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

Work program (syllabus) of the educational component

MC 11 Automation of Food and Restaurant Production Processes

Specialty	181 "Food Technology"
Educational program	"Food Technologies"
Level of higher education	first (bachelor's)

Sumy– 2026

Developer: **Maryna SAVCHENKO**
Candidate of Technical Sciences, Associate Professor of the Nutrition technology Department

Reviewed, approved and approved at the meeting of the Nutrition technology Department	Protocol No. 21 dated 02.06.26
	Head of the Department _____ **Oksana MELNYK** (signature) (surname, initials)

Agreed:

Educational guarantor programs _____ Olena KOSHEL
(signature) (Full name)

Dean of the Faculty, where the educational program is implemented _____ Nataliia BOLHOVA
(signature) (Full name)

Review of the work program (attached): _____ Oksana MELNYK

_____ Nataliia BOLHOVA

Methodist of the Education Quality Department, licensing and accreditation _____ (N. Baranyk)
(signature) (surname)

Registered in the electronic database: date: 18.06 2026.

Information about reviewing the work program (syllabus):

Academic year in which changes are made	Numberannex to the work program with a description of the changes	Changes consideredand approved		
		Dateand the number of the department meeting minutes	Head of the Department	Educational program guarantor

1. GENERAL INFORMATION ABOUTEDUCATIONAL COMPONENT

1.	Full name EC	MC 11. Automation of Food and Restaurant Production Processes			
2.	Status EC	Mandatory			
3.	Educational program	Food technology			
4.	Unit implementing EC	Food technology/nutrition technology			
5.	Level NRC	Level 6			
6.	Semester study	Semester sixth (fourth - for sh.t.). Duration of study - 15 weeks			
7.	Volume EC	5 credits, 150 hours			
	Total volume hours and their distribution (full-time/part-time)	Contact work (classes)			Independent work
		Lectures **30/8**	Practical/ seminar	Laboratory **44/16**	**76/126**
8.	Language of instruction	English			
9.	Limitation	disciplines of economic direction and technological direction			
10.	Communication with other components	"Food Machinery and Equipment", "Innovative engineering", "Processes and devices for food production", "Equipment for restaurant establishments"			
11.	The purpose of education component	Assimilation scientific and technological foundations of automation and automation of technological processes in food production.			
12.	Prerequisites for study	Educational component is based on the previous study of the disciplines "Food Machinery and Equipment", "Processes and devices of food production", "Equipment of restaurant establishments"			
13.	Academic Integrity Policy	When detected the fact of cheating during the exam - the student's work is canceled and the exam is retaken. Code of Academic Integrity (http://surl.li/khyd)			
14.	Keywords	Automated systems, control and management, regulation, technological parameters, state instrument system, food industry, control facility, SCADA, PLC			
15.	Course number on the Moodle platform	Moodle link: https://cdn.snau.edu.ua/moodle/course/view.php?id=6384 Savchenko Maryna Yuriivna			

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

Learning outcomes for EC: After studying educational component the student is expected to be able to…"	Software learning outcomes that the MC aims to achieve (indicate the number according to the numbering given in the EP)[1]					The result of learning the discipline is evaluated
	PLO 3	PLO 4	PLO 7	PLO 12	PLO 14	
DLO1. Know automatic and automated systems, their types and classes, carry out metrological work on the calibration of automation system devices. Understand the naturalness of devices and automated systems.	x					Completion and defense of laboratory work, test paper / certificate of completion of non-formal education courses, exam
DLO2. Apply basic measurements devices, conduct their metrological evaluation, and determine all necessary technological parameters using these devices.		x				
DLO3. Use microprocessor controllers when developing automation schemes, prove the need to use a particular automation device.			x			
DLO4. Apply automatic control systems, elements of analysis and calculation of automatic control systems, methods and techniques of their application in the food industry and restaurant establishments.				x		
DLO5. Use technical means of microprocessor technology and special computer software to carry out technical measures to organize safe working conditions during production activities.					x	

[1]Must comply with the Matrix of ensuring program learning outcomes by the relevant components of the educational program, indicated for mandatory educational components of EPP I and II levels, for all (mandatory and selective EC) EPP III

3. CONTENTEDUCATIONAL COMPONENT (COURSE PROGRAM)

Topic. List issues that will be considered within the topic	Distribution within the overall time budget			Recommended literature[2]
	Auditorium work		Independence work	
	Lc	Lb		
Topic 1. Scientific and technological foundations of automation. The value of automation to increase the efficiency of technological processes in the food industry. Basic concepts and definitions of automation. Control systems and their interconnection. State system of instruments and automation equipment. Classification of control and measuring instruments. General information about measurements. Classification of measurements. Principles and methods of measuring physical quantities. Measuring instruments. Errors of measuring instruments.	4/2	4/2	10/12	[1-7]
Topic 2. Temperature measurement. Temperature measurement sensors: expansion thermometers, manometric thermometers, radiation pyrometers. resistance temperature transducers (resistance thermometers), thermoelectric thermometers (thermocouples). Digital transducers. Digital instruments. Liquid thermometers. Gas thermometers. Optical thermometers. Infrared thermometers. Manometric thermometers. Temperature measurement methods and types of temperature scales. Classification of temperature measuring devices. Mercury thermometers. Dilatometric thermometers. Calibration tables.	2/2	12/2	10/12	[7-17,19-21]
Topic 3. Pressure measuring devices. Basic Concept. Liquid manometers. Strain gauges. Electric manometers. Auxiliary devices for pressure measurement. General classification. Strain gauges. Electric gauges. Vacuum gauges. Manovacuum gauges. Inductive and capacitive pressure transducers. Installation and maintenance of strain gauges. Rules for measuring with strain gauges pressure gauges. Deformation direct conversion pressure transducers.	2/2	2/2	10/12	[7,18,22-25]

[2]Specific source from basic or additionally recommended literature

Topic 4. Measurement of flow, quantity of substance and level. General position. Speed and volume meters. Variable pressure differential flowmeters. Constant pressure differential flowmeters. Variable level flowmeters (slot flowmeters). Induction (electromagnetic). Flowmeters. Basic concepts. Float level meters. Hydrostatic level meters. Capacitive level meters. Conductometric level indicators. Units and methods of measuring flow and quantity of substance. Flowmeters with a narrowing device. Anemometers. Thermal flowmeters. Ultrasonic flowmeters. Force flowmeters. Weighing method of measuring flow of bulk media. General information about liquid level measurement. Visual means of level measurement. Buoy means of level measurement. Acoustic means of level measurement. Radioisotope level meters.	4/2	2/2	6/16	[7,26-36]
Topic 5. Automatic control systems and automatic regulators of technological parameters. General provisions and definitions. Classification of ASR. Classification of ASR by the principle of regulation. Functional structure of a closed ASR. Transmission ACP function. Laplace transform. Basic links of linear ACPs. Connection of links and algorithmic structural diagrams of automatic systems. Transient processes in a closed ACP. Control quality indicators. Executive and regulatory bodies of ACPs. Representation of ACP elements by links. Parametric scheme OU (OU). Operating modes and mathematical models of OU. Static model and static characteristic of OU. Dynamic model and dynamic characteristics of OU. Dynamic characteristics of control objects. Block diagram of an automatic regulator. Classification of regulators. Regulators continuous action and their characteristics. Discrete regulators and their characteristics. Dynamic properties of the relay-pulse regulator.	4	2/2	11/16	[1-7,35,37]
Topic 6. Methods and instruments for determining the physical properties of a substance	-	2	8/16	[7,26-36]

Density measurement liquids. Liquid viscosity measurement. Humidity measurement. Solution concentration measurement. pH measurement. Automatic gas analyzers. Classification of analyzers. Conductometric analyzers. Potentiometric method.				
Topic 7. Microprocessor controllers (MPC). General information about IPC. Principles of constructing IPC. Modern IPCs and their scope. Project-based layout consideration of programmable logic controllers and microprocessor controllers. Implementation of regulators in microprocessor automation systems.	2	6/2	5/14	[1-7,37]
Topic 8. Automated systems for controlling technological processes in food production. Functional structures of ACS TP. Types of ACS TP support. Integrated (central)and distributed ACS. Automated work places technologist-operator. Functional and algorithmic structures of control systems. Software for process control systems.	4	2/2	10/14	[1-7,35,37]
Topic 9. Automated systems restaurant business management. Trends in the development of restaurants in the world. Main goaland tasks of using automation systems in a restaurant. Purpose and types of restaurant automation systems restaurant economy. Characteristics of individual component modules of the D2 System automation system. Functionality restaurant software Poster. Automated systems management restaurant businesses. Electronic menu and QR menu. POS systems for restaurants: Shopify POS, Square for restaurants, TouchBistro, Lightspeed Restaurants, MYR POS, Toast POS. Best POS systems for restaurants: Shopify POS, Square for restaurants, TouchBistro, Lightspeed Restaurants, MYR POS, Toast POS.	8	12/2	6/14	[1-7,35,37]
Total	**30/8**	**44/16**	**76/126**	

4. METHODSTEACHING AND LEARNING

DLO	**Teaching methods** (work, which will be conducted by the teacher during classroom lessons, consultations)	**Number of hours**	**Teaching methods**(which types of learning activities must be completed by the student independently)	Number hours
DLO1. Know automatic and automated systems, their types and classes, conduct metrological work on the calibration of automation system devices. Understand the naturalness of devices and means of automated systems.	Explanation of types and classes of automatic systems. Demonstration of the method of calibration of devices on a laboratory stand with an explanation of the physical nature of their operation.	14/6	Performing tasks on classifying systems by types and classes. Analyzing the principle of operation of devices (naturalness) according to technical documentation.	16/24
DLO2. Apply basic measuring instruments, conduct their metrological evaluation, and use these instruments to determine all necessary technological parameters.	Demonstration of the operation of measuring instruments (temperature, pressure, flow, level) on operating equipment. Explanation of the metrological assessment methodology (determination of accuracy class, total error).	18/6	Independent measurement of technological parameters using specified instruments. Calculation of metrological characteristics (error, variation).	30/24
DLO3. Use microprocessor controllers when developing automation schemes, and prove the need to use a particular automation device.	Work on developing an automation scheme with the selection of a microprocessor controller and justification of each device.	14/6	Independent development of an automation scheme for a given technological process (according to options). Selection of the type of microprocessor controller. Preparation of a written justification for the choice of each automation device.	15/24

DLO4. Apply automatic control systems, elements of analysis and calculation of automatic control systems, methods and techniques of their application in the food industry and restaurant establishments.	Use of technical teaching aids, use of educational and control tests, use of reference lecture notes	14	Independent working on topics as a whole or individual issues.	5/30
DLO5. Use technical microprocessor technology and special computer software for carrying out technical measures to organize safe working conditions during production activities.	Use of technical teaching aids, use of educational and control tests, use of reference lecture notes	14/6	Independent working on topics as a whole or individual issues.	10/24

5. EVALUATIONBY EDUCATIONAL COMPONENT

5.1. Summative assessment

5.1.1. For assessment of expected learning outcomes is provided

No.	Summative methods evaluation	Points/ Percentage in the overall score	Date of compilation
	Module I		
1.	Written test paper on theoretical material/ certificate of completion of non-formal education courses	*10 points / 10%*	In the sixth week
2.	Performing and defending laboratory work	*25 points / 25%*	Until the next lab session
	Module II		
3.	Written test on theoretical material/certificate of completion of non-formal education courses	*10 points / 10%*	At the fourteenth week
4.	Performing and defending laboratory work	*25 points / 25%*	Until the next lab session
5.	Exam– written response to the ticket	*30 points / 30%*	

5.1.2 Evaluation criteria

Component[1]	**Unsatisfactorily**	**Satisfactorily**	**Good**	**Perfectly**[2]
Written test on theoretical material	*<2-4 points*	*5-6*points	*7-8 points*	*9-10 points*
	Task requirements not met	*Answers to all questions are provided, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question.*	*The answers to all questions are given*	*Answers to all questions are provided, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed.*
Performing and defending laboratory work	*<12 points*	*13-17*points	*18-23 points*	*24-25 points*
	Task requirements not met	*Answers to all questions are provided, but individual components of the answers are missing or insufficiently disclosed, there is no analysis of other approaches to the question.*	*The answers to all questions are given*	*Answers to all questions are provided, creativity and thoughtfulness are demonstrated, and one's own solution to the problem is proposed.*

[1]Specify the summative assessment component
[2]Indicate the distribution of points and the criteria that determine the level of assessment

Exam	*<17 points*	*18-23 points*	*24-29 points*	*30 points*
	Task requirements not met	*Most requirements are met, but individual components are missing or insufficiently disclosed, there is no analysis of other approaches to the issue*	*All task requirements met*	*All task requirements have been met, and the solution and approach have been demonstrated.*

[3]Specify the summative assessment component

[4]Indicate the distribution of points and the criteria that determine the level of assessment

5.1. Formative assessment:

For assessing current progress in learning and understanding areas for further improvement is provided

No.	***Elements formative assessment***	***Date***
1.	*Written survey after studying topics 1, 2-6, 7-9*	*Week 3, Week 7, Week 14*
2.	*Oral feedback from the teacher while working on the test*	*11 weeks*

Self-assessment can be used as an element of summative assessment or formative assessment.

6. LEARNING RESOURCES (LITERATURE)

Main sources

1. Savchenko M.Yu. Automation of production processes of food enterprises and food processing enterprises: lecture notes for students of the 3rd year and 2nd year of the course of specialty G13 of the OPP "Food Technologies" of full-time and part-time forms of obtaining a higher education degree "bachelor". – Sumy, 2025. – 137 p.
2. Savchenko M.Yu. Automation of production processes of food enterprises and food processing enterprises: methodological recommendations for performing laboratory work – Sumy, 2025. – 100 p.
3. Savchenko M.Yu. Automation of production processes of food enterprises and food processing enterprises: methodological guidelines for independent work - Sumy, 2025. - 147 p.
4. Groover MP Automation, Production Systems, and Computer-Integrated Manufacturing. – 5th ed. - Pearson, 2023. - 816 p. - ISBN: 978-0137905676.
5. Song J., Kang H., Lee S. AI in food industry automation: Applications and challenges // Frontiers in Sustainable Food Systems. - 2025. - Vol. 9. – 1345678. – DOI: 10.3389/fsufs.2025.1345678.
6. Wevolver. 6 Types of automation: A comprehensive guide for engineers. – 2024. – URL: https://www.wevolver.com/article/6-types-of-automation-a-comprehensive-guide-for-engineers
7. Omega Engineering. A guide to industrial temperature measurement: Thermocouples, RTDs, and infrared systems. – 2023. – URL: https://www.omega.com/en-us/resources/temperature-measurement-guide
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15. Radchuk O.V. & Savchenko-Pererva M.Yu. (2023). Automated control system for apparatus for extracting plant raw materials with subcritical fluid. Scientific Bulletin of the Tavria State Agrotechnological University. – Melitopol: TSATU, 2023. – Issue 13, Volume 2, P.34-43. DOI: 10.31388/2220-8674-2023-2-34

Additional sources

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Software

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