat products. 1. Classification, purpose, design, and operating principle. 2. Heat transfer media. Heat sources and types of fuel. 3. General design principles of thermal processing equipment. 4. Universal thermal chambers. Combi-ovens. Autoclave sterilizers.	2/2			[2], [4], [5], [6], [7], [11], [12], [14] [15],

Laboratory Session 9. Equipment for the heat treatment of meat products and semi-finished meat products. 1. Universal thermal processing chambers. Combi-ovens. Autoclave sterilizers. 2. Thermal calculations for the equipment. 3. Materials used in the manufacture of thermal processing equipment. 4. General principles for formulating the heat balance equation for the equipment.		6		
Topics for independent study. 1. Electrophysical methods for processing meat and meat products. 2. Calculation of machinery and equipment productivity and energy consumption.			8/15	
Topic 10. Equipment for the cold processing of meat products and semi-finished meat products. Lecture 10. Equipment for the cold processing of meat products and semi-finished meat products. 1. Refrigeration facility equipment. Sources of refrigeration. 2. General principles for formulating heat balance equations for equipment. 3. Layout of chambers for the cold processing and refrigerated storage of meat products.	4			
Laboratory Session 10. Equipment for the cold processing of meat products and semi-finished meat products. 1. General information on refrigeration equipment in processing plants. 2. Structure of a refrigeration unit. 3. Meat chilling and freezing chambers. 4. Conveyor freezer unit. 5. Cryogenic freezing of products.		2		[1] [2], [4], [5], [8], [9], [10], [12], [14] [15],
Topics for independent study 1. Purpose, construction, and operation of refrigeration units. 2. Construction and operating principle of cooling chambers. 3. Construction and operating principle of meat freezing chambers. 4. Construction and operating principle of defrosting chambers.			8/16	
Total for Module 2	14 / 4	22	30/61	
Grand Total	30 / 8	44	76/126	

4. TEACHING AND LEARNING METHODS

Code	Teaching methods	Number of hours	Learning methods	Number of hours
DNR 1. Monitor and process large volumes of scientific and technical information from various sources and use it to solve specific technical and technological design tasks.	Lecture-based instruction Visualization-based lectures (demonstration of information related to lecture topics using multimedia technologies). Presentations covering the lecture material.	30 / 0	Laboratory sessions (completing tasks based on laboratory topics): Completion of calculation and graphic assignments, presentation of results; Solving case-study problems.	44
DNR 2 To design new food processing facilities and modernize existing ones—including specific production sections and workshops—using computer-aided design (CAD) systems and relevant software.				76 / 126
DNR 3. Ability to communicate the results of food facility design to a professional audience and the general public in order to discuss solutions and personal experience in the field of food technology.				
DNR 4. Manage the technological process of raw material processing and possess skills in organizing the work of individual production units of the enterprise.				

5. ASSESSMENT OF THE EDUCATIONAL COMPONENT

5.1. Summative assessment

5.1.1. To assess the expected learning outcomes, the following is provided:

№	Summative assessment methods	Points / Weight in the overall score	Date of preparation
	Module 1 (35 points):		
1.	Intermediate testing "Module 1" (multiple choice test)	35 points / 30%	7 week
2.	Module 2 (35 points): Final Test	35 points / 30%	15 week

5.2. Formative assessment:

5.1.2. Evaluation criteria

Component	Unsatisfactory	Satisfactory	Good	Excellent
	<10 points Answers to only 1 theoretical questions	10-14 points Answers to 2 theoretical questions	15-24 points Answers to the 3 theoretical questions are provided, but there are specific components that require explanation.	25-30 points Complete, comprehensive answers to all theoretical questions.

To assess ongoing learning progress and identify areas for further improvement, the following is provided:

№	Elements of formative assessment	Date of preparation
1	Oral questioning after covering all topics, during laboratory sessions,	during laboratory work.
2	Feedback in the form of a discussion on testing "Module 1"	7 week
3	Feedback in the form of a discussion on testing "Module 2"	15 week

The form of final assessment for students is **an exam**. A student is not permitted to take the final assessment if the number of missed and un-made-up classes during the semester exceeds 20% of the course's total volume. Failure to complete the required tasks (taking module tests and defending the project, or achieving a score of 0–34 points) constitutes grounds for retaking the course. The total score for the educational component is 100 points (based on the grading scale adopted at SNAU).

6. LEARNING RESOURCES (LITERATURE)

Primary sources.

1. Technological Equipment for Meat Processing Enterprises: Textbook. Part 2 / V. V. Sarana [et al.]. – Kyiv: NUBiP of Ukraine, 2024. – 369 p. – ISBN 978-617-8368-03
2. Fundamentals of Calculation and Design of Equipment for Processing and Food Industries: Textbook / TDATU; K. O. Samoychuk, V. S. Boyko, V. O. Oleksiienko [et al.]. – Melitopol: MMD Publishing House, 2021. – 428 p.
3. Nahovska V. O., Hachak Yu. R., Slyvka N. B., Mykhailytska O. R. Canned Dairy Products: Technology and Equipment: Study Guide for Higher Education Institutions. – Lviv: FOP Korpan Borys Ivanovych, 2021. – 292 p.
4. Meat Processing Equipment: Operation and Diagnostics: Textbook / I. H. Babanov, V. V. Malyshev, A. T. Ratushenko, O. I. Babanova. – Kyiv: University "Ukraine", 2021. – 429 p.
5. Design of Meat Industry Enterprises: A Study Guide for Higher Education Students / V.I. Tyshchenko, V.V. Sokolenko, M.M. Samilyk, N.V. Bozhko. Sumy, 2021. 240 p.
6. Tertyshnyi O.O., Pivovarov O.A., Koshulko V.S. Mechanical Processes and Equipment in Food Production: A Study Guide. Dnipro: DDAEU, 2022. 351 p.

7. Pivovarov O.A., Kovalova O.S., Koshulko V.S. Innovative Engineering in Selected Sectors of Food Production / O.A. Pivovarov, O.S. Kovalova, V.S. Koshulko. – Dnipro: FOP Obdymko O.S., 2022. – 407 p. ISBN 978-617-95201-3-6
8. Technological Equipment for Food Production Facilities: Study Guide / V. I. Telychkun et al. Kyiv: Stal, 2023. 634 p. <https://dspace.nuft.edu.ua/handle/123456789/42620>.
9. Tyshchenko V. I. Technological Equipment for Milk and Meat Processing Enterprises: Lecture Notes for Students of the First (Bachelor's) Level of Higher Education Majoring in 181 "Food Technologies" (Protocol No. 5 dated May 16, 2023). Sumy: Sumy National Agrarian University, 2023. 57 p.

Additional sources.

10. Ukraine's Food Industry: Wartime Aspects / V. M. Ivchenko, O. S. Zirnzak, A. L. Soloshonok, O. M. Polonska. Kyiv: Ukhropromproduktivnist Research Institute, 2024. 55 p.
11. Current State of Technical Regulation in the Food Industry Equipment Sector / I. O. Romanchuk et al. Food Resources. 2024. Issue 12(22). P. 150–163. <https://doi.org/10.31073/foodresources2024-22-16>.
12. DSTU EN 1672-1:2022. Food processing machinery. Basic concepts. Part 1. Safety requirements (EN 1672-1:2014, IDT). Effective from 2023-12-31. Official edition. Kyiv: SE "UkrNDNC", 2022. 22 p.
13. Technological Equipment for Food Production: Study Guide / V. I. Telychkun et al. Kyiv: Stal, 2023. 634 p. <https://dspace.nuft.edu.ua/handle/123456789/42620>.
14. Improving the energy and resource efficiency of meat conductive frying processes and equipment: a monograph / V. O. Skrypnyk, N. Yu. Molchanova, A. H. Farisieiev, D. S. Tarasenko. Poltava: Astraia PE, 2024. 274 p. URL: <http://dspace.puet.edu.ua/handle/123456789/13830>.
15. Systems engineering of automatic packaging machines: a monograph / O. M. Havva et al. Kyiv: Stal, 2023. 466 p. URL: <https://dspace.nuft.edu.ua/handle/123456789/41839>.

6.3. Software

1. Set of test assignments.
2. Lecture outline/notes.
3. Course page on the Moodle platform.